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None

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None

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None

May 21, 2018

S. See Secretary-Parliamentarian
Riverside Division of the Academic Senate
MEETING
The Riverside Division of the Academic Senate met on Tuesday, February 27, 2018 at 2:10 p.m. in the Genomics Auditorium Room 1102A. Chair D. Rodriguez presided. The meeting was attended by 53 members of the Riverside Division of the Academic Senate.

MINUTES
The Minutes of the Regular Meeting of December 5, 2017 were approved as presented.

ANNOUNCEMENTS BY THE PRESIDENT
There were no announcements by the President.

ANNOUNCEMENTS BY THE CHANCELLOR AT RIVERSIDE
Chancellor Kim A. Wilcox addressed the Division.

Chancellor Wilcox began his remarks by acknowledging UCR’s newly hired Vice Chancellor for Planning and Budget, Gerry Bomotti and the Dean of University Extension, Kevin Vaughn. Both were unable to attend today’s meeting. He also recognized the respective search committees.

Chancellor Wilcox noted the Governor has recommended a 3% increase in the State budget for the UC and the Regents talked about a 2.5% increase in tuition. An agreement was made to hold off on a vote on the tuition increase until there is an opportunity for the University and the students of the university to jointly lobby the state to make up the difference.

UC President Napolitano hired Huron Consulting Group to advise on the operations of the Office of the President. Several recommendations were given in the report and that report has been made public. In addition, the Regents hired Sjoberg Evashen Consulting, Inc. to look at the relationship of the campuses to the President’s office.

Chancellor Wilcox gave an update on the Living the Promise Campaign. UCR has raised $194 million of its $300 million goal with $30 million earned just last year. He also noted that the campus will be starting another mini promotional campaign with targeted placements primarily in the LA Times to increase our enrollment of students from the Los Angeles area.

With advice from the Senate and several other campus committees, employee performance evaluation forms will be changing this year to streamline the performance evaluation process.

Chancellor Wilcox noted that his fifth-year review will be coming up in the Spring quarter. Since becoming Chancellor, long-term funding has increased along with the growth of faculty on campus. Facilities has and will always be a topic of discussion. Several classrooms were renovated last year but much more still needs to be done. He noted that UCR has not had a Chancellor review in many years. This is an opportunity for UCR to look at its own processes, strategies and goals.

Chancellor Wilcox then took questions from the floor.
A member referenced a comment made in the Chancellor’s Town Hall meeting last year: “UCR was sending more money into the system than they were getting back,” and asked how UCR stands now. Chancellor Wilcox responded and noted that UCR benefits significantly from financial aid, given that. UCR has more PELL-eligible and first-generation students.

ANNOUNCEMENTS BY THE VICE CHANCELLORS
Provost and Executive Vice Chancellor (PEVC) Cindy Larive addressed the Division.

PEVC Larive noted there are two searches underway: Dean of the Bourns College of Engineering (4 candidates will be coming to campus) Vice Provost of Undergraduate Education (national search).

PEVC Larive noted one way to raise UCR’s national profile is to return to an effort to highlight UCR’s research strengths. Faculty can do this by nominating their peers for prestigious awards. Vice Provost Ameae Walker is in the process of selecting faculty to help advise in the process of selecting awards and figuring out how to get faculty nominated for these awards.

PEVC Larive has asked Professor Umar Mohideen to lead a short-term task force on online and hybrid instruction. She noted the Senate also has a special review committee to look at online and hybrid instruction that will differ from the task force led by Professor Mohideen. She would like the task force to give tactical advice. For example: How do we as an institution prioritize courses that should be hybrid or online? And how do we best support faculty through instructional design and other technology assistance in developing courses? A report is due to PEVC Larive by June. Part of the reason this report is needed is tied to the plan of hiring a new Vice Provost & Dean for Undergraduate Education and a Director for the Center of Teaching and Learning.

PEVC Larive appreciated the detailed feedback received on the response to the white paper on faculty hiring. She is currently reviewing the feedback with the Deans and will report back to the faculty within the next couple of months.

PEVC Larive reminded everyone about the Provost Town Hall meeting on Tuesday, March 6, 2018 at noon in HUB 302.

PEVC Larive then took questions from the floor.

A member noted that a Professor from the Department of Dance received a prestigious award last Fall and University Communications was notified but it is not being publicized as it should. PEVC Larive asked for the information to be sent directly to her so she can help get the news promoted. She also noted that UCR hired a new Assistant Vice Chancellor of University Communications, Johnny Cruz, who begins on March 1, 2018 and that most or all of the Colleges and Schools on campus have hired their own communications director which should help. She recognizes that UCR has to do better with getting the word out and promoting the great things that the faculty are doing. UCR can do this by using flyers, brochures and the website. The campus website is currently being re-designed and there will be a special website dedicated to highlighting faculty awards. Another member noted that it is also important to highlight the student achievements. A third member noted that no news, events, or recognition of Black History Month could be found on the UCR website.

ANNOUNCEMENTS BY THE DEANS OR OTHER EXECUTIVE OFFICERS
There were no announcements by the Deans.
Chair Rodriguez called upon the Secretary Parliamentarian to provide the report on election results. The Secretary Parliamentarian informed the Division that the results of the 2017-2018 recent elections for the Division, Colleges and Schools could be found on page 7 of the meeting agenda.

There were positions that had no more nominees than vacancies and there were no nominations received from the floor. The Division authorized the Secretary-Parliamentarian to cast a single ballot for all open positions.

ANNOUNCEMENTS BY THE CHAIR
Chair Rodriguez noted the following:

- The Committee on Research has circulated a survey with regards to research space, creative, and scholarship work space. Chair Rodriguez encouraged faculty to complete this brief, but substantive survey.
- The documents and directives have been received from the Systemwide Senate Executive Office and UC Office of the President for the Chancellor’s five-year stewardship review. An email will be sent to the Division with an overview and timeframe.
- There is an upcoming 150th anniversary symposium in celebration of the UC Academic Senate to be held in the Fall. This will be held in Oakland, date and time to be announced. Additional information may be requested by contacting senate150@ucop.edu.
- UCR’s new Vice Chancellor for Planning and Budget, Gerry Bomotti, as well as the Dean of University Extension, Kevin Vaughn were welcomed in absentia by Chair Rodriguez.

SPECIAL ORDERS
There were no items for the consent calendar.

The degree reports and regular reports of standing committees and faculties were received and placed on file.

REPORT OF THE REPRESENTATIVE TO THE ASSEMBLY
Riverside Assembly Representative Professor Thomas Cogswell provided the Division with a written report from the Assembly meeting on December 13, 2017. This report can be found on page 34 of the full agenda. There were no questions from the Division.

REPORTS OF SPECIAL COMMITTEES
There were no reports of special committees.

REPORTS OF STANDING COMMITTEES AND FACULTIES
Professor Ward Beyermann, Chair of the CNAS Executive Committee, introduced and moved for adoption of the proposed changes to Regulations NR3.4.5 and NR3.4.6, found on page 35 of the full agenda. The motion was approved unanimously.

PETITIONS OF STUDENTS
There were no petitions from the students.

UNFINISHED BUSINESS
There was no unfinished business.

UNIVERSITY AND FACULTY WELFARE
A. Facilities, Faculty and the Future discussion: Chair Rodriguez noted that there have been several campus-wide discussions among faculty, staff, students, committees and various levels of campus administration regarding the immediate long-term future of the UCR campus. There are shared collective concerns regarding teaching and infrastructure.

Chair Rodriguez began the discussion with reading a statement from Assistant Professor of Climate Change and Sustainability, Francesca Hopkins, who was unable to attend today’s meeting. She wrote about campus parking concerns and how faculty must compete with students/staff. Given the walk from her parking lot and the CDC (where she drops off her child) are equal, she parks her car at the CDC and walks, which has become more unsafe and longer since the closing of the student family housing access. It seems strange that new faculty would not have higher priority parking since most will also have young children, need to spend time on campus and need to attend on and off campus research meetings.

Professor Anthea Kraut gave an update on the Department of Dance and although they have seen some improvements in some areas (the Arts planters, which were empty for 5 years, finally have been filled), there are continuing and worse neglect in others. The exterior of the building is cracked and peeling and has several water stains. Dance studios are not cleaned regularly and are full of dust and debris. The bathrooms are not well maintained, and some refer to them as “gas station” restrooms. Lack of space is also an issue.

ASUCR President, Aram Ayra, noted that the facilities affect students’ educational learning/experience. Classrooms need to be repaired: tiles are ripping off the ceilings, there are desks with no tops, and students sitting on the floor while taking tests. He also noted that ASUCR sent out a parking/transportation survey to students. Three questions were asked: Are you satisfied with the current amount of parking on campus? 90.2% of those polled, said no. Have parking issues caused you to be late to class, work etc.? 85.8% of those polled, said yes. Would a parking structure alleviate parking issues on campus? 94.6% of those polled, said yes. Students drive around parking lots for 20-30 minutes looking for parking, sometimes even having to follow and ask other students to drive them to their cars to obtain their parking spots. He also noted that some buildings are not up to ADA compliance which affects students with disabilities.

Professor Kim Hammond, Department of Evolution, Ecology, and Organismal Biology (EEOB), discussed the relationship between projects (University projects, Natural Reserve System projects, faculty renovations, PI projects, etc.). She noted that project pricing increases throughout the process and more project collaboration is needed.

Professor Kate Sweeny, Department of Psychology, noted that the department faces space needs and limitations. Although the Psychology building is only ten years old, they have outgrown the building with the growth in faculty. There is no more office space and lab spaces are having to be shared. This will hinder the strategic plans and goals for hiring more faculty.

Professor Patty Springer, Department of Botany & Plant Sciences, noted that since July 2015, EEOB has hired nine faculty. Four of those hired had moderate delays in getting functional lab space (3-6 months), three had significant delays (6-12 months) and two had massive delays (more than 18 months) and have had disastrous situations with major renovations including having to go through 5 different project directors from Architects &Engineers (A&E). Each time having to start over while costs escalate.
will be renovated and faculty will be displaced from their offices for about 6 months and
campus doesn’t have a plan in place for them. The new zone management service is
working well but UCR is still very behind.

Professor Thomas Cogswell, Department of History, discussed College Building South
which is the one of the oldest buildings on campus. It is in a state of disrepair.

Professor Dan Jeske, Department of Statistics and Chair of the Committee on Faculty
Welfare, discussed the perceived unevenness across the campus of how buildings are
maintained. All are entitled to a safe and hygienic workplace and should be proud of the
workplace. Another issue is the concern of increased use of skateboards on campus and
the hazards, destruction of property and personal risk when used inappropriately.

Professor Juliann Allison, Department of Gender and Sexuality Studies, dealt with the
same parking issues twenty years ago. She noted that she used to meet her Teaching
Assistant in the parking lot, so the TA could park her car, just so she could make it to class
on time. In terms of facilities, there is a sewage scent in the Interdisciplinary building along
with leaky faucets and faculty who refuse to teach in some buildings/classrooms so there
is a constant scheduling and rescheduling issue.

Assistant Professor Boerge Hemmerling, Department of Physics and Astronomy, was
hired in October 2017 and the Chair of Physics started working with Architects and
Engineers in May 2017 for his lab space. Several quotes came in from A&E ranging from
$180K to $300K. After several revisions and removing some items, the bid came to $135K.
Because these amounts seemed excessive, Boerge compared this to a full lab renovation
at UC Berkeley, done by an outside source, and the cost was only $44K. After reviewing
these quotes with A&E and appealing to Vice Chancellor Pazzani, it was determined that
this project could be done by Facilities instead of A&E as it was determined to be less than
$50K. And although they have been told this is a priority, the renovation has not yet begun.

Professor Richard Seto, Department of Physics and Astronomy and Chair of the
Committee on Physical Resources Planning, discussed the systemic problems and UCR’s
need for a change in culture. There are many entities involved: Facilities, A&E,
Environmental Health & Safety, Risk Management, the Deans, and Procurement Services.
Costing is also an issue. For one to cost things properly, one must have expertise in
Engineering, safety, and the needs of the PI and that’s not always available.

Professor Kurt Schwabe, School of Public Policy, discussed the shortage of space for
faculty and students and there is a critical need for student advising space to include TA
space. Currently, the TA’s and lecturers are using a faculty office that’s only available
through June. The Master of Public Policy graduate students have requested a lounge as
they have no space in the School of Public Policy and it’s important to establish a sense
of community within the School of Public Policy.

Professor Jose Wudka, Department of Physics and Astronomy, shared concerns
regarding working with campus service units. A racoon entered the Physics building
through a hole and died. Rats later found the racoon and the flies found the rats. UCR
campus service units were called to remove the dead racoon in which there was no
response. UCR’s infrastructure is crumbling. Some colleagues mentioned they were going
to call OSHA and the Union to come declare this as an unsafe working environment.
Because of this, Campus Counsel was called and only through him did they receive a
response. The raccoon was removed, and the surface was wiped down. Once removed, the hole was blocked (not repaired) and two more cadavers were later found. Prior to this, several emails and various visits occurred with no answers and they were ignored by campus service units. Professor Wudka expressed a dire need to greater accountability when responsible units do not address severe issues timely and appropriately.

Chancellor Wilcox responded to the discussion:
There has been a legacy of bad construction on campus. There is currently no standardization for building on campus. Chancellor Wilcox also noted that anyone is empowered to hire an outside contractor to do the work. However, a member noted that currently you must go through A&E to hire an outside contractor.

Chancellor Wilcox noted that VCPB Bomotti has walked through buildings and notes that better equipment is needed to clean the hallways, bathrooms, etc. VCPB Bomotti spoke to the janitorial staff and asked what they needed to do their jobs. Per Chancellor Wilcox, VCPB Bomotti also noted that all light bulbs on campus will be replaced with LED bulbs which will save the campus thousands of dollars each year.

PEVC Larive suggested implementing a comment box or a link on the webpage for anyone to anonymously leave suggestions and or comments.

B. Staff Assembly President, Julie Salgado and Staff Assembly Vice President, Ross French addressed the Division and delivered a power point presentation to the Division. Their goal this year is to strengthen the relationship between faculty, staff and students. Staff Assembly is a volunteer organization made up of staff on campus and helps promote the interests of staff. The core values are RED: Recognition, Engagement and Development. Faculty, staff and students have the same vested interest in the success of this University with goals of educating students, research, and promoting intelligence. A staff engagement survey was conducted the summer of 2017. Full survey results, PowerPoint presentations and video of the January follow up forum can be found on the staff assembly website https://staffassembly.ucr.edu.

NEW BUSINESS

There being no further business, the meeting was adjourned at 4:03 p.m.

ATTEST:

S. See, Secretary-Parliamentarian
Riverside Division of the Academic Senate

Leondra Jacobs
Recording Secretary
2017-2018 CHANCELLOR’S AWARD FOR EXCELLENCE IN UNDERGRADUATE RESEARCH AND CREATIVE ACHIEVEMENT

Faculty Recipient:

Teaching Professor Jack Eichler, Chemistry:

Since 2010, Dr. Jack Eichler has mentored 11 undergraduate research students, and now has 6 peer reviewed publications all with UCR undergraduate first authors and co-authors. These publications have involved 16 different undergraduate students, some of whom are authors on multiple papers. As Prof. Zhang notes, “Also remarkably, his papers often included many different undergraduate co-authors. These papers have been published in highly recognized journals such as Inorganic Chemistry and Journal of Inorganic Biochemistry...his students are deeply involved in writing and revising these papers, as Dr. Eichler makes an attempt to give his students an authentic research experience that closely mimics what they might experience as a graduate student.” He has mentored undergraduate research students by himself, with no graduate students or postdocs to assist. Additionally (excerpted from Prof. Zhang’s letter): “Dr. Eichler has encouraged his students to present their research at local, regional, and national symposia (including SCCUR, SCALACS Regional Undergraduate Chemistry Research Symposium, UCR Undergraduate Research Symposium, and ACS National Meetings). The 11 different UCR undergraduates he has mentored have made a total of 30 presentations at these conferences...Dr. Eichler has also organized the Fall 2016 Southern California Conferences in Undergraduate Research (SCCUR) conference here at UCR (which helped raise $10-15K for undergraduate research fellowships at UCR). Students have won numerous awards under Dr. Eichler’s guidance, including presentation awards at conference symposia, undergraduate research fellowships, and honors designations for work on undergraduate research theses...Eight students, a majority of the undergraduate researchers Dr. Eichler was the PI on an external grant from the U.S. Department of Agriculture, and this funding was used to create a freshman learning community that integrated issues of environmental science and sustainability into his general chemistry courses, as well as a summer research experience for rising sophomores. In Summer 2013 and 2014 Dr. Eichler’s learning community program supported total 18 undergraduate researchers, and these students conducted research for 10 weeks with a variety of environmental science and agricultural science faculty at UCR. Dr. Eichler is also a co-PI on an NSF S-STEM grant that will support for training and preparing undergraduate students for research.”
2017-2018 CHANCELLOR’S AWARD FOR EXCELLENCE IN UNDERGRADUATE RESEARCH AND CREATIVE ACHIEVEMENT

Faculty Recipient:

Teaching Professor Kawai Tam, Chemical & Environmental Engineering:

Dr. Tam is currently a Lecturer with Security of Employment and Associate Teaching Professor. Since 2005, she has mentored more than 220 undergraduate students, resulting in first place awards in 10 competitions since 2011, and 6 since 2015. Her undergraduate student teams have earned an additional 6 second-place awards since 2011, with another 3 EPA Honorable Mention Awards since 2013. These teams have won 12 EPA grants since 2011 for student design competitions in addition to grants from the Southern California World Water Forum, UCR, and the American Public Power Association (APPA). As her department chair, Prof. Wyman, notes, Dr. Tam has proven herself to be “invaluable to undergraduate research in the UCR Department of Chemical and Environmental Engineering (CEE) and the Bourns College of Engineering and richly deserves recognition for her exceptional fostering of undergraduate research and creative activities through this award. Dr. Tam in the UCR Chemical and Environmental Engineering Department. Since joining UCR, she has devised programs to enhance undergraduate training in research conduct, presentations and writing, and professional development. Dr. Tam’s mentorship provides excellent preparation for the transition of undergraduates to future employment. Through her approach, large numbers of undergraduate teams develop research plans that result in highly successful projects that greatly broaden research experiences for undergraduate students in the College of Engineering. In particular, students work in groups on research topics directed toward extramural design competitions with support for needed supplies and equipment. The research projects are tailored to fit within the curriculum requirements of each student’s home department and may also be applied toward design requirements of CEE’s Senior Design Course... Dr. Kawai Tam exemplifies an outstanding record of mentoring undergraduate research that gives her students unique, invaluable experiences in independent planning and execution of research projects.”
SECRETARY-PARLIAMENTARIAN
REPORT TO THE RIVERSIDE DIVISION
MAY 29, 2018

2018-2019 RESULTS FROM THE CALL FOR NOMINATIONS

To be received and placed on file:

1. RIVERSIDE DIVISION

A call for Nominations was issued for the following positions:

Chair of the Division (2-year term)
One valid nomination received:
- Dylan Rodriguez, Department of Media & Cultural Studies

Vice Chair of the Division (1-year term)
One valid nomination received:
- John Cioffi, Department of Political Science

Representative to the Assembly (2-year term)
Two valid nominations received:
- Thomas Cogswell, Department of History
- Peter Chung, SOBA-Professor of Finance

An election was held, and the results of the ballot are as follows:
- Thomas Cogswell 141 votes*
- Peter Chung 48 votes

*Professor Thomas Cogswell has been elected to the position of Representative to the Assembly.

Committee on Committees (3-year terms)

One representative from BCoE
Two valid nominations received:
- Michalis Faloutsos, Department of Computer Science and Engineering
- Nosang Myung, Department of Chemical and Environmental Engineering

An election was held, and the results of the ballot are as follows:
- Michalis Faloutsos 25 votes*
- Nosang Myung 20 votes

*Professor Michalis Faloutsos has been elected to the position of member to the Committee on Committees.

Two representatives from CHASS
Two valid nominations received:
- David Lloyd, Department of English
- Jennifer Najera, Department of Ethnic Studies
2. **BOURNS COLLEGE OF ENGINEERING**

A call for Nominations was issued for the following positions:

- **One Member, BCoE Executive Committee** (3-year term)
  Elected from the Department of Chemical and Environmental Engineering

  One valid nomination was received:
  - Jucheon Guo

- **One Member, BCoE Executive Committee** (3-year term)
  Elected from the Department of Electrical and Computer Engineering

  After a third Call for Nominations, no valid nominations were received. Another call for nominations will be issued in the Fall.

- **One Member, BCoE Executive Committee** (3-year term)
  Elected from the Department of Mechanical Engineering

  One valid nomination was received:
  - Masaru Rao

3. **COLLEGE OF HUMANITIES, ARTS & SOCIAL SCIENCES**

A call for Nominations was issued for the following positions:

- **Chair of the Faculty, CHASS Executive Committee** (To complete Katherine Sweeny’s unexpired term ending in 2019)

  After a third Call for Nominations, no valid nominations were received. Another call for nominations will be issued in the Fall.

- **One Member, CHASS Executive Committee** (2-year term)
  To be chosen from among Art History, English, History, Comparative Literature & Foreign Languages, Philosophy, Religious Studies, Hispanic Studies and Gender and Sexuality Studies

  Two valid nominations received:
  - Ivan Eusebio Aguirre Darancou, Department of Hispanic Studies
  - Lucille Chia, Department of History

  An election was held, and the results of the ballot are as follows:
  - Ivan Eusebio Aguirre Darancou 33 votes
  - Lucille Chia 43 votes*

  *Professor Lucille Chia has been elected to the position of member to the CHASS Executive Committee.

  Two members, CHASS Executive Committee (2-year term)
To be chosen from among Anthropology, Economics, Ethnic Studies, Political Science, Psychology and Sociology

One valid nomination received:
  - Joao H. Vargas, Department of Anthropology

After a third Call for Nominations, no other valid nominations were received. Another call for nominations will be issued in the Fall.

One member, CHASS Executive Committee (2-year term)
To be chosen from among the Fine Arts (Art, Creative Writing, Dance, Media & Cultural Studies, Music, and Theatre, Film & Digital Production)

One valid nomination received:
  - Jodi Kim, Department of Media & Cultural Studies

One Member, CHASS Executive Committee (2-year term)
To be chosen from degree granting non-department programs.

One valid nomination received:
  - Paul H.B. Chang, Asian Studies

4. COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES

A call for nominations was issued for the following positions:

Chair of the Faculty (2-year term)
One valid nomination received:
  - Louis Santiago, Department of Botany & Plant Sciences

One Member, CNAS Executive Committee (3-year term)
Elected from the Department of Evolution, Ecology, and Organismal Biology

One valid nomination was received:
  - Timothy Higham

One Member, CNAS Executive Committee (3-year term)
Elected from the Department of Molecular, Cell and Systems Biology

One valid nomination was received:
  - Jeffrey Bachant

One Member, CNAS Executive Committee (3-year term)
Elected from the Department of Physics and Astronomy

One valid nomination was received:
  - Frederick Hamann

One Member, CNAS Executive Committee (3-year term)
Elected from the Department of Environmental Sciences
One valid nomination was received:
- Samantha Ying

5. **GRAD SCHOOL OF EDUCATION**

A call for Nominations was issued for the following positions:

One Member, GSOE Executive Committee (2-year term)
Elected from the faculty at large

One valid nomination was received:
- Celeste C. Pilegard

6. **SCHOOL OF BUSINESS ADMINISTRATION**

A call for Nominations was issued for the following positions:

One Member, SOBA Executive Committee (2-year term)
Elected from the Area of Management

One valid nomination was received:
- Michael Haselhuhn

One Member, SOBA Executive Committee (2-year term)
Elected from the Area of Operations and Supply Chain Management

One valid nomination was received:
- Elodie Goodman

7. **SCHOOL OF MEDICINE**

A call for Nominations was issued for the following positions:

One Member, SOM Executive Committee (2-year term)
Elected from the Biomedical Sciences

One valid nomination was received:
- Seema Tiwari-Woodruff

Three Members, SOM Executive Committee (2-year term)
Elected from the Clinical Sciences

Three valid nominations received:
- Ramdas Pai
- Paul Lyons
- Andrew Subica

The results from the Call for Nominations and Elections have been posted on the Academic Senate website.
To be adopted:

PROPOSED CHANGE TO CHEMICAL ENGINEERING UNDERGRADUATE REQUIREMENTS

PRESENT:

Major Requirements
Chemical Engineering

Students must choose either a Biochemical Engineering, Chemical Engineering or Nanotechnology option.

1. Lower-division requirements (75 units)
   a) BIOL 005A, BIOL 05LA
   b) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 008A, CHEM 008B, CHEM 008C, CHEM 08LA, CHEM 08LB, CHEM 08LC
   c) CS 010
   d) MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046
   e) PHYS 040A, PHYS 040B, PHYS 040C

2. Upper-division requirements (63 units)
   a) CEE 158
   b) CHE 100, CHE 110A, CHE 110B, CHE 114, CHE 116, CHE 117, CHE 118, CHE 120, CHE 122, CHE 160B, CHE 160C, CHE 175A, CHE 175B
   c) CHE 130/ENVE 130, CHE 160A/ENVE 160A
   d) ENGR 118

3. Option requirements: choose one option
   a) Biochemical Engineering option (49 units)
      (1) CEE 010
      (2) BCH110A/BCH 100
      (3) CHE 124, CHE 124L, CHE 140
      (4) Four (4) units of technical electives chosen from BIEN 125, BIEN 140A/CEE 140A, BIEN

PROPOSED:

Major Requirements
Chemical Engineering

Students must choose either a Biochemical Engineering, Chemical Engineering or Nanotechnology option.

1. Lower-division requirements (76 units)
   a) No change
   b) No change
   c) No change
   d) No change
   e) No change
   f) CEE 010

2. Upper-division requirements (63 units)
   a) No change
   b) No change
   c) No change
   d) No change

3. Option requirements: choose one option
   a) Biochemical Engineering option (18 units)
      (1) BCH110A/BCH 100
      (2) CHE 124, CHE 124L, CHE 140
      (3) Four (4) units of technical electives chosen from BIEN 125, BIEN 140A/CEE 140A, BIEN 159/CEE 159, BIOL 121/MCBL
159/CEE 159, BIOL 121/MCBL 121, CEE 125, CEE 132, CEE 135, CHE 102, CHE 150

b) Chemical Engineering option (16 units)
(1) CEE 010
(2) Sixteen (16) units of technical electives chosen from CEE 125, CEE 132, CEE 135, CHE 102, CHE 131, CHE 136, CHE 171, ENVE 120, ENVE 133, ENVE 134, ENVE 138

c) Nanotechnology option (19 units)
(1) CEE 010
(2) CHE 105
(3) CHE 161
(4) CEE 135
(5) Eight (8) units of technical electives chosen from CHE 102, CHE 131, ENVE 133, ME 114, MSE 160, MSE 161

Visit the Student Affairs Office in the College of Engineering or student.engr.ucr.edu for a sample program.

Justification:
Housekeeping for CEE 010 (Intro to CEE) to be moved to the lower division section of the program instead of one of the option courses in the traditional CHE, Biochem option, and Nano option. The ENVE program already has CEE 010 listed as a lower division course.

Approvals:
Approved by the faculty of the Department of Chemical and Environmental Engineering: December 4, 2017
Approved by the Executive Committee of Bourns College of Engineering: January 30, 2018
Approved by the Committee on Educational Policy: April 11, 2018
To be adopted:

Proposed Changes to Computer Engineering Undergraduate Program

**PRESENT:**

**Major Requirements**

1. Lower-division requirements (72 units):
   
   a) ENGR 001G
   
   b) CS 010 or CS 10V, CS 012 or CS 012V, CS 014, CS 061
   
   c) CS 011/ MATH 011
   
   d) EE 001A, EE 01LA, EE 001B, EE 020
   
   e) MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 046
   
   f) PHYS 040A, PHYS 040B, PHYS 040C
   
   g) CHEM 001A or ME 010

2. Upper-division requirements (77 units minimum):
   
   a) CS 100, CS 141, CS 153, CS 161, CS 161L
   
   b) CS 120A/ EE 120A, CS 120B/EE 120B; one course from CS 122A or EE 128
   
   c) CS 111
   
   d) CS 168
   
   e) ENGR 180W
   
   f) EE 100A
   
   g) EE 111
   
   h) EE 114 or STAT 155
   
   i) Six courses (at least 24 units) as technical electives from the following set of upper division courses
      
      CS 122A, CS 122B, CS 130, CS 133, CS 150, CS 152, CS 160, CS 162, CS 164, CS 165, CS 166, CS 169, CS 170, CS 171, CS 172, CS 177, CS 179 (E-Z), CS 180, CS 181, CS 183, CS 193

**PROPOSED:**

**Major Requirements**

1. Lower-division requirements (72 units):
   
   a) No Change
   
   b) CS 010, CS 012, CS 014, CS 061
   
   c) No Change
   
   d) No Change
   
   e) No Change
   
   f) No Change
   
   g) No Change

2. Upper-division requirements (77 units minimum):
   
   a) ENGR 101G
   
   b) CS 100, CS 141, CS 153, CS 161, CS 161L
   
   c) CS 120A/ EE 120A, CS 120B/EE 120B; one course from CS 122A or EE 128
   
   d) CS 111
   
   e) CS 168/EE 168
   
   f) ENGR 180W
   
   g) EE 100A
   
   h) EE 111
   
   i) EE 114 or STAT 155
   
   j) Six courses (at least 24 units) as technical electives from the following set of upper division courses
      
      CS 122A, CS 122B, CS 130, CS 133, CS 150, CS 152, CS 160, CS 162, CS 164, CS 165, CS 166, CS 169, CS 170, CS 171, CS 172, CS 175, CS 177, CS 179 (E-Z), CS 180, CS 181, CS 183, CS 193

EE 100B, EE 105, EE 114, EE 123, EE 128, EE 132, EE 133, EE 134, EE 135, EE 140, EE 141, EE 144, EE 146, EE 150, EE 151, EE 152, EE 155, EE 175A,
The technical electives selected from h) must include either CS 179 (E-Z) or EE 175A and EE 175B. The selection of the remaining technical electives must be planned, in consultation with a faculty advisor, to include at least one coherent sequence of two classes from either Computer Science or Electrical Engineering. The technical electives must be distinct from those used to satisfy the upper-division requirements specified in items a) and b) above.

Students may petition for exceptions to the above degree requirements. Exceptions to Computer Science and Electrical Engineering course requirements must be approved by the Computer Engineering undergraduate faculty advisor or chair. Visit the Student Affairs Office in the College of Engineering or student.engr.ucr.edu for a sample program.

**Justification:**

1. Due to the conversion to the Banner system, courses being offered online no longer require the designation of “V”. As a result, entries for CS10 and CS12 required deletion of the “V” designation to comply with Banner.
2. ENGR 101G is a required course for upper division that was missing from the catalog. The CEN faculty voted to make the correction. Approved 8-0.
3. CS 168 (Introduction to VLSI Design) is cross-listed with EE 168. Adding EE168 will allow CEN students to register either for CS 168 or EE 168. This was approved by CEN faculty 8-0.
4. Two new courses, CS 175 on Entrepreneurship in Computing and EE 147 on GPU Architectures, were recently introduced in the CSE and ECE departments. The faculty felt that these two courses are highly relevant to the CEN students. Expanding Tech Electives to include CS175 and EE147 will enable students to take these courses for credit. The motion was voted and approved 8-0.
5. The sentence to include “coherent sequence of two classes” was originally introduced to satisfy the depth in an area in computer engineering. However, it was later discovered that this requirement puts undue burden on students and takes away their flexibility in choosing the technical electives. It is also not required by ABET. Hence, the CEN faculty voted (8-0) to remove the sentence on “coherent sequence of two classes” from the technical elective.

**Approvals:**

Approved by the faculty of the Department of Computer Engineering: November 27, 2017
Approved by the Executive Committee of the College of Engineering: March 16, 2018
Approved by the Committee on Educational Policy: April 11, 2018
To be adopted:

Proposed Change to the Computer Science & Engineering Undergraduate Program

<table>
<thead>
<tr>
<th>PRESENT:</th>
<th>PROPOSED:</th>
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<tbody>
<tr>
<td><strong>Major Requirements</strong></td>
<td><strong>Major Requirements</strong></td>
</tr>
<tr>
<td><strong>Computer Science Major</strong></td>
<td><strong>Computer Science Major</strong></td>
</tr>
<tr>
<td>1. Lower-division requirements (61 units)</td>
<td>1. Lower-division requirements (61 units)</td>
</tr>
<tr>
<td>a) ENGR 001-I</td>
<td>a) No Change</td>
</tr>
<tr>
<td>b) CS 010 or CS 010V, CS 012 or CS 012V, CS 014, CS 061</td>
<td>b) No Change</td>
</tr>
<tr>
<td>c) CS 011/MATH 011</td>
<td>c) No Change</td>
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<tr>
<td>d) MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 031</td>
<td>d) No Change</td>
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<td>e) PHYS 040A, PHYS 040B, PHYS 040C</td>
<td>e) No Change</td>
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<tr>
<td>f) One course of 4 or more units in an engineering discipline outside the field of computer science to be selected in consultation with a faculty advisor. (Either a lower-division or an upper-division course may be used to satisfy this requirement.)</td>
<td>f) No Change</td>
</tr>
<tr>
<td>2. Upper-division requirements (86 units minimum)</td>
<td>2. No Change</td>
</tr>
<tr>
<td>a) ENGR 101-I</td>
<td>a) No Change</td>
</tr>
<tr>
<td>b) CS 100, CS 141, CS 150, CS 152, CS 153, CS 161, CS 179 (E-Z)</td>
<td>b) No Change</td>
</tr>
<tr>
<td>c) CS 120A/EE 120A, CS 120B/EE 120B</td>
<td>c) No Change</td>
</tr>
<tr>
<td>d) CS 111/MATH 111</td>
<td>d) No Change</td>
</tr>
<tr>
<td>e) ENGR 180W</td>
<td>e) No Change</td>
</tr>
<tr>
<td>f) STAT 155</td>
<td>f) No Change</td>
</tr>
<tr>
<td>g) At least 28 units of technical electives to be chosen from an approved list of courses which currently includes CS 122A, CS 122B, CS 130, CS 134, CS 145, CS 160, CS 162, CS 164, CS 165, CS 166, CS 168, CS 169, CS 170, CS 171, CS 172, CS 175, CS 177, CS 179 (E-Z) (4 units maximum), CS 180, CS 181, CS 182, CS 183, CS 193 (4 units maximum), EE 140, MATH 120, MATH 126, MATH 135A, MATH 135B, PHIL 124.</td>
<td>g) At least 28 units of technical electives to be chosen from an approved list of courses which currently includes CS 122A, CS 122B, CS 130, CS 133, CS 134, CS 135, CS 145, CS 160, CS 162, CS 164, CS 165, CS 166, CS 168, CS 169, CS 170, CS 171, CS 172, CS 175, CS 177, CS 179 (E-Z) (4 units maximum), CS 180, CS 181, CS 182, CS 183, CS 193 (4 units maximum), EE 140, MATH 120, MATH 126, MATH 135A, MATH 135B, PHIL 124.</td>
</tr>
</tbody>
</table>

The technical electives selected must be distinct from those used to satisfy the requirements specified in 2.a)–f) above, with at least half of the units selected from Computer Science courses.

The technical electives selected must be distinct from those used to satisfy the requirements specified in 2.a)–f) above, with at least half of the units selected from Computer Science courses.
Visit the Student Affairs Office in the College of Engineering or student.engr.ucr.edu for a sample program.

**Justification:**
The faculty approved to add CS 133 and CS 135 to the list of technical elective courses for CS majors. CS 133 (Computational Geometry) and 135 (Virtual Reality) are new courses. They are new specialized topics in computer science, and thus suit perfectly as a technical elective for our CS undergraduate students.

**Approvals:**
Approved by the faculty of the Department of Computer Science & Engineering: February 14, 2018
Approved by the Executive Committee of the College of Engineering: March 19, 2018
Approved by the Committee on Educational Policy: April 11, 2018
To be adopted:

Proposed Changes to Electrical Engineering Major

<table>
<thead>
<tr>
<th>PRESENT:</th>
<th>PROPOSED:</th>
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</thead>
<tbody>
<tr>
<td>Major Requirements</td>
<td>Major Requirements</td>
</tr>
</tbody>
</table>

1. Lower-division requirements (73 units)
   a) One course in the biological sciences chosen from an approved list
   b) CHEM 001A, CHEM 01LA
   c) CS 010, CS 013, CS 061
   d) EE 001A, EE 01LA, EE 001B, EE 010, EE 020
   e) MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046
   f) PHYS 040A, PHYS 040B, PHYS 040C

2. Upper-division requirements (81 units)
   a) EE 100A, EE 100B, EE 105, EE 110A, EE 110B, EE 114, EE 116, CS 120A/EE 120A, CS 120B/EE 120B, EE 132, EE 133, EE 141, EE 175A, EE 175B
   b) One of EE 128 or EE 155
   c) ENGR 181W
   d) Sixteen (16) units of technical electives chosen from CS 161, CS 168/EE 168, EE 115, EE 117, EE 123, EE 128 (if not chosen as a required course in b) above), EE 135, EE 136, EE 137, EE 138, EE 139, EE 144, EE 145/ME 145, EE 146, EE 150, EE 151, EE 152, EE 153, EE 155 (if not chosen as a required course in b) above), EE 162, EE 165, ENGR 160

To ensure depth, the choice of technical electives must include at least one coherent sequence of at least three (3) electrical engineering courses (lead course plus two additional) in one focus area of electrical engineering, as defined below.
Communications, Signal Processing and Networking. Lead Course: EE 141. Sequence Courses: EE 115, EE 117, EE 128, EE 146, EE 150, EE 152, ENGR 160

Control, Robotics and Machine Intelligence. Lead Course: EE 132. Sequence Courses: EE 128, EE 144, EE 145/ME 145, EE 146, EE 151, EE 152, ENGR 160

Embedded Systems and VLSI. Lead Course: EE 128. Sequence Courses: EE 135, EE 165, CS 168/EE 168, CS 161, ENGR 160

Nanotechnology, Advanced Materials and Devices. Lead Course: EE 133. Sequence Courses: EE 117, EE 134, EE 135, EE 136, EE 137, EE 138, EE 139, EE 162, EE 165, CS 168/EE 168, ENGR 160


Example course sequences are available through the Student Affairs Office in the College of Engineering or student.engr.ucr.edu

Justification:

1. EE 118, EE 142, and EE 147 are new upper division courses. They need to be added as technical electives and into the sequence courses for the related focus areas.
2. Removing EE 134 from Nanotechnology, Advanced Materials and Devices focus area: course no longer exists.
3. Removing EE 135, EE 165, CS 168/EE 168 and ENGR 160 from Nanotechnology, Advanced Materials and Devices focus area to ensure depth in this area. All courses removed from this area are much more relevant to the area of Embedded Systems and VLSI.
4. Adding EE 117 to Power Engineering sequence courses. Deeper understanding of electromagnetics is important to power generation, transmission and electric drives.

Approvals:
Approved by the Department of Electrical & Computer Engineering: January 25, 2018
Approved by the Executive Committee of the College of Engineering: January 30, 2018
Approved by the Committee on Educational Policy: April 11, 2018
To be adopted:

PROPOSED:

Major Requirements

1. Lower-division requirements (75 units)
   a) BIOL 005A, BIOL 05LA
   b) CHEM 001A, CHEM 001B, CHEM 01LA, CHEM 01LB
   c) EE 001A, EE 01LA
   d) MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046
   e) ME 002, ME 009, ME 010, ME 018
   f) PHYS 040A, PHYS 040B, PHYS 040C

2. Upper-division requirements (77 units)
   a) ME 100A, ME 103, ME 110, ME 113, ME 114, ME 116A, ME 118, ME 120, ME 135, ME 170A, ME 170B, ME 174, ME 175A, ME 175B, ME 175C
   b) STAT 100A

Choose one Focus Area:

(1) Materials and Structures

Sixteen (16) units of technical electives chosen from ME 100B, ME 116B, ME 121, ME 122, ME 153, ME 156, ME 180, ME 197

(2) Energy and Environment

Sixteen (16) units of technical electives chosen from ME 100B, ME 116B, ME 117, ME 136, ME 137, ME 138, ME 197

(3) Design and Manufacturing

Sixteen (16) units of technical electives chosen from ME 121, ME 122, ME 130, ME 131, ME 133, ME 140, ME 144/EE 144, ME 145, ME 153, ME 156, ME 175D, ME
176, ME 180, ME 197

(4) General Mechanical Engineering

Sixteen (16) units of technical electives
chosen from the following list, in
consultation with an advisor: ME 100B,
ME 116B, ME 117, ME 121, ME 122,
ME 130, ME 131, ME 133, ME 136, ME
137, ME 138, ME 140, ME144/EE 144, ME
145, ME 153, ME 156, ME 175D, ME 176,
ME 180, ME 197

Visit the Student Affairs Office in the College
of Engineering or student.engr.ucr.edu for a
sample program.

**Justification:**
This change in the program requirements is necessary because ME018 has been replaced by a sequence of
two courses, ME018A and ME018B

**Approvals:**
Approved by the faculty of the Department of Mechanical
Engineering: October 2, 2017 & November 6, 2017
Approved by the Executive Committee of the College of
Engineering: March 19, 2018
Approved by the Committee on Educational Policy: April 11, 2018
PRESENT:

The Department of Anthropology offers a minor in Anthropology which consists of six upper-division courses (at least 24 units) and appropriate prerequisites as needed.

The courses are to be selected as follows:
1. Two upper-division courses in cultural anthropology from ANTH 102/AHS 102, ANTH 121, ANTH 122, ANTH 124, ANTH 125, ANTH 127, ANTH 131, ANTH 132, ANTH 134, ANTH 135, ANTH 137, ANTH 138, ANTH 139, ANTH 144, ANTH 149/WMST 149, ANTH 160, ANTH 162, ANTH 163, ANTH 173 (ANTH 001 is the normal lower-division prerequisite for these courses.)

2. Two upper-division courses from any one of the following subdisciplinary areas: (These courses normally entail an appropriate lower-division course in the given subdiscipline.)
   a) Archaeology
      (1) Prerequisite: ANTH 003 or ANTH 005
      (2) Courses: ANTH 110, ANTH 111, ANTH 113, ANTH 117A, ANTH 117B, ANTH 118, ANTH 172, ANTH 178/WMST 178
   b) Physical/Biological Anthropology
      (1) Prerequisite: ANTH 002
      (2) Courses: ANTH 107, ANTH 129, ANTH 146/PSYC 146, ANTH 150, ANTH 158, ANTH 159
   c) Linguistic Anthropology

PROPOSED:

The Department of Anthropology offers a minor in Anthropology which consists of 24 upper division units. Many upper division anthropology courses have lower division prerequisites. Lower division prerequisites do NOT count towards the 24 unit requirement for the minor.

The courses are to be selected as follows:
1. Two upper-division courses in cultural anthropology from ANTH 103, ANTH 117, ANTH 121, ANTH 122, ANTH 124, ANTH 125, ANTH 126, ANTH 127 or ANTH 127S, ANTH 131, ANTH 132, ANTH 133, ANTH 136, ANTH 137, ANTH 139, ANTH 143, ANTH 145, ANTH 147, ANTH 148, ANTH 149/WMST 149, ANTH 160, ANTH 162, ANTH 163, ANTH 170, ANTH 173, ANTH 175, ANTH 177, ANTH 179, ANTH 182, ANTH 187 (ANTH 001 is the normal lower-division prerequisite for these courses.)

2. Two upper-division courses (8 units) from any ONE of the following subdisciplinary areas: (Both courses MUST be taken in the same subdiscipline)
   a) Archaeology
      (1) Prerequisite: ANTH 005
      (2) Courses: ANTH 110, ANTH 111, ANTH 112, ANTH 113, ANTH 118, ANTH 172, ANTH 178/WMST 178
   b) Physical/Biological Anthropology
      (1) Prerequisite: ANTH 002
      (2) Courses: ANTH 104, ANTH 107, ANTH 150, ANTH 152, ANTH 153, ANTH 155, ANTH 158
   c) Linguistic Anthropology
(1) Prerequisite: **LING 020**

(2) Courses: ANTH 120, ANTH 123, ANTH 167/LING 167

3. One area course from ANTH 115 (E-Z), ANTH 140 (E-Z), ANTH 161/LNST 161, ANTH 164/LNST 164/WMST 164, ANTH 168/ETST 148/LNST 168, ANTH 186/LNST 166

4. One methodological course from ANTH 112, ANTH 114A, ANTH 116, ANTH 155, ANTH 171, ANTH 180A, ANTH 183, ANTH 185

See Minors under the College of Humanities, Arts, and Social Sciences in the Colleges and Programs section of this catalog for additional information on minors.

JUSTIFICATION:
The majority of changes have to do with the turnover in additions and deletions of courses. However, regarding the methods courses, the courses that are still in the system have been taken off because they are not deemed to be sufficiently methods-oriented for the methods requirements. For example, courses such as ANTH 112 are outdated methodologically as they retain a high degree of theoretical focus. Further, now, the department has added specific, adequately methods-oriented courses. These are some of the reasons as to why the methodologically oriented courses are changed. Further justification is provided for other changes below:

a) To cancel courses that **duplicate** other existing course

Example: **Courses to be deleted**

- ANTH 154-duplicates ANTH 165F
- ANTH 180A-duplicates ANTH 165E
- ANTH 180B-duplicates ANTH 165G
- ANTH 180C-duplicates ANTH 184

b) To **update** the minor with the current course catalog offerings.

Example: Courses that are not in the current course catalog offerings

The following courses **are NOT in the new department curriculum list anymore**: ANTH 102/AHS 102, ANTH 134, ANTH 135, ANTH 138, and ANTH 144, which we deleted from the list of minor requirements below. We also added recently created courses including: ANTH 116 and ANTH 174, ANTH 133, ANTH 140 (E-Z) to minor requirements list, which are updated as follows:

- 114A, 116, 171, 183 are not in the new department curriculum anymore

APPROVALS:
Approved by the faculty of the Department of Anthropology: January 22, 2018
Approved by the Executive Committee College of Humanities, Arts, and Social Sciences: February 28, 2018
Approved by the Committee on Educational Policy: April 25, 2018
To be adopted:

Proposed changes to the Business Economics Major

PRESENT:
Business Economics Major
The major requirements for a B.A. degree in Business Economics are as follows:
1. Lower-division requirements (five courses [at least 22 units])
   a) ECON 002, ECON 003
   b) BUS 020
   c) MATH 009A or MATH 09HA, MATH 009B

2. Upper-division requirements (12 courses [at least 54 units])
   a) ECON 104A, ECON 104B
   b) ECON 105A, ECON 105B
   c) ECON 101, ECON 107
   d) Five additional upper-division courses in Economics worth 4 or 5 units each,
      including at least two courses from ECON 108, ECON 130, ECON 135, BUS 153/
      ECON 153, BUS 160/ECON 160, BUS 162/ECON 162, ECON 163. Two 2-unit
      courses can satisfy one 4- or 5-unit elective course.
   e) One course chosen from POSC 182,
      PSYC 142, SOC 151

Note: Up to 4 units of internship credit may be counted toward the upper-division electives in Business Economics.

PROPOSED:
Business Economics Major
The major requirements for a B.A. degree in Business Economics are as follows:
1. Lower-division requirements (five courses [at least 22 units])
   a) ECON 002 or ECON 002H, ECON 003 or ECON 003H
   b) BUS 020
   c) MATH 009A or MATH 09HA, MATH 009B or MATH 09HB

No Change.

JUSTIFICATION:
Honors courses were added for ECON 002 and ECON 003 and MATH 009B

APPROVALS:
Approved by the faculty of the Department of Economics: January 30, 2018
Approved by the Executive Committee College of Humanities, Arts, and Social Sciences: February 28, 2018
Approved by the Committee on Educational Policy: April 25, 2018
To be adopted:

Proosed changes to the Economics/Administrative Studies Major

PRESENT:
In order to receive a B.A. degree in Economics/Administrative Studies students must fulfill the following requirements:

**Economics requirements** (12 courses, 55 units)
1. ECON 002, ECON 003
2. ECON 104A, ECON 104B, ECON 105A
3. Four additional upper-division courses in Economics worth 4 or 5 units each, including at least two that have either ECON 104A or ECON 105A or ECON 107 as a prerequisite. Two 2-unit courses can satisfy one 4-unit course.
4. ECON 101, ECON 107
5. One of MATH 009A, MATH 009HA, or equivalent

**Administrative Studies requirements** (37 units)
1. Lower-division courses (17 units)
   a) BUS 010, BUS 020
   b) STAT 048 or equivalent (may be used to satisfy breadth requirements)
   c) CS 008 (may be used to satisfy breadth requirements)
2. Upper-division requirements (20 units)
   a) Two courses (8 units) from the list below:
      1. ECON 102 or ECON 104A or ECON 162/BUS 162
      2. PSYC 140 or PSYC 142
      3. SOC 150 or SOC 151 or SOC 171
      4. POSC 181 or POSC 182 or POSC 183
      5. ANTH 127 or ANTH 131
   These two courses must be outside the discipline of Economics and cannot be courses included as part of the three-course Business Administration track or their cross-listed equivalents.
   b) A three-course track (12 units) in

PROPOSED:
In order to receive a B.A. degree in Economics/Administrative Studies students must fulfill the following requirements:

**Economics requirements** (12 courses, 55 units)
1. ECON 002 or ECON 002H, ECON 003 or ECON 003H
2. ECON 104A, ECON 104B, ECON 105A
3. Four additional upper-division courses in Economics worth 4 or 5 units each, including at least two that have either ECON 104A or ECON 105A or ECON 107 as a prerequisite. Two 2-unit courses can satisfy one 4-unit course.
4. ECON 101, ECON 107
5. One of MATH 009A, MATH 009HA, or equivalent

**Administrative Studies requirements** (37 units)
1. Lower-division courses (17 units)
   a) BUS 010, BUS 020
   b) STAT 048 or equivalent (may be used to satisfy breadth requirements)
   c) CS 008 (may be used to satisfy breadth requirements)
2. Upper-division requirements (20 units)
   a) Two courses (8 units) from the list below:
      1. ECON 102 or ECON 104A or ECON 162/BUS 162
      2. PSYC 140 or PSYC 142
      3. SOC 150 or SOC 151 or SOC 171
      4. POSC 181 or POSC 182 or POSC 183
      5. ANTH 127 or ANTH 131
   These two courses must be outside the discipline of Economics and cannot be courses included as part of the three-course Business Administration track or their cross-listed equivalents.
   b) A three-course track (12 units) in

**Note** Up to 4 units of internship credit may be counted toward the upper-division electives in Economics.
Business Administration courses from one of the following:

1. Organizations (General): BUS 100, BUS 107, BUS 176/SOC 176, BUS 158/ANTH 105, SOC 150, SOC 151
2. Human Resources Management/Labor Relations: BUS 100, BUS 107, ECON 152, BUS 153/ECON 153, BUS 155, BUS 157, PSYC 142
3. Business and Society: BUS 100, BUS 102, BUS 107, PHIL 116, POSC 182, POSC 186
4. Marketing: BUS 103, and two from BUS 112, BUS 113, BUS 114, BUS 117
5. Managerial Accounting/Taxation: BUS 108, and two from BUS 166, BUS 168A, BUS 168B
7. Finance: BUS 106/ECON 134 and two from BUS 134, BUS 136, BUS 137, BUS 138, BUS 139
9. Production Management: BUS 104/STAT 104, and two from BUS 105, BUS 122, BUS 127/STAT 127

Note: In filling the dual requirements of the major students may not count more than two courses toward both parts of their total requirements. (This limitation applies to specified Economics requirements and specified Administrative Studies requirements, but does not apply to the required Mathematics and Statistics courses.)

BUSINESS ADMINISTRATION COURSES FROM ONE OF THE FOLLOWING:

1. Organizations (General): BUS 100, BUS 107, BUS 176/SOC 176, BUS 158/ANTH 105, SOC 150, SOC 151
2. Human Resources Management/Labor Relations: BUS 100, BUS 107, ECON 152, BUS 153/ECON 153, BUS 155, BUS 157, PSYC 142
3. Business and Society: BUS 100, BUS 102, BUS 107, PHIL 116, POSC 182, POSC 186
4. Marketing: BUS 103, and two from BUS 112, BUS 113, BUS 114, BUS 117
5. Managerial Accounting/Taxation: BUS 108, and two from BUS 166, BUS 168A, BUS 168B
7. Finance: BUS 106/ECON 134 and two from BUS 134, BUS 136, BUS 137, BUS 138, BUS 139
9. Production Management: BUS 104/STAT 104, and two from BUS 105, BUS 122, BUS 127/STAT 127

Note: In filling the dual requirements of the major students may not count more than two courses toward both parts of their total requirements. (This limitation applies to specified Economics requirements and specified Administrative Studies requirements, but does not apply to the required Mathematics and Statistics courses.)

JUSTIFICATION:
Honors courses were added for ECON 002 and ECON 003.
SOC 171 was deleted by the SOC department, the course no longer exists.

APPROVALS:
Approved by the faculty of the Department of Economics: January 30, 2018
Approved by the Executive Committee College of Humanities, Arts, and Social Sciences: February 28, 2018
Approved by the Committee on Educational Policy: April 10, 2018
To be adopted:

Proposed changes to the Economics/Law and Society Major

PRESENT:

Economics/Law and Society Major
The Law and Society major is open to undergraduate students with junior standing who have completed LWSO 100 with a grade of “C” or higher. The major requirements for the B.A. degree in Economics/Law and Society are as follows:

1. Economics requirements (11 courses [at least 49 units])
   a) ECON 002, ECON 003

   b) ECON 119
   c) ECON 104A, ECON 104B, ECON 105A
   d) Five additional upper-division courses in Economics worth 4 or 5 units each, including at least two that have either ECON 104A or ECON 105A or ECON 107 as a prerequisite. ECON 107 may be chosen as an advanced elective. Two 2-unit courses can replace one 4- or 5-unit elective course.
   
   Note: Up to 4 units of internship credit may be counted toward the upper-division elective courses in Economics.

2. Law and Society requirements (36 units)
   a) PHIL 007 or PHIL 007H
   b) LWSO 100 (with a grade of “C” or better)
   c) One course chosen from POSC 114, PSYC 012, SOC 004 (or equivalent course in research methods)
   d) Three courses chosen from ANTH 127, ECON 119, HISE 153, PHIL 165, POSC 167, PSYC 175, SOC 159
   e) Two courses chosen from ENSC 174, HISA 120A, HISA 120B, HISE 123, LWSO 175 (E-Z), PHIL 164, POSC 111, POSC 166, POSC 168, POSC 186, SOC 147, SOC 149, SOC 180
   f) LWSO 193, Senior Seminar

PROPOSED:

Economics/Law and Society Major
The Law and Society major is open to undergraduate students with junior standing who have completed LWSO 100 with a grade of “C” or higher. The major requirements for the B.A. degree in Economics/Law and Society are as follows:

1. Economics requirements (11 courses [at least 49 units])
   a) ECON 002 or ECON 002H, ECON 003 or ECON 003H

   b) ECON 119
   c) ECON 104A, ECON 104B, ECON 105A
   d) Five additional upper-division courses in Economics worth 4 or 5 units each, including at least two that have either ECON 104A or ECON 105A or ECON 107 as a prerequisite. ECON 107 may be chosen as an advanced elective. Two 2-unit courses can replace one 4- or 5-unit elective course.
   
   Note: Up to 4 units of internship credit may be counted toward the upper-division elective courses in Economics.

No change.
Note For sections 2.d) and 2.e) combined, not more than two courses may be taken from the same department. In filling the dual requirements of the major, students may not count more than two courses toward both parts of their total requirements. (This limitation applies to specified Economics requirements and Law and Society requirements.)

JUSTIFICATION:
Honors courses were added for ECON 002 and ECON 003

APPROVAL:
Approved by the faculty of the Department of Economics: January 30, 2018
Approved by the Executive Committee College of Humanities, Arts, and Social Sciences: February 28, 2018
Approved by the Committee on Educational Policy: April 10, 2018
To be adopted:

Proposed changes to the Economics Major

PRESENT:

The major requirements for the B.A. degree in Economics are as follows:
1. Lower-division requirements (4 courses [at least 18 units])
   a) ECON 002, ECON 003
   b) MATH 009A or MATH 09HA, MATH 009B

2. Upper-division requirements (12 courses [at least 54 units])
   a) ECON 104A, ECON 104B
   b) ECON 105A, ECON 105B
   c) ECON 101, ECON 107
   d) One four or five unit course with ECON 104B or ECON 105B or ECON 107 as a prerequisite.
   e) Five additional upper-division courses in Economics worth 4 or 5 units each, including at least three that have either ECON 104A or ECON 105A or ECON 107 as a prerequisite. Two 2-unit courses can satisfy one 4- or 5-unit course.

Note Up to 4 units of internship credit may be counted toward the upper-division electives in Economics.

PROPOSED:

The major requirements for the B.A. degree in Economics are as follows:
1. Lower-division requirements (4 courses [at least 18 units])
   a) ECON 002 or ECON 002H, ECON 003 or ECON 003H
   b) MATH 009A or MATH 09HA, MATH 009B or MATH 09HB

2. Upper-division requirements (12 courses [at least 54 units])
   a) ECON 104A, ECON 104B
   b) ECON 105A, ECON 105B
   c) ECON 101, ECON 107
   d) One four or five unit course with ECON 104B or ECON 105B or ECON 107 as a prerequisite.
   e) Five additional upper-division courses in Economics worth 4 or 5 units each, including at least three that have either ECON 104A or ECON 105A or ECON 107 as a prerequisite. Two 2-unit courses can satisfy one 4- or 5-unit course.

Note Up to 4 units of internship credit may be counted toward the upper-division electives in Economics.

JUSTIFICATION:
Honors courses were added for ECON 002 and ECON 003 and MATH 009B.

APPROVALS:
Approved by the faculty of the Department of Economics: January 30, 2018
Approved by the Executive Committee College of Humanities, Arts, and Social Sciences: February 28, 2018
Approved by the Committee on Educational Policy: April 25, 2018
PRESENT:
The minor in Economics provides a background in this discipline. Students take basic microeconomic and macroeconomic theory courses, and then are given freedom of choice in pursuing upper-division courses of great interest.

All candidates for the minor in Economics must take
1. Lower-division requirements (10 units):
   ECON 002 and ECON 003

2. Upper-division requirements (at least 26 units):
   a) ECON 102 or ECON 104A, ECON 103 or ECON 105A
   b) Four additional upper-division courses (at least 16 units) in Economics

See Minors under the College of Humanities, Arts, and Social Sciences in the Colleges and Programs section of this catalog for additional information on minors.

PROPOSED:
The minor in Economics provides a background in this discipline. Students take basic microeconomic and macroeconomic theory courses, and then are given freedom of choice in pursuing upper-division courses of great interest.

All candidates for the minor in Economics must take
1. Lower-division requirements (10 units):
   ECON 002 or ECON 002H and ECON 003 or ECON 003H

2. Upper-division requirements (at least 26 units):
   a) ECON 102 or ECON 104A, ECON 103 or ECON 105A
   b) Four additional upper-division courses (at least 16 units) in Economics

See Minors under the College of Humanities, Arts, and Social Sciences in the Colleges and Programs section of this catalog for additional information on minors.

JUSTIFICATION:
Honors courses were added for ECON 002 and ECON 003

APPROVALS:
Approved by the faculty of the Department of Economics: January 30, 2017
Approved by the Executive Committee College of Humanities, Arts, and Social Sciences: February 28, 2018
Approved by the Committee on Educational Policy: April 10, 2018
EXECUTIVE COMMITTEE  
COLLEGE OF HUMANITIES, ARTS, AND SOCIAL SCIENCES  
REPORT TO THE RIVERSIDE DIVISION  
MAY 29, 2018

To be adopted:  
Proposed Changes to Languages and Literatures/French Major

PRESENT:
1. CPLT 001 or CPLT 001W, CPLT 002, FREN 045/MCS 045
2. Language proficiency (12 units) FREN 101A, FREN 101B, FREN 101C
3. Eight courses (32 units) of upper-division electives in the French Program. Of these the student must choose a minimum of five courses (20 units) offered entirely in French. Students may petition to take one course (4 units) outside of the French Program on a related topic. It is strongly encouraged that students take at least one class focusing on a time period earlier than 1800. It is highly recommended that students complete FREN 101B and FREN 101C before enrolling in upper-division electives.
4. CPLT 193 (4 units). (CPLT 196 strongly recommended but not required)

PROPOSED:
1. CPLT 001 or CPLT 001W, CPLT 002
2. Language proficiency (16 units) FREN 075, FREN 101A, FREN 101B, FREN 101C
3. Eight courses (32 units) of upper-division electives in the French Program. Of these the student must choose a minimum of five courses (20 units) offered entirely in French. Students may petition to take one course (4 units) outside of the French Program on a related topic. It is strongly encouraged that students take at least one class focusing on a time period earlier than 1800. It is highly recommended that students complete FREN 101B and FREN 101C before enrolling in upper-division electives.
4. CPLT 193 (4 units). (CPLT 196 strongly recommended but not required)

JUSTIFICATION:
Deletion of FREN 45/MCS 45 as Major Requirement: Due to demands on faculty availability FREN45/MCS 45 cannot be offered every year. Retaining this course as a Major requirement could cause undo hardship on students attempting to complete the Major in a timely manner.

Addition of FREN 75 as Major Requirement: FREN 75 is a new course focusing on oral proficiency. Following discussion of students’ language learning in the French Major the faculty of the French Program determined that students needed to take a course in oral proficiency following the fourth quarter of French language rather than following the sixth quarter, as had previously been the case. FREN 75 will better prepare students for upper-division coursework and will complement the second-year language curriculum.

APPROVALS:
Approved by the faculty of the Department of Comparative Literature & Languages: January 5, 2018
Approved by the Executive Committee of the College of Humanities, Arts, and Social Sciences: January 17, 2018
Approved by the Committee on Educational Policy: April 10, 2018
To be adopted: Proposed Changes to Languages and Literatures/French Minor

**PRESENT:**
1. Language proficiency (16 units) - FREN 100, FREN 101A, FREN 101B, FREN 101C
2. Two courses (8 units) chosen from among upper-division courses offered entirely in French.

See Minors under the College of Humanities, Arts, and Social Sciences in the Colleges and Programs section of this catalog for additional information on minors.

**PROPOSED:**
1. Language proficiency (16 units) - FREN 075, FREN 101A, FREN 101B, FREN 101C
2. Two courses (8 units) chosen from among upper-division courses offered entirely in French.

See Minors under the College of Humanities, Arts, and Social Sciences in the Colleges and Programs section of this catalog for additional information on minors.

**JUSTIFICATION:**
Deletion of FREN 100 as Minor Requirement: FREN 100 has been replaced with FREN 75 (see below).

Addition of FREN 75 as Minor Requirement: FREN 75 is a new course focusing on oral proficiency. Following discussion of students’ language learning in the French Minor the faculty of the French Program determined that students needed to take a course in oral proficiency following the fourth quarter of French language rather than following the sixth quarter, as had previously been the case. FREN 75 will better prepare students for upper-division coursework and will complement the second-year language curriculum.

**APPROVALS:**
Approved by the faculty of the Department of Comparative Literature & Languages: January 5, 2018
Approved by the Executive Committee of the College of Humanities, Arts, and Social Studies: January 17, 2018
Approved by the Committee on Educational Policy: April 10, 2018
To be adopted:

Proposed Changes to Languages & Literature/Russian Studies Major

**PRESENT:**

1. Lower-division requirement: CPLT 001 or CPLT 001W, and CPLT 002

2. Upper-division requirements:
   a) Language requirement: 12 units from RUSN 101 (E-Z), RUSN 102 (E-Z), RUSN 120 (E-Z), RUSN 103
   b) Literature requirement: 12 units from RUSN 109A, RUSN 109B, RUSN 109C

3. Civilization requirements: 12 units from EUR 111A, EUR 111B, EUR 111C

4. CPLT 193 (4 units). (CPLT 196 strongly recommended but not required)

   **Total upper-division units:** 40

**PROPOSED:**

1. Lower-division requirement: CPLT 001 or CPLT 001W, and CPLT 002

2. Upper-division requirements:
   a) Language requirement: 12 units from RUSN 101 (E-Z), RUSN 102 (E-Z), RUSN 103
   b) Literature requirement: 12 units from RUSN 109A, RUSN 109B, RUSN 109C

3. 8 units from EUR 111A, EUR 111B, EUR 111C

4. CPLT 193 (4 units). (CPLT 196 strongly recommended but not required)

   **Total upper-division units:** 36

**JUSTIFICATION:**

At the recommendation of our Department Undergraduate Committee and Russian Faculty; this will also bring the unit requirement for this major in line with others, including German, Japanese, Chinese, and Linguistics.

**APPROVALS:**

Approved by the faculty of the Department of Comparative Literature & Languages: January 5, 2018

Approved by the Executive Committee of the College of Humanities, Arts, and Social Sciences: January 17, 2018

Approved by the Committee on Educational Policy: April 10, 2018
To be adopted:

Proposed Changes to Languages and Literatures/Languages: Chinese Minor

PRESENT

1. Lower-division requirements (4 units plus language proficiency)
   a. Proficiency in Chinese through the intermediate level (second year)
   b. Four (4) units from lower-division lecture courses on Chinese literature and culture:
      CHN 030/AST 030, CHN 040/AST 040, CHN 046/AST 046 or CHN 046W/AST 046W, CHN 048/AST 048

2. Upper-division requirements (20 units)
   a. Six upper-division units in Chinese language from CHN 101A, CHN 101B, CHN 101C, CHN 102, CHN 105, CHN 108, CHN 110 (E-Z), CHN 115 (E-Z)
   b. Eight (8) units in Chinese literature and culture from CHN 104, CHN 105, CHN 106/PHIL 123, AST 107/CHN 107/RLST 107, CHN 108, CHN 110 (E-Z), CHN 115 (E-Z), CHN 118 (E-Z)/AST 118 (E-Z), CHN 132/AST 132/CLA 132/CPAC 132, CHN 134, AST 135/CHN 135, AST 136/CHN 136, CHN 137, AST 145/CHN 141/CLA 141/CPAC 141/POSC 140, AST 142/CHN 142, ART 148/CHN 148, AST 185/CHN 185/MCS 169, CHN 190, CPLT 142E/WMST 142E,
   c. Four (4) units in Asian literatures and cultures: can be chosen from all the upper-division lecture courses on Asian literature and culture from the department as well as China-related upper-division courses from other departments (with adviser’s consent), including the courses listed under (b).

PROPOSED

1. No change

2. Upper-division requirements (20 units)
   a. Twelve (12) upper-division units in Chinese language from CHN 101A, CHN 101B, CHN 101C, CHN 102, CHN 105, CHN 108, CHN 110 (E-Z), CHN 115 (E-Z)
   b. Eight (8) units in Chinese literature and culture from CHN 104, CHN 105, CHN 106/PHIL 123, AST 107/CHN 107/RLST 107, CHN 108, CHN 110 (E-Z), CHN 115 (E-Z), CHN 118 (E-Z)/AST 118 (E-Z), CHN 132/AST 132/CLA 132/CPAC 132, CHN 134, AST 135/CHN 135, AST 136/CHN 136, CHN 137, AST 145/CHN 141/CLA 141/CPAC 141/POSC 140, AST 142/CHN 142, ART 148/CHN 148, AST 185/CHN 185/MCS 169, CHN 190, CPLT 142E/WMST 142E, and any other upper-division lecture courses on Chinese literature, culture, and film chosen in consultation with the student’s advisor.
**Justification:**

By consensus of the Chinese-teaching faculty members in the department, our minors need a higher level of language proficiency.

**Approvals:**

Approved by the faculty of the Department of Comparative Literature & Languages: January 5, 2018

Approved by the Executive Committee of the College of Humanities, Arts, and Social Sciences: January 17, 2018

Approved by the Committee on Educational Policy: April 10, 2018
To be adopted:

Proposed changes to the Political Science/Administrative Studies Major

PRESENT:
The major requirements for the B.A. degree in Political Science/Administrative Studies are as follows. Note that the prerequisite for POSC 198-I is a GPA of 2.70 or better.

Political Science requirements (48 units)
1. Lower-division requirements
Three courses from POSC 005 or POSC 005H or POSC 007; POSC 010 or POSC 010H or POSC 010W; POSC 015 or POSC 015H or POSC 017; POSC 020 or POSC 020H

Students in the major must complete two of the three lower-division Political Science courses with a grade of “C” or better in order to take upper-division political science courses.

2. Upper-division requirements
a) Three courses from POSC 181, POSC 182, POSC 183, POSC 186
b) At least one course from each of the following:
   (1) U.S. Government and Politics:
   POSC 100, POSC 101, POSC 104 or POSC 104S, POSC 108, POSC 143, POSC 144 or POSC 144S, POSC 145, POSC 146, POSC 148 or POSC 148H or POSC 148S, POSC 149, POSC 166, POSC 167, POSC 168, POSC 170, POSC 171, POSC 172/URST 172, POSC 173 or POSC 173S, POSC 180 or POSC 180S, POSC 181, POSC 182, POSC 183, POSC 184 or POSC 184S, POSC 186

(2) Comparative Government and Politics:
POSC 120, POSC 131, POSC 133, POSC 151, POSC 152, POSC 153,

PROPOSED:
The major requirements for the B.A. degree in Political Science/Administrative Studies are as follows. Note that the prerequisite for POSC 198-I is a GPA of 2.70 or better.

Political Science requirements (48 units)
1. No Change
2. Upper-division requirements
a) No Change
b) At least one course from each of the following:
   (1) U.S. Government and Politics:
   POSC 100, POSC 101, POSC 104 or POSC 104S, POSC 108, POSC 143, POSC 144 or POSC 144S, POSC 145, POSC 146, POSC 148 or POSC 148H or POSC 148S, POSC 149, POSC 166, POSC 167, POSC 168, POSC 170, POSC 171, POSC 172/URST 172, POSC 173 or POSC 173S, POSC 180 or POSC 180S, POSC 181, POSC 182, POSC 183, POSC 184 or POSC 184S, POSC 186

(2) Comparative Government and Politics:
POSC 120, POSC 131, POSC 133, POSC 151, POSC 152, POSC 153, POSC
POSC 154, POSC 155 or POSC 155S, POSC 156, POSC 157, POSC 158/
LNST 148, POSC 159 or POSC 159S, POSC 160 or POSC 160S, POSC 161/
LNST 188, POSC 162/LNST 142 or POSC 162S/LNST 142S, POSC 163 or
POSC 163S, POSC 164 or POSC 164S, POSC 165 or POSC 165S, POSC 178
or POSC 178S, POSC 188 or POSC 188S

(3) International Relations and Foreign Policy: POSC 123, POSC 124 or POSC
124S, POSC 125, POSC 126 or POSC 126S, POSC 127 or POSC 127S, POSC
128, POSC 129, POSC 130, POSC 132 or POSC 132S, POSC 134 or POSC
134S, POSC 135, POSC 137 or POSC 137S, POSC 138 or POSC 138S, POSC
139 or POSC 139S, POSC 147 or POSC 147S, POSC 150 or POSC 150S, POSC
153, POSC 169, POSC 189

(4) Political Theory: POSC 106 or POSC 106S, POSC 110 or POSC 110S,
POSC 111 or POSC 111S, POSC 112 or POSC 112S, POSC 113, POSC
115 or POSC 115S, POSC 116, POSC 117, POSC 119, CLA 121/CPAC121/
POSC121 or CLA 121S/CPAC121S/ POSC121S, POSC 122 or POSC 122S
c) Four (4) units from POSC 198G or POSC 198-I (prerequisite: GPA of 2.70 or better)
d) Additional four (4) units in any upper division
Political Science course

**Administrative Studies requirements** (37 units)
1. Lower-division courses (17 units)
a) BUS 010, BUS 020
b) STAT 048 or equivalent (may be used to satisfy breadth requirements)
c) CS 008 (may be used to satisfy breadth requirements)
2. Upper-division requirements (20 units)
a) Two courses (8 units) from the list below:
(1) ECON 102 or ECON 104A or ECON 130 or ECON 162/BUS 162
(2) PSYC 140 or PSYC 142
(3) SOC 150 or SOC 151 or SOC 171
(4) POSC 181 or POSC 182 or POSC 183

**Administrative Studies requirements** (37 units)
1. Lower-division courses (17 units)
a) No Change
b) No Change
c) No Change
2. Upper-division requirements (20 units)
a) Two courses (8 units) from the list below:
(1) No Change
(2) No Change
(3) SOC 150 or SOC 151
(4) No Change

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These two courses must be outside the discipline of Political Science and cannot be courses included as part of the three course Business Administration track or their cross-listed equivalents.

b) A three-course track (12 units) in Business Administration courses from one of the following:

1. Organizations (General): BUS 100, BUS 107, BUS176/SOC 176, BUS 158/ANTH 105, SOC 150, SOC 151
2. Human Resources Management/Labor Relations: BUS 100, BUS 107, BUS 152/ECON 152, BUS 153/ECON 153, BUS 155, BUS 157, PSYC 142
3. Business and Society: BUS 100, BUS 102, BUS 107, PHIL 116, POSC 182, POSC 186
4. Marketing: BUS 103, and two from BUS 112, BUS 113, BUS 114, BUS 117
5. Managerial Accounting/Taxation: BUS 108, and two from BUS 166, BUS 168A, BUS 168B
7. Finance: BUS 106/ECON 134 and two from BUS 134, BUS 136, BUS 137, BUS 138, BUS 139
9. Production Management: BUS 104/STAT 104, and two from BUS 105, BUS 122, BUS 127/STAT 127

Note in filling the dual requirements of the selected major, students may not count more than two courses toward both parts of their total requirements (Political Science requirements and Administrative Studies requirements).

JUSTIFICATION:

The first set of changes responds the fact that the new Banner system is flagging more students’ transcripts for supposed failure to meet unit requirements. These are students who have taken the right number of courses in the categories defined by our different majors (we have four different POSC majors). But for a variety of reasons, the students don’t have the number of units specified. In the broadest sense, this is because students don’t all get the same number of units for taking the same
classes. For example, currently we have a lower-division requirement that is measured both in number of courses (four) and units (20). This assumes, then, that each course taken toward the lower division requirement (5, 7, 10, 15, 17, 20) is a five-unit class. But we allow transfer students to meet some of these requirements by using community college courses, some of which come with only four units. The solution is to say that the lower division requirement remains four courses from the same list of lower div courses – but can be met with a range of units, from 16 to 20. A similar problem arises with upper division courses. In this case, the issue is that sometimes we offer S versions of our courses, and sometimes we offer the versions without sections. In one case, the course is worth five units, in the other, four. The fix is similar.
We are removing courses that were deleted by other departments.

**APPROVALS:**
Approved by the faculty of the Department of Political Science: February 12, 2018
Approved by the Executive Committee College of Humanities, Arts, and Social Sciences: February 28, 2018
Approved by the Committee on Educational Policy: April 10, 2018
PRESENT:
The major requirements for the B.A. degree in Political Science/International Affairs are as follows:

1. Lower-division requirements (two courses [at least 10 units]): One course from a and one course from b:
   a) POSC 015 or POSC 015H or POSC 017
   b) POSC 020 or POSC 020H.

Students in the major must complete two lower division Political Science courses with a grade of “C” or better in order to take upper-division political science courses.

Upper-division requirements (11 courses, 44-55 units):

a) International Relations (three courses)
   POSC 123, POSC 124 or POSC 124S,
   POSC 125, POSC 126 or POSC 126S,
   POSC 127 or POSC 127S, POSC 128,
   POSC 129, POSC 130, POSC 132 or
   POSC 132S, POSC 134 or POSC 134S,
   POSC 135, POSC 137 or POSC 137S,
   POSC 138 or POSC 138S, POSC 139 or
   POSC 139S, POSC 147 or POSC 147S,
   POSC 150 or POSC 150S, POSC 169,
   POSC 189

b) Comparative Politics (three courses) POSC 120, POSC 131, POSC 133, POSC 151,
   POSC 152, POSC 153, POSC 154, POSC
   155 or POSC 155S, POSC 156, POSC
   157, POSC 158/LNST 148, POSC 159 or
   POSC 159S, POSC 160 or POSC 160S,
   POSC 161/LNST 188, POSC 162/ LNST
   142 or POSC 162S/LNST 142S, POSC
   163 or POSC 163S, POSC 164 or POSC
   164S, POSC 165 or POSC 165S, POSC
   178 or POSC 178S, POSC 188 or POSC
   188S

c) General Political Science (three other

PROPOSED:
The major requirements for the B.A. degree in Political Science/International Affairs are as follows:

1. Lower-division requirements (two courses [at least 8-10 units]): One course from a and one course from b:
   a) No Change
   b) No Change

Upper-division requirements (11 courses, 44-55 units):

a) International Relations (three courses)
   POSC 123, POSC 124 or POSC 124S,
   POSC 125, POSC 126 or POSC 126S,
   POSC 127 or POSC 127S, POSC 128,
   POSC 129, POSC 130, POSC 132 or
   POSC 132S, POSC 134 or POSC 134S,
   POSC 135, POSC 137 or POSC 137S,
   POSC 138 or POSC 138S, POSC 139 or
   POSC 139S, POSC 147 or POSC 147S,
   POSC 150 or POSC 150S, POSC 169,
   POSC 189

b) Comparative Politics (three courses) POSC 120, POSC 131, POSC 133, POSC 151,
   POSC 152, POSC 153, POSC 154, POSC
   155 or POSC 155S, POSC 156, POSC
   157, POSC 158/LNST 148, POSC 159 or
   POSC 159S, POSC 160 or POSC 160S,
   POSC 161/LNST 188, POSC 162/ LNST
   142 or POSC 162S/LNST 142S, POSC
   163 or POSC 163S, POSC 164 or POSC
   164S, POSC 165 or POSC 165S, POSC
   178 or POSC 178S, POSC 188 or POSC
   188S

c) General Political Science (three other
political science courses in any subfield).
d) In addition, students must take two
courses from the following:
ANTH109/GSST 109, ANTH 122, ANTH 127, ANTH 136/SEAS 136, ANTH 139,
ANTH 161/LNST 161, ANTH 163, ANTH 164/LNST 164/GSST 164, ANTH168/
ETST148/LNST168, ANTH 169/GBST 169,
ANTH 182, ANTH 186/LNST 166, ANTH 188/GSST 151

ECON 171, ECON 175, ECON 178/BUS 178, ECON 181, ECON 182, ECON 185/
LNST 185

HISA 117A, HISA 117B, HISA 140, HISA 161, HISA 162, HISA 163B, HISA 164A,
HISA 164B, HISA 165, HISA 166, HISE 141, HISE 142, HISE 145 or HISE 145S, HISE 146 or HISE 146S, HISE 147, HISE 152,
HISE 162, HISE 174, HIST 124, HIST 125, HIST 127, HIST 182, HIST 184, HIST 186
SOC 135, SOC 136, SOC 137, SOC 161,
SOC 181, SOC 185

Students may petition for permission to
count a specific course not on this list.

Political Science/International Affairs majors are
strongly encouraged to learn a language other
than English. The university offers language
instruction in Chinese, French, German, Greek,
Italian, Japanese, Korean, Latin, Portuguese,
Spanish, and Vietnamese.

POLITICAL SCIENCE/INTERNATIONAL AFFAIRS MAJORS

political science courses in any subfield).
d) In addition, students must take two
courses from the following:
ANTH109/GSST 109, ANTH 122, ANTH 127, ANTH 136/SEAS 136, ANTH 139,
ANTH 161/LNST 161, ANTH 163, ANTH 164/LNST 164/GSST 164, ANTH168/
ETST148/LNST168, ANTH 169/GBST 169,
ANTH 182, ANTH 186/LNST 166, ANTH 188/GSST 151

ECON 171, ECON 175, ECON 178/BUS 178, ECON 181, ECON 182, ECON 185/
LNST 185

HISA 117A, HISA 117B, HISA 140, HISA 161, HISA 162, HISA 163B, HISA 164A,
HISA 164B, HISA 165, HISA 166, HISE 141, HISE 142, HISE 145 or HISE 145S, HISE 146 or HISE 146S, HISE 147, HISE 152,
HISE 162, HISE 174, HIST 124, HIST 125, HIST 127, HIST 182, HIST 184, HIST 186
SOC 135, SOC 136, SOC 137, SOC 161,
SOC 181, SOC 185

Students may petition for permission to
count a specific course not on this list.

Political Science/International Affairs majors are
strongly encouraged to learn a language other
than English. The university offers language
instruction in Chinese, French, German, Greek,
Italian, Japanese, Korean, Latin, Portuguese,
Spanish, and Vietnamese.

JUSTIFICATION:

The first set of changes responds the fact that the new Banner system is flagging more students’ transcripts for supposed failure to meet unit requirements. These are students who have taken the right number of courses in the categories defined by our different majors (we have four different POSC majors). But for a variety of reasons, the students don’t have the number of units specified. In the broadest sense, this is because students don’t all get the same number of units for taking the same classes. For example, currently we have a lower-division requirement that is measured both in number of courses (four) and units (20). This assumes, then, that each course taken toward the lower division requirement (5, 7, 10, 15, 17, 20) is a five-unit class. But we allow transfer students to meet some of these requirements by using community college courses, some of which come with only four units. The solution is to say that the lower division requirement remains four courses from the same list of lower div courses — but can be met with a range of units, from 16 to 20. A similar problem arises with upper division courses. In this case, the issue is that sometimes we offer S versions of our courses, and
sometimes we offer the versions without sections. In one case, the course is worth five units, in the other, four. The fix is similar.

We are removing courses that were deleted by other departments.

**APPROVALS:**

Approved by the faculty of the Department of Political Science: February 12, 2018
Approved by the Executive Committee College of Humanities, Arts, and Social Sciences: February 28, 2018
Approved by the Committee on Educational Policy: April 10, 2018
To be adopted:

Proposed changes to the Political Science Major

PRESENT:
The major requirements for the B.A. degree in Political Science are as follows:
1. Lower-division requirements (four courses [at least 20 units]): one course from a, b, c, and d.
   Students in the major must complete two of the four lower-division Political Science courses with a grade of “C” or better in order to take upper-division Political Science courses.
   a) POSC 005 or POSC 005H or POSC 005W or POSC 007
   b) POSC 010 or POSC 010H or POSC 010W
   c) POSC 015 or POSC 015H or POSC 017
   d) POSC 020 or POSC 020H

Upper-division requirements (nine courses [at least 36 units])
   a) One course from each of the following areas:
       (1) U.S. Government and Politics: POSC 100, POSC 101, POSC 104 or 104S, POSC 108, POSC 143, POSC 144 or POSC 144S, POSC 145, POSC 146, POSC 148 or POSC 148H or POSC 148S, POSC 149, POSC 166, POSC 167, POSC 170, POSC 171, POSC 172/URST 172, POSC 173 or POSC 173S, POSC 180 or POSC 180S, POSC 181, POSC 182, POSC 183, POSC 184 or POSC 184S, POSC 186
       (2) Comparative Government and Politics: POSC 120, POSC 131, POSC 133, POSC 151, POSC 152, POSC 153, POSC 154, POSC 155 or POSC 155S, POSC 156, POSC 157, POSC 158/ LNST 148, POSC 159 or POSC 159S, POSC 160 or POSC 160S, POSC 161/ LNST 188, POSC 162/LNST 142 or POSC 162S/LNST 142S, POSC 163

PROPOSED:
The major requirements for the B.A. degree in Political Science are as follows:
1. Lower-division requirements (four courses [at least 16-20 units]): one course from a, b, c, and d.
   Students in the major must complete two of the four lower-division Political Science courses with a grade of “C” or better in order to take upper-division Political Science courses.
   a) POSC 005 or POSC 005H or POSC 005W or POSC 007
   b) POSC 010 or POSC 010H or POSC 010W
   c) POSC 015 or POSC 015H or POSC 017
   d) POSC 020 or POSC 020H

Upper-division requirements (nine courses [at least 36 units])
   a) One course from each of the following areas:
       (1) U.S. Government and Politics: POSC 100, POSC 101, POSC 104 or 104S, POSC 108, POSC 143, POSC 144 or POSC 144S, POSC 145, POSC 146, POSC 148 or POSC 148H or POSC 148S, POSC 149, POSC 166, POSC 167, POSC 170, POSC 171, POSC 172/URST 172, POSC 173 or POSC 173S, POSC 180 or POSC 180S, POSC 181, POSC 182, POSC 183, POSC 184 or POSC 184S, POSC 186
       (2) Comparative Government and Politics: POSC 120, POSC 131, POSC 133, POSC 151, POSC 152, POSC 153, POSC 154, POSC 155 or POSC 155S, POSC 156, POSC 157, POSC 158/ LNST 148, POSC 159 or POSC 159S, POSC 160 or POSC 160S, POSC 161/ LNST 188, POSC 162/LNST 142 or POSC 162S/LNST 142S, POSC 163
or POSC 163S, POSC 164 or POSC 164S, POSC 165 or POSC 165S, POSC 178 or POSC 178S, POSC 188 or POSC 188S

(3) International Relations and Foreign Policy: POSC 123, POSC 124 or POSC 124S, POSC 125, POSC 126 or POSC 126S, POSC 127 or POSC 127S, POSC128, POSC 129, POSC 130, POSC 132 or POSC 132S, POSC 134 or POSC 134S, POSC 137S, POSC 138 or POSC 138S, POSC 139 or POSC 139S, POSC 147 or POSC 147S, POSC 150 or POSC 150S, POSC 169

(4) Political Theory: POSC 106 or POSC 106S, POSC 110 or POSC 110S, POSC 111 or POSC 111S, POSC 112 or POSC 112S, POSC 113, POSC 115 or POSC 115S, POSC 116, POSC 117, POSC 119, POSC121/CLA 121/CPAC 121/ or POSC 121S /CLA 121S/CPAC 121S/, POSC 122 or POSC 122S

b) Five additional courses in Political Science course work (Not more than 2 courses from the 190 series and POSC 142L and POSC 142M are allowed toward the nine-course upper-division requirement.)

A course in statistics is strongly recommended.

JUSTIFICATION:

The first set of changes responds the fact that the new Banner system is flagging more students’ transcripts for supposed failure to meet unit requirements. These are students who have taken the right number of courses in the categories defined by our different majors (we have four different POSC majors). But for a variety of reasons, the students don’t have the number of units specified. In the broadest sense, this is because students don’t all get the same number of units for taking the same classes. For example, currently we have a lower-division requirement that is measured both in number of courses (four) and units (20). This assumes, then, that each course taken toward the lower division requirement (5, 7, 10, 15, 17, 20) is a five-unit class. But we allow transfer students to meet some of these requirements by using community college courses, some of which come with only four units. The solution is to say that the lower division requirement remains four courses from the same list of lower div courses – but can be met with a range of units, from 16 to 20. A similar problem arises with upper division courses. In this case, the issue is that sometimes we offer S versions of our courses, and sometimes we offer the versions without sections. In one case, the course is worth five units, in the other, four. The fix is similar. We are removing courses that were deleted by other departments.

APPROVALS:

Approved by the faculty of the Department of Political Science: February 12, 2018
Approved by the Executive Committee College of Humanities,
**To be adopted:**

**Proposed changes to the Political Science/Public Service Major**

<table>
<thead>
<tr>
<th>PRESENT:</th>
<th>PROPOSED:</th>
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<tr>
<td>The major requirements for the B.A. degree in Political Science/Public</td>
<td>The major requirements for the B.A. degree in Political Science/Public</td>
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<tr>
<td>Service are as follows. Note that the prerequisite for POSC 198-I is a</td>
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<tr>
<td>GPA of 2.70 or better.</td>
<td>GPA of 2.70 or better.</td>
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<tr>
<td>1. Lower-division requirements (five courses [at least 20 units])</td>
<td>1. Lower-division requirements (five courses [at least 20-25 units])</td>
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<tr>
<td>a) POSC 010 or POSC 010H or POSC 010W</td>
<td>a) POSC 010 or POSC 010H or POSC 010W</td>
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<tr>
<td>b) One course from POSC 005 or POSC 005H or POSC 005W, POSC 015 or</td>
<td>b) One course from POSC 005 or POSC 005H or POSC 005W, POSC 015 or</td>
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<tr>
<td>POSC 017, POSC 020 or POSC 020H</td>
<td>POSC 017, POSC 015H or POSC 017, POSC 020 or POSC 020H</td>
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<td>c) ECON 003</td>
<td>c) ECON 003</td>
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<td>d) SOC 004</td>
<td>d) SOC 004</td>
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<td>e) SOC 005 or STAT 040</td>
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<td>Students in the major must complete two of the lower-division Political</td>
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<td>Science courses with a grade of “C” or better in order to take upper</td>
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<td>division political science courses.</td>
<td>division political science courses.</td>
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<tr>
<td>2. Upper-division requirements (11 courses [at least 44 units])</td>
<td>2. Upper-division requirements (11 courses [at least 40-48 units])</td>
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<tr>
<td>a) Political Science distribution: choose one course from each group</td>
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<tr>
<td>(1) Comparative Government and Politics Group: POSC 120, POSC 131,</td>
<td>(1) Comparative Government and Politics Group: POSC 120, POSC 151, POSC</td>
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<tr>
<td>POSC 151, POSC 152, POSC 153, POSC 154, POSC 155 or POSC 155S, POSC</td>
<td>152, POSC 153, POSC 154, POSC 155 or POSC 155S, POSC 152, POSC 153,</td>
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<td>156, POSC 157, POSC 158/LNST 148, POSC 159 or POSC 159S, POSC 160 or</td>
<td>POSC 154, POSC 155 or POSC 155S, POSC 152, POSC 153, POSC 154, POSC</td>
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<tr>
<td>POSC 160S, POSC 161/LNST 148 or POSC 162/LNST 142 or POSC 162S/LNST</td>
<td>155 or POSC 155S, POSC 156, POSC 157, POSC 158/LNST 148, POSC 159 or</td>
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<td>142, POSC 163 or POSC 163S, POSC 164 or POSC 164S, POSC 165 or POSC 165</td>
<td>POSC 159S, POSC 160 or POSC 160S, POSC 161/LNST 148, POSC 162/LNST</td>
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<td>S, POSC 178 or POSC 178S, POSC 188 or POSC 188S</td>
<td>142 or POSC 162S/LNST 142 or POSC 163 or POSC 163S, POSC 164 or POSC</td>
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<tr>
<td>(2) International Relations and Foreign Policy Group: POSC 123, POSC</td>
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<td>124 or POSC 124S, POSC 125, POSC 126 or POSC 124S, POSC 125, POSC 126</td>
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POSC 126S, POSC 127 or POSC 127S, POSC 128, POSC 129, POSC 130, POSC 132 or POSC 132S, POSC 134 or POSC 134S, POSC 135, POSC 137 or POSC 137S, POSC 138 or POSC 138S, POSC 139 or POSC 139S, POSC 147 or POSC 147S, POSC 150 or POSC 150S, POSC 169, POSC 189

(3) Political Theory Group: POSC 106 or POSC 106S, POSC 110 or POSC 110S, POSC 111 or POSC 111S, POSC 112 or POSC 112S, POSC 113, POSC 115 or POSC 115S, POSC 116, POSC 117, POSC 119, POSC 121/CLA 121/CPAC 121 or POSC 121S/CLA 121S/CPAC 121S, POSC 122 or POSC 122S

b) Public Service requirement
(1) POSC 181, POSC 183
(2) Eight (8) units from POSC 198G and POSC 198-I (prerequisite: GPA of 2.70 or better)
(3) An additional four courses from POSC 118, POSC 170, POSC 171, POSC 172/URST 172, POSC 182, POSC 186

JUSTIFICATION:

The first set of changes responds the fact that the new Banner system is flagging more students’ transcripts for supposed failure to meet unit requirements. These are students who have taken the right number of courses in the categories defined by our different majors (we have four different POSC majors). But for a variety of reasons, the students don’t have the number of units specified. In the broadest sense, this is because students don’t all get the same number of units for taking the same classes. For example, currently we have a lower-division requirement that is measured both in number of courses (four) and units (20). This assumes, then, that each course taken toward the lower division requirement (5, 7, 10, 15, 17, 20) is a five-unit class. But we allow transfer students to meet some of these requirements by using community college courses, some of which come with only four units. The solution is to say that the lower division requirement remains four courses from the same list of lower div courses – but can be met with a range of units, from 16 to 20. A similar problem arises with upper division courses. In this case, the issue is that sometimes we offer S versions of our courses, and sometimes we offer the versions without sections. In one case, the course is worth five units, in the other, four. The fix is similar.

We are removing courses that were deleted by other departments.

APPROVALS:
Approved by the faculty of the Department of Political Science: February 12, 2018
To be adopted:

Proposed changes to the Psychology Major (BA)

**PRESENT:**

For the Bachelor of Arts The major requirements for the B.A. degree in Psychology are as follows:

1. Lower-division requirements (39 units)
   a) One course in Mathematics chosen from MATH 004, MATH 005, MATH 008A, or MATH 009A
   b) One 4 unit course in Biological Sciences (Biochemistry, Biology, Botany and Plant Sciences, Entomology, Nematology, or Plant Pathology)
   c) One 4 unit course in Physical Sciences (Chemistry, Physics, Earth Sciences, excluding cultural Geography courses)
   d) Two additional 4 unit courses that satisfy the CHASS Natural Sciences and Mathematics breadth requirements.
   e) PSYC 001, PSYC 002, PSYC 011, PSYC 012

2. Upper-division requirements (37 units)
   a) PSYC 110 or CBNS 106
   b) PSYC 140, PSYC 150
   c) PSYC 132 or PSYC 134
   d) PSYC 160 or PSYC 161 or PSYC 162 or PSYC 163
   e) Four additional 4-unit, upper-division Psychology courses. Only one 4- to 5-unit quarter of PSYC 198G, or one 4- to 8-unit quarter of PSYC 1981 may be included. No 190-series courses other than PSYC 198G or PSYC 1981 may be used.

Students planning for graduate school should take into consideration any specific graduate school requirements when choosing these elective Psychology courses.

**PROPOSED:**

For the Bachelor of Arts The major requirements for the B.A. degree in Psychology are as follows:

1. Lower-division requirements (at least 39 units)
   a) One course in Mathematics equivalent to MATH 004 or higher; or a score on the MAE (Math Advisory Exam) sufficient for placement into MATH 022 or higher.
   b) One 4 unit course in Biological Sciences (Biochemistry, Biology, Botany and Plant Sciences, Entomology, Nematology, or Plant Pathology)
   c) One 4 unit course in Physical Sciences (Chemistry, Physics, Earth Sciences, excluding cultural Geography courses)
   d) Two additional 4 unit courses that satisfy the CHASS Natural Sciences and Mathematics breadth requirements.
   e) PSYC 001, PSYC 002, PSYC 011, PSYC 012

No change.

Students planning for graduate school should take into consideration any specific graduate school requirements when choosing these elective Psychology courses.

**Note** Students who have taken general or introductory Psychology courses other than

No change
PSYC 001 and PSYC 002 must consult with a departmental advisor.

JUSTIFICATION:
The following change to the BA and BS major criteria is in the wording of the math requirement. The wording clarifies the existing requirement and brings it in line with prior catalog changes to the change of major and transfer admissions criteria. The change is not a substantive change to the requirement itself.

The PSYC department has adopted CEP’s recommendation to add, “at least” to the 39 units for lower division requirements to account for the possibility that students can use the placement exams in place of course requirements.

APPROVALS:
Approved by the faculty of the Department of Psychology: October 17, 2017
Approved by the Executive Committee College of Humanities, Arts, and Social Sciences: February 28, 2018
Approved by the Committee on Educational Policy: May 1, 2018
To be adopted:

Proposed changes to the Psychology Major (BS)

PRESENT:
For the Bachelor of Science
The B.S. degree is designed to provide a research-intensive curriculum for students who want a deeper understanding of how knowledge is created through research and for students who may be interested in research-based graduate programs in psychology and the biological sciences.

Psychology courses must be taken for a letter grade. Students must check course descriptions for prerequisite requirements.

Admission A limited number of students are accepted into the B.S. degree of the Psychology major. Acceptance is according to overall GPA and acceptable progress towards the Psychology major, including PSYC 001, PSYC 002, PSYC 011 and PSYC 012 with a B- or better. Students must apply when they have completed between 75 and 100 quarter units of college work.

The major requirements for the B.S. degree in Psychology are as follows:

1. Lower-division requirements for the B.S. (39 units)
a) One course in Mathematics chosen from MATH 004, MATH 005, MATH 008A, or MATH 009A
b) One 4 unit course in Biological Sciences (Biochemistry, Biology, Botany and Plant Sciences, Entomology, Nematology, or Plant Pathology)
c) One 4 unit course in Physical Sciences (Chemistry, Physics, Earth Sciences, excluding cultural Geography courses)
d) Two additional 4 unit courses that satisfy the CHASS Natural Sciences and

PROPOSED:
For the Bachelor of Science
No Change.

The major requirements for the B.S. degree in Psychology are as follows:

1. Lower-division requirements for the B.S. (at least 39 units)
a) One course in Mathematics equivalent to MATH 004 or higher, or a score on the MAE (Math Advisory Exam) sufficient for placement into MATH 022 or higher.
b) One 4 unit course in Biological Sciences (Biochemistry, Biology, Botany and Plant Sciences, Entomology, Nematology, or Plant Pathology)
c) One 4 unit course in Physical Sciences (Chemistry, Physics, Earth Sciences, excluding cultural Geography courses)
d) Two additional 4 unit courses that satisfy the CHASS Natural Sciences and
Mathematics breadth requirements.

2. Upper-division requirements (37 units)
   a) PSYC 110 or CBNS 106
   b) PSYC 140, PSYC 150
   c) PSYC 132 or PSYC 134
   d) PSYC 160 or PSYC 161 or PSYC 162 or PSYC 163
   e) Any three of the following: PSYC 109, PSYC 120L/CBNS 120L, PSYC 181, PSYC 182 (E-Z), PSYC 195, PSYC 197 (for a total of 4 units, letter grade required), PSYC 199H
   f) One of the following: PSYC 117, PSYC 136, PSYC 139, PSYC 148, PSYC 169, or PSYC 190 (for a total of 4 units, letter grade required). One of the following graduate seminars may be substituted, with permission of the instructor: PSYC 251, PSYC 255, PSYC 256, PSYC 257, PSYC 258, PSYC 263
   g) One additional 4-unit, upper-division Psychology course. No 190- series courses other than PSYC 198G or PSYC 198I may be used.

Students planning for graduate school should take into consideration any specific graduate school requirements when choosing these elective Psychology courses.

JUSTIFICATION:
The following change to the BA and BS major criteria is in the wording of the math requirement. The wording clarifies the existing requirement and brings it in line with prior catalog changes to the change of major and transfer admissions criteria. The change is not a substantive change to the requirement itself.
PSYC 180 has been deleted by the department the course no longer exists.
The PSYC department has adopted CEP's recommendation to add, “at least” to the 39 units for lower division requirements to account for the possibility that students can use the placement exams in place of course requirements.

APPROVALS:
Approved by the faculty of the Department of Psychology: October 17, 2017
Approved by the Executive Committee College of Humanities, Arts, and Social Sciences: February 28, 2018
Approved by the Committee on Educational Policy: May 1, 2018
To be adopted:

Proposed Changes to Science Fiction and Technoculture Studies Minor

PRESENT:

SFTS Science Fiction and Technoculture Studies Minor

Subject abbreviation: SFTS

Committee in Charge
Sherryl Vint (English)
Dana Simmons (History)
Tamara Ho (Gender and Sexuality Studies)
Nalo Hopkinson (Creative Writing)
Eric Schwitzgebel (Philosophy)
Milagros Peña, Ph.D.
Dean, College of Humanities, Arts, and Social Sciences, ex officio

Supporting Faculty
Derek Burrill (Media and Cultural Studies)
Stuart Krieger (Theatre, Film and Digital Production)
Margherita Long (Comparative Literature)
Juliet McMullin (Anthropology)
Yolanda Moses (Anthropology)
Lisa Raphals, (Comparative Literature)
Robin Russin (Theatre, Film and Digital Production)
Chikako Takeshita (Gender and Sexuality Studies)
James Tobias (English)
Susan Zieger (English)
Milagros Peña, Ph.D.
Dean, College of Humanities, Arts, and Social Sciences, ex officio

PROPOSED:

SFCS Speculative Fiction and Cultures of Science Minor

Subject abbreviation: SFCS

Committee in Charge
Sherryl Vint (English)
Dana Simmons (History)
Tamara Ho (Gender and Sexuality Studies)
Nalo Hopkinson (Creative Writing)
Eric Schwitzgebel (Philosophy)
Milagros Peña, Ph.D.
Dean, College of Humanities, Arts, and Social Sciences, ex officio

Supporting Faculty
Derek Burrill (Media and Cultural Studies)
Robb Hernandez (English)
John Jennings (Media and Cultural Studies)
Gloria Kim (Media and Cultural Studies)
Stuart Krieger (Theatre, Film and Digital Production)
Tim Labor (Media and Cultural Studies)
Juliette Levy (History)
Juliet McMullin (Anthropology)
Yolanda Moses (Anthropology)
Lisa Raphals, (Comparative Literature)
Judith Rodenbeck (Media and Cultural Studies)
Richard Rodriguez (Media and Cultural Studies)
Robin Russin (Theatre, Film and Digital Production)
Steven Sohn (English)
Chikako Takeshita (Gender and Sexuality Studies)
James Tobias (English)
Susan Zieger (English)
Milagros Peña, Ph.D.
Dean, College of Humanities, Arts, and Social Sciences, ex officio
The minor in Science Fiction and Technoculture Studies explores the intersections linking science fiction studies, science and technology studies (STS), and technoculture studies. The program examines the histories and cultures of science, technology, and medicine to understand the role that culture has always played in the production of science and the reciprocal way that changes in science and technology have shaped culture. The program uniquely emphasizes the role of popular culture and the genre of science fiction in particular in mediating public understandings of science, serving as an imaginative testing ground for technological innovation, and articulating hopes and anxieties regarding technocultural change. Drawing on faculty from across CHASS, the Science Fiction and Technoculture Studies minor enables students to develop a critical understanding of the cultures of science and their dialectical exchange with contemporary popular culture.

The minor in Speculative Fiction and Cultures of Science explores intersections among speculative fiction, science and technology studies (STS), and traditions of speculative thought. We study the pervasive role of speculative discourses in public culture, investigating the complex and reciprocal exchanges among futuristic discourses, research agendas, public policy decisions, media texts, and daily life in technologically saturated societies. Using the combined perspectives of cultural studies and STS helps students develop critical literacy about their media-dominated landscape through which to understand its discourses of science and the future. Bringing speculative fictions and STS into dialogue, our scholars focus on understanding technological change in specific contexts by analyzing the texts and practices that have responded to, critiqued, and build upon the ways science shapes our cultural, material, and economic milieu. Speculative thinking and speculative fictions are central to many of the most compelling contemporary research concerns, such as the Anthropocene, climate change, genetic engineering, and discourses of the posthuman. We examine the histories and cultures of science, technology, and medicine to understand the role culture plays in the production of science and the reciprocal way changes in science and technology shape culture. Our program uniquely emphasizes the role of popular culture and the genres of speculative fiction, in particular, for serving as an imaginative testing ground for technological innovation, articulating hopes and anxieties regarding technological change, and mediating public understandings of science and its applications.

1. Upper-division requirements (24 units)
   a) Four (4) units from SFTS 001
   b) Sixteen (16) additional units, selected from the following groups. Students must take at least four (4) units from two of the three groups.

   **GROUP ONE**: Fine Arts; selected from CRWT 162; CRWT 172; MCS 146; MCS 151G; MCS 153 (E-Z); TFDP 166C.

   **GROUP TWO**: Humanities; selected from CPLT 118; CPAC 132; ENGL 179A; ENGL 179B; ENGL 179C; ENGL 179D; ENGL 179T; JPN 184; HIST 105; HIST 107; HISA 147; PHIL 137; PHIL 167.

   b) No change.

   1. Upper-division Requirements (24 units)
      a) Four (4) units from SFCS 001 or from the approved substitutes ENGL 146(E-Z)/MCS 146(E-Z) or ENGL 179C or ANTH 162.
GROUP THREE: Social Sciences; selected from ANTH 143; ANTH 162; GSST 106; GSST 161; GSST 185; GSST 187; GSST 189.

c) Four (4) units from SFTS 193 (senior seminar) or CPLT 193 or ENGL 189 or MCS 193 or PHIL 193

c) Four (4) units from SFCS 193 (senior seminar) or approved equivalents listed above. There is no required order in which elective courses must be taken but credit in SFCS 001 is required for entry into SFCS 193.

All students must take the introductory course and the senior seminar. There is no required order in which elective courses must be taken but credit in SFTS 001 is required for entry into SFTS 193.

All students must take the introductory course (SFCS 001) and the senior seminar or approved equivalents listed above. There is no required order in which elective courses must be taken but credit in SFCS 001 is required for entry into SFCS 193.

See Minors under the College of Humanities, Arts, and Social Sciences in the Colleges and Programs section of this catalog for information on minors.

See Minors under the College of Humanities, Arts, and Social Sciences in the Colleges and Programs section of this catalog for information on minors.

JUSTIFICATION:

We have changed the name of the program to match the name change for the related Designated Emphasis that was approved in 2015. The Registrar’s Office was consulted regarding the proposed new subject code and that the proposed new subject code meets their guidelines and can be used in the system. We have also increased the course options for meeting requirements, since we were unable to offer some courses frequently enough for students to complete in a timely manner. None of the course are new courses, just newly configured to this program. We have slightly adjusted the description of the program and the core course to better match the direction of research with the new faculty complement. Finally, some new faculty have joined the program and some people have left UCR and so the faculty list is updated.

APPROVALS:

Approved by the faculty of the Department of English: May 2017
Approved by the Executive Committee of the College of Humanities, Arts, and Social Sciences: January 17, 2018
Approved by the Committee on Educational Policy: April 25, 2018
To be adopted:  
Proposed Changes to Chemistry Undergraduate Program  
Bachelor of Arts in Chemistry

**PRESENT:**

**Bachelor of Arts**

1. Lower-division requirements (63 units)
   
   a) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC (or CHEM 01HA and CHEM 1HLA, CHEM 01HB and CHEM 1HLB, CHEM 01HC and CHEM 1HLC), CHEM 005, CHEM 008A and CHEM 08LA or CHEM 12A, CHEM 008B and CHEM 08LB or CHEM 12B, CHEM 008C and CHEM 08LC or CHEM 12C (or CHEM 08HA and CHEM 08HLA or CHEM 12HA, CHEM 08HB and CHEM 08HLB or CHEM 12HB, CHEM 08HC and CHEM 08HLC or CHEM 12HC)
   
   b) MATH 009A, MATH 009B, MATH 009C, MATH 010A
   
   c) PHYS 040A, PHYS 040B, PHYS 040C (or PHYS 002A, PHYS 002B, PHYS 002C, PHYS 02LA, PHYS 02LB, PHYS 02LC)

2. Upper-division requirements (36 units) A minimum grade of “C-” for any upper-division course used to fulfill the requirements for the B.A. degree.

   a) CHEM 110A, CHEM 110B, CHEM 113, CHEM 125, CHEM 150A, CHEM 191, and either CHEM 111 or CHEM 140 or CHEM 166
   
   b) Ten (10) additional upper-division units

**PROPOSED:**

**Bachelor of Arts**

1. Lower-division requirements (63 units)
   
   a) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC (or CHEM 01HA and CHEM 1HLA, CHEM 01HB and CHEM 1HLB, CHEM 01HC and CHEM 1HLC), CHEM 005, CHEM 008A and CHEM 08LA or CHEM 12A, CHEM 008B and CHEM 08LB or CHEM 12B, CHEM 008C and CHEM 08LC or CHEM 12C (or CHEM 08HA and CHEM 08HLA or CHEM 12HA, CHEM 08HB and CHEM 08HLB or CHEM 12HB, CHEM 08HC and CHEM 08HLC or CHEM 12HC)
   
   b) No Change
   
   c) No Change

2. No Change
JUSTIFICATION:

Organic Chemistry series has been approved to update from CHEM 012 to CHEM 008 in Fall on 2017 in order help all CNAS major by reducing the upper division requirement between 36 to 60 units and give other majors an opportunity to strengthen their own degree program. CHEM 012 no longer exists.

Changing CHEM 125 to CHEM 125W

The CHEM 125 course contained an objective of having the students paraphrase experiments and scientific techniques to better understand the importance and objective of the experiment being performed. By changing the course from CHEM 125 to CHEM 125W, this will allow students to be trained in writing scientific reports or journals while preparing lab reports for this class. Along with that, this will also accomplish the requirement of satisfying the UCR’s third-quarter writing requirement.

APPROVALS:

Approved by the faculty of the Department of Chemistry: February 27, 2018
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: March 20, 2018
Approved by the Committee on Educational Policy: May 4, 2018
To be adopted: Proposed Changes to Chemistry Undergraduate Program
Bachelor of Science in Chemistry

PRESENT:
Bachelor of Science
1. Lower-division requirements (71-72 units)
   a) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC
      (or CHEM 01HA and CHEM 1HLA, CHEM 01HB and CHEM 1HLB, CHEM 01HC and
      CHEM 1HLC), CHEM 005, CHEM 008A
      and CHEM 08LA or CHEM 12A, CHEM 008B and CHEM 08LB or CHEM 12B,
      CHEM 008C and CHEM 08LC or CHEM 12C (or CHEM 08HA and CHEM 08HLA
      or CHEM 12HA, CHEM 08HB and CHEM 08HLB or CHEM 12HB, CHEM 08HC and
      CHEM 08HLC or CHEM 12HC)
   b) MATH 009A, MATH 009B, MATH 009C, and three out of the following: MATH 010A,
      MATH 010B, MATH 031, MATH 046
   c) PHYS 040A, PHYS 040B, PHYS 040C

2. Upper-division requirements (41-43 units)
   A minimum grade of “C-” for any upper-
   division course used to fulfill the requirements
   for the B.S. degree.
   a) CHEM 110A, CHEM 110B, CHEM 111, CHEM 113, CHEM 125, CHEM 150A, CHEM
      191
   b) Two laboratory courses from CHEM 114or CHEM 140, CHEM 166, BCH 162
   c) One course from BCH 100, BCH 110A, CHEM 143
   d) One 4-unit course from CHEM 135/ENSC 135/ENTX 135, CHEM 136/ENSC
      136/ENTX 136/SWSC 136, CHEM 150B, CHEM 197, CHEM 199, CHEM 197 and

PROPOSED:
Bachelor of Science
No Change

a) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC
   (or CHEM 01HA and CHEM 1HLA, CHEM 01HB and CHEM 1HLB, CHEM 01HC and
   CHEM 1HLC), CHEM 005, CHEM 008A
   and CHEM 08LA or CHEM 12A, CHEM 008B and CHEM 08LB or CHEM 12B,
   CHEM 008C and CHEM 08LC or CHEM 12C (or CHEM 08HA and CHEM 08HLA
   or CHEM 12HA, CHEM 08HB and CHEM 08HLB or CHEM 12HB, CHEM 08HC and
   CHEM 08HLC or CHEM 12HC)

b) MATH 009A, MATH 009B, MATH 009C, and two out of the following: MATH 010A,
   MATH 010B, MATH 031, MATH 046

   c) No Change

2. No Change

a) CHEM 110A, CHEM 110B, CHEM 111, CHEM 113, CHEM 125W, CHEM 150A, CHEM
   191

b) No Change

   c) No Change

   d) No Change
CHEM 199 must be taken for a grade and a written report submitted.

**Chemical Physics Option**

Students must consult with their Chemistry advisor before electing this option.

1. **Lower-division requirements (79-80 units)**
   
a) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC (or CHEM 01HA and CHEM 1HLA, CHEM 01HB and CHEM 01HLB, CHEM 01HC and CHEM 1HLC), CHEM 005, CHEM 008A and CHEM 08LA or CHEM 012A, CHEM 008B and CHEM 08LB or CHEM 012B, CHEM 008C and CHEM 08LC or CHEM 012C (or CHEM 08HA and CHEM 08HLA or CHEM 12HA, CHEM 08HB and CHEM 08HLB or CHEM 12HB, CHEM 08HC and CHEM 08HLC or CHEM 12HC)

b) MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046

c) PHYS 041A, PHYS 041B, PHYS 041C or PHYS 040A, PHYS 040B, PHYS 040C, and PHYS 041C

2. **Upper-division requirements (59 units)** A minimum grade of “C-” for any upper-division course used to fulfill the requirements for the Chemical Physics option.

   a) CHEM 110A, CHEM 110B, CHEM 111, CHEM 113, CHEM 114, CHEM 150A, CHEM 150B, CHEM 191

   b) Twenty-one (21) units of upper-division course work in Mathematics or Physics (110 or above excluding 190 series)

   c) Nine (9) additional units in physical chemistry

**Environmental Chemistry Option**

Students must consult with their Chemistry advisor before electing this option.

**Chemical Physics Option**

No Change

1. **No Change**

   a) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC (or CHEM 01HA and CHEM 1HLA, CHEM 01HB and CHEM 01HLB, CHEM 01HC and CHEM 1HLC), CHEM 005, CHEM 008A and CHEM 08LA or CHEM 012A, CHEM 008B and CHEM 08LB or CHEM 012B, CHEM 008C and CHEM 08LC or CHEM 012C (or CHEM 08HA and CHEM 08HLA or CHEM 12HA, CHEM 08HB and CHEM 08HLB or CHEM 12HB, CHEM 08HC and CHEM 08HLC or CHEM 12HC)

   b) No Change

   c) No Change

2. **No Change**

   a) No Change

   b) No Change

   c) No Change

**Environmental Chemistry Option**

No Change
1. Lower-division requirements (84 units)

   a) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC (or CHEM 01HA and CHEM 1HLA, CHEM 01HB and CHEM 1HLB, CHEM 01HC and CHEM 1HLC), CHEM 005, CHEM 008A and CHEM 08LA or CHEM 12A, CHEM 008B and CHEM 08LB or CHEM 12B, CHEM 008C and CHEM 08LC or CHEM 12C (or CHEM 08HA and CHEM 08HLA or CHEM 12HA, CHEM 08HB and CHEM 08HLB or CHEM 12HB, CHEM 08HC and CHEM 08HLC or CHEM 12HC)

   b) MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046

   c) PHYS 040A, PHYS 040B, PHYS 040C

   d) BIOL 005A, BIOL 05LA or BIOL 020, BIOL 005B, BIOL 005C.

2. Upper-division requirements (57-58 units) A minimum grade of “C-” for any upper-division course used to fulfill the requirements for the Environmental Chemistry option.

   a) CHEM 110A, CHEM 110B, CHEM 111, CHEM 113, CHEM 125, CHEM 135/ENSC 135/ENTX 135, CHEM 136/ENSC 136/ENTX 136/SWSC 136, CHEM 140, CHEM 150A, CHEM 166, CHEM 191

   b) One course from ENSC 104/SWSC 104 or GEO 137

   c) One course from BCH 100, BCH 110A or CHEM 143

   d) Two additional courses from CHEM 150B, CHEM 197, CHEM 199, ENSC 100, ENSC 101, ENSC 102, ENSC 140/SWSC 140, ENSC 163, ENTX 101, GEO 132, GEO 157 (4 units total from CHEM 197 and/or CHEM 199)

Undergraduate Research is strongly encouraged for students with the requisite ability. Students wishing to participate in this activity should consult
Chemistry faculty, their Chemistry advisor, or check: ugr.ucr.edu.

JUSTIFICATION:

- Removing CHEM 012 courses

Organic Chemistry series has been approved to update from CHEM 012 to CHEM 008 in Fall on 2017 in order help all CNAS major by reducing the upper division requirement between 36 to 60 units and give other majors an opportunity to strengthen their own degree program. CHEM 012 no longer exists.

- Changing CHEM 125 to CHEM 125W

The CHEM 125 course contained an objective of having the students paraphrase experiments and scientific techniques to better understand the importance and objective of the experiment being performed. By changing the course from CHEM 125 to CHEM 125W, this will allow students to be trained in writing scientific reports or journals while preparing lab reports for this class. Along with that, this will also accomplish the requirement of satisfying the UCR’s third-quarter writing requirement.

- Moving MATH 010A from being an optional course

MATH 010A is a prerequisite to CHEM 110A, a course requirement for the Bachler of Science in the Chemistry Program. With that, MATH 010A is a requirement.

APPROVALS:

Approved by the faculty of the Department of Chemistry: February 27, 2018
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: March 20, 2018
Approved by the Committee on Educational Policy: May 4, 2018
EXECUTIVE COMMITTEE
COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES
REPORT TO THE RIVERSIDE DIVISION
MAY 29, 2018

To be adopted:
Proposed Changes to Chemistry Undergraduate Program
Change of Major Criteria

PRESENT:
General Requirements
1. Students must be in good academic standing with 2.0 cumulative GPA and 2.0 upper-division chemistry major GPA.
2. Grades for all chemistry core and required lower-division math and physics courses must be “C-” or better.
3. A grade of “C-” or better in each of the courses used to satisfy the 20-unit CNAS Natural Science and Mathematics breadth requirement.
4. AP credit is not accepted for lower-division chemistry courses.

Specific requirement:
If student has completed less than 45 units (first year students), then
• Completion of CHEM 001A, CHEM 01LA, MATH 009A

If student has completed between 45 and 90 units (second year students), then
• Completion of MATH 009A, MATH 009B, MATH 009C.
• Completion of CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC and PHYS 040A or PHYS 002A and PHYS 02LA (PHYS 002A & PHYS 02LA can be used for B.A. program only)

If student has completed between 90 and 135 units (third year students), then

PROPOSED:
General Requirements
1. No Change
2. No Change
3. No Change
4. No Change

Specific requirement:
No Change

No Change

No Change

No Change

No Change

No Change

No Change
• Completion of all lower-division math requirements (MATH 009A, MATH 009B, MATH 009C, MATH 010A for B.A. program; and MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046 for B.S. program).

• Completion of the following chemistry courses (CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 005, CHEM 008A and CHEM 08LA or CHEM 12A, CHEM 008B and CHEM 08LB or CHEM 12B, CHEM 008C and CHEM 08LC or CHEM 12C (or CHEM 08HA and CHEM 08HLA or CHEM 12HA, CHEM 08HB and CHEM 08HLB or CHEM 12HB, CHEM 08HC and CHEM 08HLC or CHEM 12HC).

• Completion of all lower-division physics requirements (PHYS 040A, PHYS 040B, PHYS 040C or PHYS 002A, PHYS 002B, PHYS 002C and PHYS 02LA, PHYS 02LB, PHYS 02LC) (PHYS 002A, PHYS 002B, PHYS 002C and PHYS 02LA, PHYS 02LB, PHYS 02LC can be used for B.A. program only).

If student has completed more than 135 units (fourth year students), then

• Completion of all lower-division math requirements (MATH 009A, MATH 009B, MATH 009C, MATH 010A for B.A. program; and MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046 for B.S. program).

No Change

• Completion of the following chemistry courses (CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 005, CHEM 008A and CHEM 08LA or CHEM 12A, CHEM 008B and CHEM 08LB or CHEM 12B, CHEM 008C and CHEM 08LC or CHEM 12HC).

• Completion of all lower-division math requirements (MATH 009A, MATH 009B, MATH 009C, MATH 010A for B.A. program; and MATH 009A, MATH 009B, MATH 009C, MATH 010A, two out of the following: MATH 010B, MATH 031, MATH 046 for B.S. program).

• Completion of the following chemistry courses (CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 005, CHEM 008A and CHEM 08LA, CHEM 008B and CHEM 08LB, CHEM 008C and CHEM 08LC (or CHEM 08HA and CHEM 08HLA, CHEM 08HB and CHEM 08HLB, CHEM 08HC and CHEM 08HLC).

No Change
12C (or CHEM 08HA and CHEM 08HLA or CHEM 12HA, CHEM 08HB and CHEM 08HLB or CHEM 12HB, CHEM 08HC and CHEM 08HLC or CHEM 12HC).

- Completion of all lower-division physics requirements (PHYS 040A, PHYS 040B, PHYS 040C or PHYS 002A, PHYS 002B, PHYS 002C and PHYS 02LA, PHYS 02LB, PHYS 02LC) (PHYS 002A, PHYS 002B, PHYS 002C and PHYS 02LA, PHYS 02LB, PHYS 02LC can be used for B.A. program only)

- Completion of upper-division chemistry courses (CHEM 125 and CHEM 150A)

- Completion of upper-division chemistry courses (CHEM 125W and CHEM 150A)

**JUSTIFICATION:**

- Removing CHEM 012 courses

Organic Chemistry series has been approved to update from CHEM 012 to CHEM 008 in Fall on 2017 in order help all CNAS major by reducing the upper division requirement between 36 to 60 units and give other majors an opportunity to strengthen their own degree program. CHEM 012 no longer exists.

- Changing CHEM 125 to CHEM 125W

The CHEM 125 course contained an objective of having the students paraphrase experiments and scientific techniques to better understand the importance and objective of the experiment being performed. By changing the course from CHEM 125 to CHEM 125W, this will allow students to be trained in writing scientific reports or journals while preparing lab reports for this class. Along with that, this will also accomplish the requirement of satisfying the UCR’s third-quarter writing requirement.

- Moving MATH 010A from being an optional course

MATH 010A is a pre-requisite to CHEM 110A, a course requirement for the Bachler of Science in the Chemistry Program. With that, MATH 010A is a requirement.

- Adding General Chemistry Honor Series and Honors Lab to Second Year Requirements.

Students who are placed into General Chemistry Honors and Honors Lab meet the same requirement as students taking General Chemistry and Lab.

**APPROVALS:**

Approved by the faculty of the Department of Chemistry: February 27, 2018
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: March 20, 2018
Approved by the Committee on Educational Policy: May 4, 2018
EXECUTIVE COMMITTEE
COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES
REPORT TO THE RIVERSIDE DIVISION
MAY 29, 2018

To be adopted: Proposed Changes to Chemistry Undergraduate Program
Minor

PRESENT:

Minors
The minor in Chemistry consists of 28 upper-division units in chemistry.

1. Of the specified upper-division units, a minimum of 16 units must be unique to the minor and may not be used to satisfy major requirements.

2. At least one of the courses used to satisfy the 28 units must be in CHEM 125, CHEM 111, CHEM 140 or CHEM 166 (courses which include laboratory work).

3. No more than 4 units of 190-199 courses may be used in fulfilling the upper-division units for a minor.

All of the upper-division courses in chemistry have a prerequisite of CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, or CHEM 01HA and CHEM 1HLA, CHEM 01HB and CHEM 1HLB, CHEM 01HC and CHEM 1HLC and most have CHEM 005 as a prerequisite.

Students with a minor in Chemistry should consult with their Chemistry advisor to construct a specific program consistent with their career goals.

See Minors under the College of Natural and Agricultural Sciences in the Colleges and Programs section of this catalog for additional information on minors.

PROPOSED:

Minor
No Change

1. No Change

2. At least one of the courses used to satisfy the 28 units must be in CHEM 125W, CHEM 111, CHEM 140 or CHEM 166 (courses which include laboratory work).

3. No Change

All of the upper-division courses in chemistry have a prerequisite of CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, or CHEM 01HA and CHEM 1HLA, CHEM 01HB and CHEM 1HLB, CHEM 01HC and CHEM 1HLC and most have CHEM 005 as a prerequisite.

Students with a minor in Chemistry should consult with their Chemistry advisor to construct a specific program consistent with their career goals.

See Minors under the College of Natural and Agricultural Sciences in the Colleges and Programs section of this catalog for additional information on minors.

JUSTIFICATION:

Changing CHEM 125 to CHEM 125W
The CHEM 125 course contained an objective of having the students paraphrase experiments and scientific techniques to better understand the importance and objective of the experiment being performed. By changing the course from CHEM 125 to CHEM 125W, this will allow students to be trained in writing scientific reports or journals while preparing lab reports for this class. Along with that, this will also accomplish the requirement of satisfying the UCR’s third-quarter writing requirement.

**APPROVALS:**

Approved by the faculty of the Department of Chemistry: February 27, 2018
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: March 20, 2018
Approved by the Committee on Educational Policy: May 4, 2018
To be adopted: Proposed Changes to Chemistry Undergraduate Program
Sample Program

PRESENT:
Sample Program

Student programs are planned on an individual basis with their advisors, and there is considerable flexibility in the sequence in which courses required for the major are taken. For example, PHYS 040A, PHYS 040B, PHYS 040C can be started equally well during either the freshman or sophomore year. The sample program is typical for a well-prepared entering freshman who seeks the B.S. degree.

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<th>Freshman Year</th>
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<th>Winter</th>
<th>Spring</th>
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Total Units 17 18 18

PROPOSED:
Sample Program

No Change
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JUSTIFICATION:

Changing CHEM 125 to CHEM 125W

The CHEM 125 course contained an objective of having the students paraphrase experiments and scientific techniques to better understand the importance and objective of the experiment being performed. By changing the course from CHEM 125 to CHEM 125W, this will allow students to be trained in writing scientific reports or journals while preparing lab reports for this class. Along with that, this will also accomplish the requirement of satisfying the UCR’s third-quarter writing requirement.

APPROVALS:

Approved by the faculty of the Department of Chemistry: February 27, 2018
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: March 20, 2018
Approved by the Committee on Educational Policy: May 7, 2018
To be adopted:

Proposed changes to the Cell, Molecular, and Developmental Biology Major

**Major**
The Cell, Molecular and Developmental Biology major is designed to prepare students for diverse and exciting careers that include research, professional programs in the health sciences, and biotechnology. Course work is structured so that students first receive a solid grounding in the basic genetic and biological principles. Subsequent course requirements expand upon these themes and include courses in cell biology, molecular biology, developmental biology and genetics. Problem based learning is employed throughout the curriculum to produce graduates with the analytical and critical thinking skills necessary to become successful researchers and professionals. After completing required core courses, students take intermediate level courses that lay the foundation for more advanced undergraduate courses. Several mechanisms exist to tailor the curriculum to the needs of the individual student, including by choosing either Disciplinary or Health Science track options.

Both the Disciplinary and Health Science tracks can lead to B.A. or B.S. degrees. They have similar major requirements, but the B.A. degree requires 12 additional units of Humanities and Social Sciences courses and 16 units in a foreign language (see College Breadth Requirements).

**University Requirements**
See the Undergraduate Studies section for requirements that all students must satisfy.

**College Requirements**

(no change)
See Degree Requirements, College of Natural and Agricultural Sciences, in the Undergraduate Studies Section, for requirements that students must satisfy.

**Major Requirements**

Some of the following requirements for the Cell, Molecular and Developmental Biology major may also fulfill the College’s breadth requirements. Consult with an advisor for course planning.

1. Life Sciences core curriculum (72-76 units)
   a) BIOL 005A, BIOL 05LA or BIOL 020, BIOL 005B, BIOL 005C
   b) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC
   c) CHEM 008A, CHEM 008B, CHEM 008C, CHEM 008LA, CHEM 008LB, CHEM 008LC, or CHEM 08HA, CHEM 08HB, CHEM 08HC, CHEM 08HLA, CHEM 08HLB, CHEM 08HLC
   d) PHYS 002A, PHYS 002B, PHYS 02LA, PHYS 02LB, PHYS 002C, PHYS 02LC
   e) MATH 007A or MATH 009A, MATH 007B or MATH 009B
   f) STAT 100A
   g) BCH 100 or BCH 110A and BCH 110B
      Students must complete all required Core Curriculum courses with a grade of C- or better and with a cumulative GPA in the courses of at least 2.0. Grades of D or F in two required courses, either separate courses or repetitions of the same course, are grounds for discontinuation from the major.

2. Upper-division requirements (48 units)
   a) Major core (16 units) BIOL 102, BIOL 107A, CBNS 101, CBNS 108.
b) Major electives (24 units from the following).

**Cellular emphasis.** At least one of the following is required: BIOL 113; BIOL 114; BIOL 121/MCBL 121, BIOL 128/CBNS 128; BPSC 135; CBNS 116; CBNS 120/PSYC 120; CBNS 165.

**Molecular emphasis.** At least one of the following is required: BCH 180A; BCH 180B; BIOL 107B; BIOL 119; BIOL 124/MCBL 124; BIOL 155/BPSC 155; CBNS 150/ENTX 150.

**Developmental emphasis.** At least one of the following is required: BCH 183; BIOL 123/MCBL 123; BIOL 132/BPSC 132; BIOL 138/BPSC 138; BIOL 168; CBNS 121/PSYC 121; CBNS 169.

**Laboratory course:** Two courses in a biological science are required. Courses including at least 3 hours of lab per week are eligible, including combined lecture and lab classes. Eligible classes include BCH 153/BIOL 153/BPSC 153; BIEN 155; BIOL 118; BIOL 121L/MCBL 121L; BIOL 104/BPSC 104; BIOL 132/BPSC 132; BIOL 138/BPSC 138; BIOL 143/BPSC 143; BIOL 161A; CBNS 120L/PSYC 120L; MCBL 125; and others. Students in the Health Science Track may substitute one laboratory course with a course in ethics.

**Note** A maximum of 8 units of 190-199 courses, including no more than 4 units of 198 courses, may be counted towards the major elective requirement. Three units of BCH 197, BIOL 197, BPSC 197, CBNS 197, ENTM 197, PLPA 197, MCBL 197, NEM 197, BCH 199, BIOL 199, BPSC 199, CBNS 199, ENTM 199, PLPA 199, MCBL199, or NEM 199 may substitute for one of the required laboratory courses.

3. **Depth requirement (16 units).** For B.A. students, this requirement can be fulfilled 3. (no change)
with additional courses in Humanities and Social Sciences, and Foreign Languages. For the B.S. degree, students are required to take an additional 16 units of course work in natural sciences (including a biological or chemical science) or mathematics. Additional major elective units beyond the 32 required in 2b may be applied to this requirement.

4. Health Science track. Students wishing to apply to medical, dental or veterinary professional schools must follow the requirements listed above, but are encouraged to select from the following courses. For B.A. students, some of these will fulfill their Humanities and Social Sciences and Foreign Languages requirements. Please consult the faculty adviser.

   i. Foreign language: three courses are recommended.

   ii. Community service: a maximum of 4 units may be counted towards the 180 unit graduation requirement, using CBNS 198-I or equivalent.

   iii. Ethics: A course is strongly recommended, such as PHIL 009 or PHIL 167.

   iv. Two upper-division classes in Psychology are recommended, such as CBNS 126/PSYC 126; CBNS 127/PSYC 127; PSYC 129; PSYC 178; or PSYC 179.

   v. When selecting electives in the natural sciences, students are recommended to include classes in an area of microbiology (e.g. BIOL 157, BIOL 171, ENSC 133/MCBL 133/SWSC 133, NSC141/MCBL 141/SWSC 141, BIOL 121/MCBL 121, BIOL 123/MCBL 123/PLPA 123, BIOL 124/MCBL 124, BIOL 134/PLPA 134), and in anatomy, zoology, or physiology (BIOL 151, BIOL 161A, BIOL 175, BIOL 176).

Sample Program Outlines
1. **Bachelor of Science Degree (Disciplinary track)**

The sample program for B.S. students provides a solid science background for students interested in research or teaching careers in biomedical science. Undergraduate laboratory research is strongly recommended as an important element in the program.

### Freshman Year

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### Sophomore Year

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2. Bachelor of Science Degree (Health Science track)

The sample program for B.S. students with a professional emphasis provides a very strong science background, with recommended elective course choices emphasizing biomedical pertinence. Additionally, a foreign language is recommended, as well as Community Service (for course credit). Further breadth may be developed by electing Humanities and Social Science course options within the major depth requirement.

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3. Bachelor of Arts Degree (Disciplinary or Health Science tracks)

The sample program for B.A. students provides a broad-based education that builds on the strong foundation in science, with emphasis in humanities, social sciences, and foreign language.

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<td>BCH 100</td>
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<td>Foreign Language</td>
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**Justification:**

Corrections listed above are editorial changes to add equivalent courses. For example, adding BIOL 020 wherever BIOL 05LA appears, a junior year correction to add 4 units of humanities credits as it was previously missing, etc.

The change in the catalog copy from 48 to 40 units of upper-division is simply to correct a technical error in the catalog copy. In 2016, the CMDB faculty voted to reduce the upper division requirements from 48 to 40 units; this involved keeping the "a) Major Core" requirement at 16 units and reducing the "b) Major Elective" requirements from 32 to 24; 16+24 equals 40. This change was approved by campus. However, when we prepared the catalog copy we accidently didn't change all of the necessary wording; the erroneous wording said that we required 48 upper division units, comprised of 16 "a) Major Core" and 24 "b) Major Elective" units. But 48 does not equal 16 + 24. So the revised wording corrects this.

**Approvals:**

Approved by the faculty of the CMDB Program: November 21, 2017
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: January 9, 2018
Approved by the Committee on Educational Policy: May 7, 2018
EXECUTIVE COMMITTEE
COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES
REPORT TO THE RIVERSIDE DIVISION
MAY 29, 2018

To be adopted:

Proposed Changes to the Undergraduate Program in Earth Sciences

**Earth Sciences Major**
Students who choose Earth Sciences Major study the past, present, and future of our Earth through the interdisciplinary study of its various systems. Earth Sciences majors choose between concentrations in Geosystems, Climate Change, Geophysics, and Geobiology, which are explored from a combination of lab-based, field-based, and computational perspectives.

**Geology Major**
Students who choose the Geology major study the structure, composition, processes, and history of the Earth. In particular, the Geology major stresses features of the Earth’s surface and interactions between its atmosphere, hydrosphere, biosphere, rocky crust, and interior.

**Geophysics Major**
Students who choose the Geophysics major apply the principles and concepts of physics, mathematics, geology, and engineering to the study of the physical characteristics of the earth and other planets. They make measurements of gravity and magnetic fields, seismic waves, temperatures, and natural electric current. Geophysicists study these topics from the standpoint of the physics of solid bodies, gases, and fluids. Some geophysicists are field oriented, some...
laboratory oriented, some theoretical, and some combine these areas.

Change of Major and Continuation Criteria

Students wishing to change into or continue in the Earth Sciences major must be in good academic standing and show potential to graduate without exceeding 216 units.

Freshmen (2nd and 3rd quarter) must demonstrate progress in basic sciences and aptitude for earth sciences by satisfying the following three criteria by Spring Quarter or Summer Session:

- MATH 007B or MATH 009B eligible (e.g. completion of MATH 007A or MATH 009A with grades of C- or better)
- CHEM 01B eligible (e.g. completion of CHEM 01A with a grade of C- or better)
- One of GEO 001, GEO 002 or GEO 009 or GEO 011, or GEO 003 completed with a grade of C- or better

Sophomores (up to 89.9 cumulative units) must demonstrate sustained progress in basic sciences and aptitude for geology by satisfying the following three criteria by Spring Quarter or Summer Session:

- CHEM 001B completed with passing grades
- MATH 009C or MATH 046 eligible (e.g. MATH 007B or MATH 009B with grade of C- or better)
- Two of GEO 001, GEO 002 or GEO 009 or GEO 011, or GEO 003 completed with no grade below C- after repeats

Juniors (90 – 134.9 units) must demonstrate near completion of basic sciences and aptitude for upper-division earth sciences by satisfying the following three criteria by Spring Quarter or Summer Session:
Students wishing to change into or continue in the Geology major must be in good academic standing and show potential to graduate without exceeding 216 units.

Freshmen (2nd and 3rd quarter) must demonstrate progress in basic sciences and aptitude for geology by satisfying the following three criteria by Spring Quarter or Summer Session:

- MATH 009B eligible (e.g. completion of MATH 007A or MATH 009A with grades of C- or better)
- CHEM 001B eligible (e.g. completion of CHEM 1A with a grade of C- or better)
- One of GEO 001, GEO 002, or GEO 003 completed with a grade of C- or better

Sophomores (up to 89.9 cumulative units) must demonstrate sustained progress in basic sciences and aptitude for geology by

- CHEM 001B and MATH 009C or MATH 046 completed with passing grades
- PHYS 040B or PHYS 002B and PHYS 002LB eligible (i.e. completion of one quarter of college physics with C- or better)
- GEO 001, GEO 002 or GEO 009 or GEO 011, GEO 003, GEO 111, and GEO 115 or GEO 157 (and all prerequisites) completed with no grade below C- after repeats

Seniors (135+ units): must have completed all but 1 course of the earth sciences core requirements by Spring Quarter or Summer Session, as follows:

- CHEM 001B, MATH 009C or MATH 046, PHYS 040B or PHYS 002B and PHYS 002LB completed with passing grades.
- BIOL 002 or BIOL 005A and BIOL 05LA or BIOL 020, and STAT 100A or STAT 155 completed with passing grades.
- GEO 001, GEO 002 or GEO 009 or GEO 011, GEO 003, GEO 004 or GEO 007 or GEO 008 or GEO 010 or GEO 012, GEO 111, GEO 115, and GEO 157 (and all prerequisites) completed with no grade below C- after repeats.

Students wishing to change into or continue in the Geology major must be in good academic standing and show potential to graduate without exceeding 216 units.

Freshmen (2nd and 3rd quarter) must demonstrate progress in basic sciences and aptitude for geology by satisfying the following three criteria by Spring Quarter or Summer Session:

- MATH 009B eligible (e.g. completion of MATH 007A or MATH 009A with grades of C- or better)
- CHEM 001B eligible (e.g. completion of CHEM 01A with a grade of C- or better)
- One of GEO 001, GEO 002, or GEO 003 completed with a grade of C- or better
satisfying the following three criteria by Spring Quarter or Summer Session:
• CHEM 001C completed with passing grades
• MATH 009C or MATH 046 eligible (e.g. MATH 007B or MATH 009B with grade of C- or better)
• Two of GEO 001, GEO 002, or GEO 003 completed with no grade below C- after repeats

Juniors (90 – 134.9 units) must demonstrate near completion of basic sciences and aptitude for upper-division geology by satisfying the following three criteria by Spring Quarter or Summer Session:
• CHEM 001C and MATH 009C or MATH 046 completed with passing grades
• PHYS 040B or PHYS 002B and PHYS 002LB eligible (i.e. completion of one quarter of college physics with C- or better)
• GEO 002, GEO 003 and GEO 115 or GEO 122 (and all prerequisites) completed with no grade below C- after repeats

Seniors (135+ units): must have completed all but 1 course of the geology core requirements by Spring Quarter or Summer Session, as follows:
• CHEM 001C, MATH 009C or MATH 046 and PHYS 040C or PHYS 002C and PHYS 02LC completed with passing grades.
• BIOL 002 or BIOL 005A and BIOL 05LA or BIOL 020, and STAT 100A or STAT 155 completed with passing grades.
• GEO 001, GEO 003, GEO 115, and GEO 122 or GEO 101 (and all prerequisites) completed with no grade below C- after repeats.

Transfer Selection Criteria
Applicants to majors in the College of Natural and Agricultural Sciences are selected on the basis of academic preparation, as assessed by

Seniors (135+ units): must have completed all but 1 course of the geology core requirements by Spring Quarter or Summer Session, as follows:
• CHEM 001B, MATH 009C or MATH 046 and PHYS 040B or PHYS 002B and PHYS 02LB completed with passing grades.
• BIOL 002 or BIOL 005A and BIOL 05LA or BIOL 020, and STAT 100A or STAT 155 completed with passing grades.
• GEO 001, GEO 002, GEO 003, GEO 111, GEO 115 or GEO 122 and GEO 101 or GEO 118 (and all prerequisites) completed with no grade below C- after repeats.

Transfer Selection Criteria
their GPA and the strength of preparation for the intended major. A GPA of at least 2.70 is required. (This is a baseline GPA for consideration and not a guarantee of admission.)

In addition, applicants will need to complete college courses comparable to at least two of the following UCR year-long sequences in order to meet selection criteria for this major. Courses must be completed with “C” grades or better:

MATH 007A or MATH 009A, MATH 007B or MATH 009B, and MATH 009C or MATH 046 (mandatory)

And at least one sequence from:
1. BIOL 005A, BIOL 05LA or BIOL 020 and BIOL 005B (and BIOL 005C, if articulated))
2. CHEM 001A, CHEM 01LA, CHEM 001B, CHEM 01LB, and CHEM 001C, and CHEM 01LC
3. PHYS 040A, PHYS 040B, and PHYS 040C or PHYS 002A, PHYS 002B and PHYS 002C
4. MATH 010A, MATH 010B, and MATH 046

Courses must be completed with a letter grade, with no grade lower than a “C.” Students should visit assist.org for updated and comprehensive major preparation requirements.

Applicants to majors in the College of Natural and Agricultural Sciences are selected on the basis of academic preparation, as assessed by their GPA and the strength of preparation for the intended major. A GPA of at least 2.70 is required. (This is a baseline GPA for consideration and not a guarantee of admission.)

In addition, applicants will need to complete college courses comparable to at least two of the following UCR year-long sequences in order to meet selection criteria for this major. Courses must be completed with “C” grades or better:

MATH 007A or MATH 009A, MATH 007B or MATH 009B, and MATH 009C or MATH 046 (mandatory)

And at least one sequence from:
1. BIOL 005A, BIOL 05LA or BIOL 020 and BIOL 005B (and BIOL 005C, if articulated))
2. CHEM 001A, CHEM 01LA, CHEM 001B, CHEM 01LB, and CHEM 001C, and CHEM 01LC
3. PHYS 040A and PHYS 040B or PHYS 002A and PHYS 002B
4. MATH 010A, MATH 010B, and MATH 046

Courses must be completed with a letter grade, with no grade lower than a “C.” Students should visit assist.org for updated and comprehensive major preparation requirements.

Any applicant not meeting the above math course requirements may still be considered for possible admission by exception.

**Justification:**

In the academic year 2016-2017 the Dept. of Earth Sciences proposed a major modification of our curriculum, restructuring the Geology degree to be more focused on professional training in geology, and
establishing an Earth Sciences degree with four concentrations, to reflect the expanding scope of the field and UCR’s research interests. These changes were approved and are now part of the present catalog.

The changes proposed in this document are simple “housekeeping” changes that update all parts of the catalog. They include the following:

1. Changes to the faculty listing for future catalog edit changes.

2. A revised summary description of each of the three departmental majors.

3. Establishment of a program-specific “Change of Major and Continuing Criteria” for the Earth Sciences degree to reflect its curriculum.

4. Modification of the program-specific “Change of Major and Continuing Criteria” for the Geology degree to reflect the revised curriculum.

This proposal serves only to bring all parts of the catalog description into line with the new curricula as approved last year. There are no novel changes to the curricula proposed herein, and hence our description of this as “housekeeping”.

We propose to remove the CHEM 001C and CHEM 01L PHYS 049C, PHYS 002C and PHYS 02L requirements in line with the changes approved to our curriculum last year. This is a housekeeping change that updates the curriculum and makes it consistent.

In line with UCR’s mission to increase our reach to transfer students, and given the typically healthy ratio of transfer students in our program, the Department would to keep our requirements in line with those of continuing students but have the opportunity to review students not meeting the Math requirements by exception.

**Approvals:**

Approved by the faculty of the Department of Earth Sciences: November 22, 2017

Approved by the Executive Committee of the College of Natural and Agricultural Sciences: January 12, 2018

Reviewed by the Committee on Undergraduate Admissions: April 10, 2018

Approved by the Committee on Educational Policy: April 18, 2018
To be adopted:

Proposed Changes to the undergraduate major requirements in Entomology

PRESENT:

Major

The Department of Entomology offers undergraduate programs leading to either the B.S. or the B.A. degree. The B.S. degree offers students with a strong interest in the natural sciences an opportunity to emphasize this aspect of their education. The B.A. degree is available to students who wish to obtain a broader background in the humanities and social sciences than is required of students in the B.S. program.

Information on the programs and course requirements is available at CNAS Academic Advising Center, 1223 Pierce Hall. Counseling, course recommendations, and information on education and career goals are provided by the Undergraduate Faculty Advisor, Dr. Dong-Hwan Choe, 382 Entomology.

Transfer Selection Criteria

Applicants to majors in the College of Natural and Agricultural Sciences are selected on the basis of academic preparation, as assessed by their GPA and the strength of preparation for the intended major. A GPA of at least 2.70 is required. (This is a baseline GPA for consideration and not a guarantee of admission.)

In addition, applicants will need to complete college courses comparable to at least two of the following UCR year-long sequences in order to meet selection criteria for this major. Courses must be completed with “C” grades or better:

PROPOSED:

(No change)

Transfer Selection Criteria

Applicants to majors in the College of Natural and Agricultural Sciences are selected on the basis of academic preparation, as assessed by their GPA and the strength of preparation for the intended major. A GPA of at least 2.70 is required. (This is a baseline GPA for consideration and not a guarantee of admission.)

In addition, applicants will need to complete college courses comparable to at least two of the following UCR year-long sequences in order to meet selection criteria for this major. Courses must be completed with “C” grades or better:
MATH 009A and MATH 009B (mandatory)  MATH 007A or MATH 009A and MATH 007B or MATH 009B (mandatory)

And at least one sequence from: And at least one sequence from:

1. BIOL 005A-BIOL 05LA and BIOL 005B (and BIOL 005C, if articulated) 1. BIOL 005A, BIOL 05LA or BIOL 020 and BIOL 005B (and BIOL 005C, if articulated)

2. CHEM 001A, CHEM 01LA, CHEM 001B, CHEM 01LB, CHEM 001C, and CHEM 01LC 2. CHEM 001A, CHEM 01LA, CHEM 001B, CHEM 01LB, CHEM 001C, and CHEM 01LC

3. Organic chemistry (one-year lower-division), each course completed with a grade of “B” or better 3. Organic chemistry (one-year lower-division), each course completed with a grade of “B” or better

4. PHYS 002A, PHYS 02LA, PHYS 002B, PHYS 02LB PHYS 002C, and PHYS 02LC 4. PHYS 002A, PHYS 02LA, PHYS 002B, PHYS 02LB PHYS 002C, and PHYS 02LC

5. PHYS 040A, PHYS 040B, and PHYS 040C 5. PHYS 040A, PHYS 040B, and PHYS 040C

6. MATH 009C, MATH 010A, MATH 010B, and MATH 046 6. MATH 009C, MATH 010A, MATH 010B, and MATH 046

Courses must be completed with a letter grade, with no grade lower than a “C.” Courses must be completed with a letter grade, with no grade lower than a “C.”

Students should visit assist.org for updated and comprehensive major preparation requirements. Students should visit assist.org for updated and comprehensive major preparation requirements.

**Justification:**

MATH 007A and 007B are new courses that are accepted equivalents for MATH 009A and MATH 009B. BIOL 020 is an accepted equivalent at UCR for BIOL 05LA.

**Approvals:**

Approved by the faculty of the Department of Entomology: November 20, 2017
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: January 9, 2018
Reviewed by the Committee on Undergraduate Admissions: April 10, 2018
Approved by the Committee on Educational Policy: April 18, 2018
To be adopted:

Proposed Changes to the undergraduate minor requirements in Entomology

PRESENT:

Minor

The Department of Entomology offers a minor in Entomology designed to allow the student the freedom to pursue areas of particular interest.

The minor consists of no less than 20 and no more than 28 units of Entomology courses to be selected as follows:

1. ENTM 100/BIOL 100

2. Select from the following upper-division Entomology courses to complete unit requirement: ENTM 106, ENTM 107, ENTM 109, ENTM 112/BIOL 112/BPSC 112, ENTM 114, ENTM 124, ENTM 125, ENTM 126, ENTM 127/BIOL 127, ENTM 129, ENTM 129L, ENTM 133, ENTM 154, ENTM 154L, ENTM 162/BIOL 162, ENTM 173/BIOL 173, ENTM 180, ENTM 190, ENTM 197, ENTM 199, ENTM 199H

3. No more than 4 units of ENTM 190, ENTM 197, ENTM 199, or ENTM 199H, either solely or in combination, may be applied toward the unit requirement.

4. Of the specified upper-division units, a minimum of 16 must be unique to the minor and may not be used to satisfy major requirements.

PROPOSED:

Minor

The Department of Entomology offers a minor in Entomology designed to allow the student the freedom to pursue areas of particular interest.

The minor consists of no less than 20 and no more than 28 units of Entomology courses to be selected as follows:

1. No Change

2. Select from the following upper-division Entomology courses to complete unit requirement: ENTM 106, ENTM 107, ENTM 109, ENTM 112/BIOL 112/BPSC 112, ENTM 114, ENTM 124, ENTM 125, ENTM 126, ENTM 127/BIOL 127, ENTM 129, ENTM 129L, ENTM 133, ENTM 154, ENTM 154L, ENTM 162/BIOL 162, ENTM 173/BIOL 173, ENTM 180, ENTM 190, ENTM 197, ENTM 199, ENTM 199H

3. No Change

4. No Change

Justification:

See Minors under the College of Natural and Agricultural Sciences in the Colleges and Programs section of this catalog for additional information on minors.
The ENTM 154 and ENTM 154L courses are upper-division offerings in the Entomology curriculum and fulfill the requirements for inclusion in the list of courses under item 2 in the minor.

**Approvals:**

Approved by the faculty of the Department of Entomology: November 20, 2017
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: January 9, 2018
Approved by the Committee on Educational Policy: April 18, 2018
To be adopted:

Proposed Changes to the undergraduate major requirements in Physics

**PRESENT:**

**Transfer Students**

Students transferring to the Physics major must complete courses comparable to the following one-year sequences before they transfer:

1. General physics (calculus-based) equivalent to PHYS 040A, PHYS 040B, PHYS 040C, each course completed with a grade of “B-” or better

2. First-year calculus, equivalent to MATH 009A, MATH 009B, MATH 009C, each course completed with a grade of “B-” or better

At least one of the following one-year sequences:

1. General chemistry, equivalent to CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, each course completed with a grade of “C” or better

2. Second-year calculus, equivalent to MATH 010A, MATH 010B, MATH 046, each course completed with a grade of “C” or better

3. Organic chemistry (one-year lower-division), each course completed with a grade of “B” or better

Students must have a minimum grade point average of 2.70 in transferable college courses. UCR has articulation agreements with most of the California community colleges. These agreements list specific community college courses that have been designated

**PROPOSED:**

**Transfer Students**

Students transferring to the Physics major must complete courses comparable to the following one-year sequences before they transfer:

1. General physics (calculus-based) equivalent to PHYS 040A, PHYS 040B, PHYS 040C

2. First-year calculus, equivalent to MATH 007A or MATH 009A, MATH 007B or MATH 009B, MATH 009C

At least one of the following one-year sequences:

1. General chemistry, equivalent to CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, each course completed with a grade of “C” or better

2. Second-year calculus, equivalent to MATH 010A, MATH 010B, MATH 046, each course completed with a grade of “C” or better

3. Organic chemistry (one-year lower-division), each course completed with a grade of “B” or better

Students must have a minimum grade point average of 2.70 in transferable college courses. UCR has articulation agreements with most of the California community colleges. These agreements list specific community college courses that have been designated
as comparable to UCR courses (see the statewide articulation Web site at www.assist.org). Transfer students will usually find it advantageous to complete most or all sequences before starting at UCR. All prospective transfers should try to complete the sequences they begin rather than divide a sequence between two campuses.

University Requirements

See Undergraduate Studies section.

College Requirements

See College of Natural and Agricultural Sciences, Colleges and Programs section. Some of the following requirements for the major may also fulfill some of the college’s breadth requirements. Consult with a department advisor for course planning.

Major Requirements

The major requirements consist of a core curriculum and additional requirements for various B.S. degrees. The core requirements for the B.A. and B.S. degrees in Physics are as follows:

1. Lower-division requirements (70 units)
   a) one of the following sequences: PHYS 041A, PHYS 041B, PHYS 041C, or PHYS 040A, PHYS 040B, PHYS 040C, PHYS 040D, PHYS 040E. The first sequence is preferred for the B.S. in Physics.
   b) PHYS 39
   c) MATH 007A or MATH 009A, MATH 007B or MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046
   d) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC
   e) CS 010 or CS 010V. A higher-level CS course may satisfy the CS 010 requirement with approval.

Major Requirements

The major requirements consist of a core curriculum and additional requirements for various B.S. degrees. The core requirements for the B.A. and B.S. degrees in Physics are as follows:

1. Lower-division requirements (70 units)
   a) one of the following sequences: PHYS 041A, PHYS 041B, PHYS 041C, or PHYS 040A or PHYS 40HA, PHYS 040B or PHYS 40HB, PHYS 040C or PHYS 40HC, PHYS 040D, PHYS 040E. The first sequence is preferred for the B.S. in Physics.
   b) PHYS 39
   c) MATH 007A or MATH 009A or MATH 09HA, MATH 007B or MATH 09HB, MATH 009C, MATH 010A, MATH 010B, MATH 046
   d) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC
   e) CS 010. A higher-level CS course may satisfy the CS 010 requirement with approval.
2. Upper-division requirements (41 to 42 units)
   a) PHYS 130A, PHYS 130B, PHYS 132, PHYS 135A, PHYS 135B, PHYS 156A, PHYS 156B
   b) PHYS 139L (5 units), PHYS 142L (4 units) or PHYS 142W (5 units). Note that PHYS 142W satisfies the ENGL 1C requirement.
   c) 4 units of upper division Physics electives. Upper division math, science of engineering may be substituted with approval.

**Physics: Standard Track (B.S. degree)**

1. Additional upper-division requirements (16 to 17 units)
   a) PHYS 136
   b) One additional quarter of either PHYS 142L (4 units) or PHYS 142W (5 units). Approved undergraduate research (PHYS 195A, PHYS 195B, PHYS 195C, PHYS 195D) in physics or an internship (PHYS 198-I) in physics at a government or industrial laboratory can be used in place of up to 4 units of PHYS 142L.
   c) 8 additional units of upper division Physics electives. PHYS 156C is highly recommended for those planning to go to graduate school in physics.

**Physics: Biophysics Track (B.S. degree)**

1. Additional lower-division requirements (25 units)
   a) BIOL 005A, BIOL 005B, BIOL 005C, BIOL 05LA or BIOL 020.
   b) CHEM 008A, or 08HA, CHEM 008B or 08HB, CHEM 008C or 08HC CHEM 08LA or 08HLA, CHEM 08LB or 08HLC, CHEM 08LC or 08HLC

**Physics: Biophysics Track (B.S. degree)**

1. Additional lower-division requirements (25 units)
   a) BIOL 005A, BIOL 005B, BIOL 005C, BIOL 05LA or BIOL 020.
   b) CHEM 008A, or CHEM 08HA, CHEM 008B or CHEM 08HB, CHEM 008C or CHEM 08HC, CHEM 08LA or CHEM 08HL, CHEM 08LB or CHEM 08HLC, CHEM 08LC or CHEM 08HLC
2. Additional upper-division requirements (8 units)

a) 8 additional upper-division units taken from BCH 110A, BCH 110B, BCH 110C or BIOL 107A (other upper division CHEM/BIOL/BCH may be substituted upon approval)

Physics Education Track (B.S. degree only)

1. Additional lower-division requirements (10 units)

a) EDUC 003, EDUC 004

b) LING 020 or LING 021. Note that this satisfies 4 units of the CNAS Humanities requirement.

2. Additional upper-division requirements (8 units)

a) EDUC 110 or EDUC 110S, EDUC 174 or EDUC 174S.

Physics: Applied Physics and Engineering Track (B.S. degree)

1. Additional upper-division requirements (16 to 17 units)

a) One additional quarter of either PHYS 142L (4 units) or PHYS 142W (5 units).

b) Approved undergraduate research (PHYS 195A, PHYS 195B, PHYS 195C, PHYS 195D) in physics or an internship (PHYS 198-I) in physics at a government or industrial laboratory can be used in place of up to 4 units of PHYS 142L.

b) 4 additional units of upper division Physics electives.

c) 8 units of upper division Engineering electives.

Students seeking an emphasis in environmental
Students continuing on to graduate school are encouraged to take additional upper-division courses in Mathematics, such as MATH 146A, MATH 146B, MATH 146C, MATH 165A, MATH 165B, and MATH 113.

Students may wish to earn a Minor in Mathematics which requires an additional 24 units of upper division math.

To graduate, a minimum grade point average of 2.00 (C) is necessary overall and in the upper-division courses taken for the major (courses listed under 2.).

**Justification:**

**Changes to the Admissions Criteria for Transfer Students:**
In 2012, the department introduced criteria that transfer students must satisfy to be eligible for admission to UCR as a physics major. We now believe these criteria are too strict. We studied the success rate of transfer students admitted before 2012 to evaluate which requirements are correlated with success as a physics major. We found that the minimum course grade requirements are unnecessary, and that first-year physics and math is sufficient preparation. Most students in the study also had second year math and chemistry completed. For details of this study, please see the attached pdf file.

**Changes to the Physics Education Track:**
These changes are based on the feedback from Thomas Smith, Dean of the UCR Graduate School of Education.

Regarding the removal of LING 020 or LING 021: it was a prerequisite for EDUC 177A, which was a required course for the Physics Education Track. EDUC 177A no longer exists and none of the current EDUC courses in the track require LING 020 or LING 021, so it is no longer needed for the track. The change to the additional upper-division requirements for the Physics Educational Track requirement makes the track more flexible. All the courses listed in the revision are useful preparation for a teaching credential program. However, we do not want to increase the number of required units for the track. We propose to allow the student to choose two courses from the list.

**Changes to the Applied Physics and Engineering Track:**
The tracks within the physics major replace 16 units of physics requirements with 16 units from another concentration. The current Applied Physics and Engineering Track consists of 8 units of physics requirements and 8 units of upper division engineering electives. The upper division engineering classes typically require 4 to 8 units of lower division engineering classes as prerequisites, increasing the effective number of units required for the track. The proposed change would make the engineering track
more flexible and allow students to take classes in computer science, electrical engineering, and mechanical engineering without increasing the number of required units for the major.

**Addition of Honors versions of introductory physics (2 and 40 series):**

The addition of honors versions is meant to allow instructors to spend more time on active engagement activities, such as problem solving in small groups, and provide more direct instructor contact with the advanced students. The instruction will be at a higher level of rigor and include advanced topics. Having an honors option for Physics will make the UCR undergraduate program more attractive to potential and current students. Five of the other UC campuses have some form of honors physics.

**Approvals:**

Approved by the faculty of the Department of Physics and Astronomy:  
November 17, 2017

Approved by the Executive Committee of the College of Natural and Agricultural Sciences:  
January 16, 2018

Reviewed by the Committee on Undergraduate Admissions:  
April 10, 2018

Approved by the Committee on Educational Policy:  
May 7, 2018
Courses that will satisfy the revised Applied Physics and Engineering Track for the Physics major

January 10, 2018
Contact person: Owen Long (owen.long@ucr.edu)

The Applied Physics and Engineering Track for the B.S. degree for the Physics major will be changed to require the following:

1. Additional upper- and lower-division requirements (16 units).
   a) 16 units of approved Engineering electives including a minimum of 8 units at the upper-division level.

The courses listed below are all approved for the track. Courses not listed may be approved by a physics faculty academic advisor.

Computer Science, lower division
CS 010 Introduction to computer science for science, mathematics, and eng. (4)
CS 011 Introduction to Discrete Structures (4)
CS 012 Introduction to computer science for science, mathematics, and eng. II (4)
CS 013 Introductory computer science for engineering majors (4)
CS 014 Introduction to data structures and algorithms (4)
CS 030 Introduction to computational science and engineering (4)
CS 061 Machine organization and assembly language programming (4)

Computer Science, upper division
CS 100 Software construction (4)
CS 111 Discrete structures (4)
CS 120A Logic design (5)
CS 120B Introduction to embedded systems (4)
CS 121 Programming embedded systems (4)
CS 121L Laboratory in programming embedded systems (2)
CS 122A Intermediate Embedded and Real-Time Systems (5)
CS 122B Advanced Embedded and Real-Time Systems (5)
CS 130 Computer graphics (4)
CS 134 Video game creation and design (4)
CS 141 Intermediate data structures and algorithms (4)
CS 145 Combinatorial optimization algorithms (4)
CS 150 Automata and formal languages (4)
CS 152 Compiler design (4)
CS 153 Design of operating systems (4)
CS 160 Concurrent programming and parallel systems (4)
CS 161 Design architecture of computer systems (4)
CS 161L Laboratory in Design and Architecture of Computer Systems (2)
CS 162 Computer Architecture (4)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 164</td>
<td>Computer Networks</td>
<td>4</td>
</tr>
<tr>
<td>CS 165</td>
<td>Computer Security</td>
<td>4</td>
</tr>
<tr>
<td>CS 166</td>
<td>Database Management Systems</td>
<td>4</td>
</tr>
<tr>
<td>CS 168</td>
<td>Introduction to Very Large Scale Integration (VLSI) Design</td>
<td>4</td>
</tr>
<tr>
<td>CS 169</td>
<td>Mobile Wireless Networks</td>
<td>4</td>
</tr>
<tr>
<td>CS 171</td>
<td>Introduction to Machine Learning and Data Mining</td>
<td>4</td>
</tr>
<tr>
<td>CS 172</td>
<td>Introduction to Information Retrieval</td>
<td>4</td>
</tr>
<tr>
<td>CS 175</td>
<td>Entrepreneurship in Computing</td>
<td>4</td>
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<tr>
<td>CS 177</td>
<td>Modeling and Simulation</td>
<td>4</td>
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<tr>
<td>CS 179</td>
<td>(E-Z) Project in Computer Science</td>
<td>4</td>
</tr>
<tr>
<td>CS 179E</td>
<td>Compilers</td>
<td>4</td>
</tr>
<tr>
<td>CS 179F</td>
<td>Operating Systems</td>
<td>4</td>
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<td>CS 179G</td>
<td>Database Systems</td>
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<tr>
<td>CS 179-I</td>
<td>Networks</td>
<td>4</td>
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<tr>
<td>CS 179-J</td>
<td>Computer Architecture and Embedded Systems</td>
<td>4</td>
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<tr>
<td>CS 179K</td>
<td>Software Engineering</td>
<td>4</td>
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<tr>
<td>CS 179M</td>
<td>Artificial Intelligence</td>
<td>4</td>
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<tr>
<td>CS 179N</td>
<td>Graphics and Electronic Games</td>
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<tr>
<td>CS 180</td>
<td>Introduction to Software Engineering</td>
<td>4</td>
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<tr>
<td>CS 181</td>
<td>UNIX System Administration</td>
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**Electrical and Computer Engineering, lower division**

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<tr>
<td>EE 001A</td>
<td>Engineering Circuit Analysis I</td>
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<tr>
<td>EE 001B</td>
<td>Engineering Circuit Analysis II</td>
<td>4</td>
</tr>
<tr>
<td>EE 01LA</td>
<td>Engineering Circuit Analysis I Laboratory</td>
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<tr>
<td>EE 020</td>
<td>Linear Methods for Engineering Analysis and Design Using MATLAB</td>
<td>4</td>
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**Electrical and Computer Engineering, upper division**

<table>
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<tr>
<th>Course Code</th>
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<tr>
<td>EE 100A</td>
<td>Electronic Circuits</td>
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<tr>
<td>EE 100B</td>
<td>Electronic Circuits</td>
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</tr>
<tr>
<td>EE 105</td>
<td>Modeling and Simulation of Dynamic Systems</td>
<td>4</td>
</tr>
<tr>
<td>EE 110A</td>
<td>Signals and Systems</td>
<td>4</td>
</tr>
<tr>
<td>EE 110B</td>
<td>Signals and Systems</td>
<td>4</td>
</tr>
<tr>
<td>EE 111</td>
<td>Digital and Analog Signals and Systems</td>
<td>4</td>
</tr>
<tr>
<td>EE 114</td>
<td>Probability, Random Variables, and Random Processes in Electrical Engineering</td>
<td>4</td>
</tr>
<tr>
<td>EE 115</td>
<td>Introduction to Communication Systems</td>
<td>4</td>
</tr>
<tr>
<td>EE 116</td>
<td>Engineering Electromagnetics</td>
<td>4</td>
</tr>
<tr>
<td>EE 117</td>
<td>Electromagnetics II</td>
<td>4</td>
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<tr>
<td>EE 120A</td>
<td>Logic Design</td>
<td>5</td>
</tr>
<tr>
<td>EE 120B</td>
<td>Introduction to Embedded Systems</td>
<td>4</td>
</tr>
<tr>
<td>EE 123</td>
<td>Power Electronics</td>
<td>4</td>
</tr>
<tr>
<td>EE 128</td>
<td>Data Acquisition, Instrumentation, and Process Control</td>
<td>4</td>
</tr>
</tbody>
</table>
EE 132 Automatic Control (4)
EE 133 Solid-State Electronics (4)
EE 135 Analog Integrated Circuit Layout and Design (4)
EE 136 Semiconductor Device Processing (4)
EE 137 Introduction to Semiconductor Optoelectronic Devices (4)
EE 138 Electrical Properties of Materials (4)
EE 139 Magnetic Materials (4)
EE 141 Digital Signal Processing (4)
EE 144 Introduction to Robotics (4)
EE 145 Robotic Planning and Kinematics (4)
EE 146 Computer Vision (4)
EE 150 Digital Communications (4)
EE 151 Introduction to Digital Control (4)
EE 152 Image Processing (4)
EE 153 Electric Drives (4)
EE 155 Power System Analysis (4)
EE 162 Introduction to Nanoelectronics (4)
EE 165 Design for Reliability of Integrated Circuits and Systems (4)
EE 168 Introduction to Very Large Scale Integration (VLSI) Design (4)

**Mechanical Engineering, lower division**
ME 002 Introduction to Mechanical Engineering (4)
ME 018 Introduction to Engineering Computation (4)

**Mechanical Engineering, upper division**
ME 100A Thermodynamics (4)
ME 100B Thermodynamics (4)
ME 103 Dynamics (4)
ME 110 Mechanics of Materials (4)
ME 113 Fluid Mechanics (4)
ME 114 Introduction to Materials Science and Engineering (4)
ME 116A Heat Transfer (4)
ME 116B Heat Transfer (4)
ME 117 Combustion and Energy Systems (4)
ME 118 Mechanical Engineering Modeling and Analysis (4)
ME 120 Linear Systems and Controls (4)
ME 121 Feedback Control (4)
ME 122 Vibrations (4)
ME 130 Kinematic and Dynamic Analysis of Mechanisms (4)
ME 131 Design of Mechanisms (4)
ME 133 Introduction to Mechatronics (4)
ME 135 Transport Phenomena (4)
ME 136 Environmental Impacts of Energy Production and Conversion (4)
ME 137 Environmental Fluid Mechanics (4)
ME 138 Transport Phenomena in Living Systems (4)
ME 140 Ship Theory (4)
ME 144 Introduction to Robotics (4)
ME 145 Robotic Planning and Kinematics (4)
ME 153 Finite Element Methods (4)
ME 156 Mechanical Behavior of Materials (4)
ME 170A Experimental Techniques (4)
ME 170B Experimental Techniques (4)
ME 174 Machine Design (4)
ME 176 Sustainable Product Design (4)
ME 180 Optics and Lasers in Engineering (4)

**Chemical and Environmental engineering, upper division**
CEE 125 Analytical Methods for Chemical and Environmental Engineers (4)
CEE 132 Green Engineering (4)
CEE 135 Chemistry of Materials (4)
CEE 136 Aerosol Technology (4)
CEE 140A Biomaterials (4)
CEE 140B Biomaterials (4)
CEE 159 Dynamics of Biological Systems (4)
CHE 100 Engineering Thermodynamics (4)
CHE 102 Catalytic Reaction Engineering (4)
CHE 105 Introduction to Nanoscale Engineering (4)
CHE 110A Chemical Process Analysis (3)
CHE 110B Chemical Process Analysis (3)
CHE 114 Applied Fluid Mechanics (4)
CHE 116 Heat Transfer (4)
CHE 117 Separation Processes (4).
CHE 118 Process Dynamics and Control (4)
CHE 120 Mass Transfer (4)
CHE 122 Chemical Engineering Kinetics (4)
CHE 124 Biochemical Engineering Principles (4)
CHE 124L Biochemical Engineering Laboratory (2)
CHE 130 Advanced Engineering Thermodynamics (4)
CHE 131 Electrochemical Engineering (4)
CHE 136 Advanced Topics in Heat Transfer (4)
CHE 140 Cell Engineering (4)
CHE 150 Biosensors (4)
CHE 160A Chemical and Environmental Engineering Laboratory (3)
CHE 160B Chemical Engineering Laboratory (3)
CHE 160C Chemical Engineering Laboratory (3)
CHE 161 Nanotechnology Processing Laboratory (3)
CHE 171 Pollution Control for Chemical Engineers (4)

**Bioengineering, lower division**
BIEN 010 Overview of Bioengineering (4)

**Bioengineering, upper division**
BIEN 101 Quantitative Biochemistry (4)
BIEN 105 Circulation Physiology (4)
BIEN 110 Biomechanics of the Human Body (4)
BIEN 115 Quantitative Physiology (4)
BIEN 120 Biosystems and Signal Analysis (4)
BIEN 125 Biotechnology and Molecular Bioengineering (4)
BIEN 130 Bioinstrumentation (4)
BIEN 130L Bioinstrumentation Laboratory (2)
BIEN 135 Biophysics and Biothermodynamics (4)
BIEN 136 Tissue Engineering (4)
BIEN 137 Advanced Biomechanics (4)
BIEN 138 Fundamental Principles of Wound Repair (4)
BIEN 140A Biomaterials (4)
BIEN 140B Biomaterials (4)
BIEN 142 Introductory Biomedical Optical Imaging (4)
BIEN 155 Biotechnology Laboratory (2)
BIEN 159 Dynamics of Biological Systems (4)
BIEN 160 Biomedical Imaging (4)
BIEN 165 Biomolecular Engineering (4)
BIEN 166 Bioinspired Engineering for Sustainable Energy (4)
BIEN 167 Medical Diagnostics (4)
To be adopted:

Proposed changes in the core requirements for Bachelor of Science and Bachelor of Arts in Statistics including the Statistical Computing and Quantitative Management Options.

<table>
<thead>
<tr>
<th>PRESENT:</th>
<th>PROPOSED:</th>
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<tbody>
<tr>
<td>Major</td>
<td>Major</td>
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<tr>
<td>(No Change)</td>
<td>(No Change)</td>
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</tbody>
</table>

The Department of Statistics is concerned with teaching, research, and statistical consulting. The courses offered present a comprehensive spectrum of statistical and probability theory, in so far as such theory is necessary for the understanding and analysis of observational data. The applications of the theory delineated in the courses may be made in any field of experience. Laboratory classes in which examples related to the student’s actual field of interest are worked out, play an essential part. The department offers both B.A. and B.S. degrees in Statistics as well as a B.S. in Statistics with options in Statistical Computing and Quantitative Management; the M.S. degree in Statistics; and the Ph.D. degree in Applied Statistics.

The courses STAT 040, STAT 048, STAT 100A, STAT 100B, STAT 104/BUS 104, STAT 110, STAT 130, STAT 140, STAT 146, and STAT 155 are intended for students of other departments who wish a knowledge of statistical techniques. Some of them may be taken as electives by statistics majors. The objective of these courses is to acquaint the student with the elements of statistics with only the necessary amount of mathematical training.

STAT 147 and STAT 157 are computer-oriented courses intended for students who would like to learn about computer programming in the most important languages and who would like to learn about statistical computing.
Transfer Students

Students transferring to the Statistics major must complete courses comparable to the following one-year sequence before they transfer:

1. First-year calculus, equivalent to MATH 009A, MATH 009B, MATH 009C, each course completed with a grade of “B-” or better.

Computing Laboratories

The department has two large undergraduate Windows-based teaching laboratories. These laboratories provide users access to a wide variety of statistical software packages including SAS, R, Minitab, and SPSS, and other popular software packages including Mathematica, Adobe Acrobat, and Microsoft Office. The department also houses the Garber Research Computing Laboratory, which is a combination of a UNIX/LINUX-based system with multiple workstations and several Windows-based machines. The department recently added a Windows-based simulations laboratory in Summer 2014.

Statistical Consulting Center

The Statistical Consulting Collaboratory provides a broad range of analytical and statistical support services, including design of experiments, statistical inference, hypothesis testing, and data modeling for the campus community, and promotes cooperative research between statisticians and other investigators in all fields of the application of statistics. The Collaboratory is staffed by:

Daniel R. Jeske, Ph.D., Faculty Director
Karen Huaying Xu, Ph.D., Associate Director
and rotating graduate students.

Change of Major Criteria

All courses taken to fulfill major requirements must be completed with grades of “C-” or better after repeats.

Transfer Students

Students transferring to the Statistics major must complete courses comparable to the following one-year sequence before they transfer:

1. First-year calculus, equivalent to MATH 007A or MATH 009A or MATH 09HA, MATH 007B or MATH 009B or MATH 09HB, MATH 009C or MATH 09HC, each course completed with a grade of “B-” or better.

Computing Laboratories

The department has two large undergraduate Windows-based teaching laboratories. These laboratories provide users access to a wide variety of statistical software packages including SAS, R, Minitab, and SPSS, and other popular software packages including Mathematica, Adobe Acrobat, and Microsoft Office. The department also houses the Garber Research Computing Laboratory, which is a combination of a UNIX/LINUX-based system with multiple workstations and several Windows-based machines.

Statistical Consulting Center

The Statistical Consulting Collaboratory provides a broad range of analytical and statistical support services, including design of experiments, statistical inference, hypothesis testing, and data modeling for the campus community, and promotes cooperative research between statisticians and other investigators in all fields of the application of statistics. The Collaboratory is staffed by: Zhiwei Zhang, Ph.D., Faculty Director and Karen Huaying Xu, Ph.D., Associate Director and rotating graduate students.

Change of Major Criteria

All courses taken to fulfill major requirements must be completed with grades of “C-” or better after repeats.
Freshman (0-44.9 units earned)
Completion of the following with grade of “C-” or better and must be in good academic standing. (2.0 quarter and cumulative GPA)
MATH 008B or MATH 009A, MATH 009B

Sophomores (45-89.9 earned units)
Completion of the following with grade of “C-” or better and must be in good academic standing. (2.0 quarter and cumulative GPA)
MATH 008B or MATH 009A, MATH 009B, MATH 009C
4 (four) additional units of college-level Mathematics or Statistics (STAT 100A recommended)

Juniors (90-134.9 earned units)
Completion of the following with grade of “C-” or better and must be in good academic standing. (2.0 quarter and cumulative GPA)
MATH 008B or MATH 009A, MATH 009B, MATH 009C
12 (twelve) additional units of college level Mathematics or Statistics (MATH 031, STAT 100A and STAT 147 recommended)

Seniors (135 or more earned units)
Completion of the following with grade of “C-” or better and must be in good academic standing. (2.0 quarter and cumulative GPA)
MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 031, STAT 100A (or equivalent), STAT 100B (or equivalent), STAT 147, STAT 157

Juniors (90-134.9 earned units)
Completion of the following with grade of “C-” or better and must be in good academic standing. (2.0 quarter and cumulative GPA)
MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 031, STAT 100A (or equivalent), STAT 100B (or equivalent), STAT 147, STAT 157
12 (twelve) additional units of college level Mathematics or Statistics (MATH 031, STAT 100A and STAT 147 recommended)

Seniors (135 or more earned units)
Completion of the following with grade of “C-” or better and must be in good academic standing. (2.0 quarter and cumulative GPA)
MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 031, STAT 100A (or equivalent), STAT 100B (or equivalent), STAT 147, STAT 157

Major change requests are reviewed during the 2nd, 3rd, 4th & 10th weeks of each quarter.
Transfer Selection Criteria

Applicants to majors in the College of Natural and Agricultural Sciences are selected on the basis of academic preparation, as assessed by their GPA and the strength of preparation for the intended major. A GPA of at least 2.70 is required. (This is a baseline GPA for consideration and not a guarantee of admission.)

In addition, applicants will need to complete college courses comparable to at least two of the following UCR year-long sequences in order to meet selection criteria for this major. Courses must be completed with “C” grades or better:

MATH 009A, MATH 009B, and MATH 009C (mandatory). A grade of “B-” or better is required in this series.

And at least one sequence from:

1. BIOL 005A, BIOL 05LA or BIOL 005B (and BIOL 005C, if articulated)
2. CHEM 001A, CHEM 01LA, CHEM 001B, CHEM 01LB, CHEM 001C, and CHEM 01LC
3. Organic chemistry (one-year lower-division), each course completed with a grade of “B” or better
4. PHYS 002A, PHYS 02LA, PHYS 002B, PHYS 02LB PHYS 002C, and PHYS 02LC
5. PHYS 040A, PHYS 040B, and PHYS 040C
6. MATH 010A and MATH 010B, or one course in linear algebra.

Courses must be completed with a letter grade, with no grade lower than a “C.” Students should visit assist.org for updated and comprehensive major preparation requirements.

University Requirements

In addition, applicants will need to complete college courses comparable to at least two of the following UCR year-long sequences in order to meet selection criteria for this major. Courses must be completed with “C” grades or better:

MATH 007A or MATH 09A or MATH 09HA, MATH 007B or MATH 09B or MATH 09HB, and MATH 009C or MATH 09HC (mandatory). A grade of “B-” or better is required in this series.

And at least one sequence from:

1. BIOL 005A, BIOL 05LA or BIOL 020 and BIOL 005B (and BIOL 005C, if articulated)
2. CHEM 001A, CHEM 01LA, CHEM 001B, CHEM 01LB, CHEM 001C, and CHEM 01LC
3. Organic chemistry (one-year lower-division), each course completed with a grade of “B” or better
4. PHYS 002A, PHYS 02LA, PHYS 002B, PHYS 02LB PHYS 002C, and PHYS 02LC
5. PHYS 040A, PHYS 040B, and PHYS 040C
6. MATH 010A and MATH 010B, or one course in linear algebra.

Courses must be completed with a letter grade, with no grade lower than a “C.” Students should visit assist.org for updated and comprehensive major preparation requirements.

University Requirements
See Undergraduate Studies section.

College Requirements

See College of Natural and Agricultural Sciences, Colleges and Programs section.

Some of the following requirements for the major may also fulfill some of the college’s breadth requirements. Consult with a department advisor for course planning.

Major Requirements

The department offers both a B.A. and a B.S. degree in Statistics as well as a B.S. in Statistics with options in Statistical Computing and Quantitative Management.

The major requirements for the B.A. and the B.S. degrees in Statistics are as follows:

For the Bachelor of Arts

1. Core requirements (24–25 units)
   a) CS 010, MATH 009A, MATH 009B, MATH 009C, MATH 010A
   b) MATH 031

2. Upper-division requirements
   a) Thirty-six (36) units of upper-division course work
      (1) STAT 147, STAT 157, STAT 160A, STAT 160B, STAT 160C, STAT 170A, STAT 170B, STAT 171
      (2) Four (4) units of STAT 183 taken during senior year

Note An introductory Statistics class such as STAT 048 or STAT 100A is strongly recommended.

No change

College Requirements

(No Change)
For the Bachelor of Science

1. Core requirements (24–25 units)

   a) CS 010, MATH 009A, MATH 009B, MATH 009C, MATH 010A

   b) MATH 031

2. Upper-division requirements (52 units)

   a) Thirty-six (36) units of upper-division course work

      (1) STAT 147, STAT 157, STAT 160A, STAT 160B, STAT 160C, STAT 170A, STAT 170B, STAT 171

      (2) Four (4) units of STAT 183 taken during senior year

   b) Sixteen (16) units of additional course work chosen with the approval of the major advisor from STAT/BUS 104, STAT 127/BUS 127, STAT 130, STAT 140, STAT 146, STAT 161, or from related fields.

Note An introductory Statistics class such as STAT 048 or STAT 100A is strongly recommended.

Statistical Computing Option

The requirements for this option are in addition to the requirements for the B.S. in Statistics, except that the option requirement takes the place of the 16 units in 2.b) above.

1. Lower-division requirements (8 units): CS 012, CS 014

2. Upper-division requirements (16 units)

   a) Sixteen (16) units of coursework selected from

   b) Twelfth (12) units of coursework selected from

For the Bachelor of Science

1. Core requirements (24–25 units)

   a) CS 010, MATH 009A or MATH 009A, or MATH 09HA, MATH 007B or MATH 09HB, MATH 009C or MATH 09HC, MATH 010A

   b) MATH 031

2. Upper-division requirements (52 units)

   a) Thirty-six (36) units of upper-division course work to include thirty-two units in (1) and four units in (2)

      (1) STAT 147, STAT 157, STAT 160A, STAT 160B, STAT 160C, STAT 170A, STAT 170B, STAT 171

      (2) Four (4) units of STAT 183 taken during senior year

   b) Sixteen (16) units of additional course work chosen from STAT 110, STAT 127/BUS 127, STAT 130, STAT 140, STAT 146, STAT 161, STAT 167 or from related fields with the approval of the major advisor.

Note An introductory Statistics class such as STAT 048 or STAT 100A is strongly recommended.

Statistical Computing Option

The requirements for this option are in addition to the requirements for the B.S. in Statistics, except that the option requirement takes the place of the 16 units in 2.b) above.

1. Lower-division requirements (8 units): CS 012, CS 014

2. Upper-division requirements (16 units)

   a) STAT 167

   b) Twelfth (12) units of coursework selected from
Quantitative Management Option

The requirements for this option are in addition to the requirements for the B.S. in Statistics, except that the option requirement takes the place of the 16 units in 2.b) above.

1. Lower-division requirements (18 units)
   a) ECON 002, ECON 003
   b) BUS 010, BUS 020

2. Upper-division requirements (16 units)
   a) Three courses from one area and four (4) additional units from one other area
      (1) Marketing: BUS 103, BUS 113, BUS 117
      (2) Finance: BUS 106/ECON 134, BUS 134, BUS 135, BUS 136, BUS 138
      (3) Accounting: BUS 108, BUS 165A, BUS 165B, BUS 168A, BUS 168B
      (4) Management Information Systems: BUS 101, BUS 171, BUS 173
   b) BUS/STAT 104

(1) CS 141, CS 177
(2) MATH 120, MATH 135A, MATH 135B
(3) STAT 198-I

Quantitative Management Option

The requirements for this option are in addition to the requirements for the B.S. in Statistics, except that the option requirement takes the place of the 16 units in 2.b) above.

1. Lower-division requirements (18 units)
   a) ECON 002, ECON 003 or ECON 03H
   b) BUS 010, BUS 020; BUS 020, BUS 021 for those who choose area (3) Accounting under below 2 b).

2. Upper-division requirements (16 units)
   a) BUS/STAT 104
   b) Three courses from one area:
      (1) Marketing: BUS 103 and two other courses from BUS 111, BUS 112, BUS 114, BUS 115, BUS 116, BUS 117, BUS 118, BUS 119
      (2) Finance: BUS 106 and two other courses from BUS 138, BUS 139, BUS 140
      (3) Accounting: BUS 108, BUS 165A, BUS 165B, BUS 168A, BUS 168B, BUS 169A
      (4) Management: BUS 143, BUS 144, BUS 145, BUS 149, BUS 150
      (5) Information Systems: BUS 101 and two other courses from BUS 171, BUS 173, BUS 174, BUS 175
      (6) Operations & Supply Chain Management: BUS 122, BUS 123, BUS 124, BUS 125, BUS 126, BUS
Justification:

There are a few editorial changes to include previously approved equivalent courses. Another change made for the Bachelor of Arts and the Bachelor of Science (see 2 a)) is to explain more clearly what the 36 units of upper-division course work are. The other change made for the Bachelor of Science (see 2 b)) is updating the list of upper-division courses the students can choose from to include all the upper-division courses currently being offered.

Another change made for the Bachelor of Science with Statistical Computing Option (see 2 a) and b)) is adding the new course STAT 167: Introduction to Data Science as a required course for this option, since it is important for the students who are interested in statistical computing to have some general knowledge of data science. The deletion of STAT 198-I is because it is difficult for faculty to evaluate the quality of internship the students find independently.

For the Bachelor of Science with Quantitative Management Option, students are required to take 6 courses from SoBA. However, the list of business courses students can choose from has not been updated for a long time. Every year students experience the following problems: (i) some of the business courses require some prerequisites students lack; (ii) some of the business courses impacted by SoBA students so that Statistics students cannot enroll; (iii) some of the students want to choose courses from Information Systems, Operation & Supply Chain Management; the two areas SoBA offers, but not on the Statistics list. To address the above problems, the Department of Statistics worked with the Assistant Dean Kazi Mamun of SoBA to create the updated list of business courses to give students more options.

Approvals:

Approved by the faculty of the Department of Statistics: October 16, 2017
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: January 9, 2018
Reviewed by the Committee on Undergraduate Admissions: April 10, 2018
Approved by the Committee on Educational Policy: May 7, 2018
To be adopted:

Proposed Changes to Statistics Minor

PRESENT:

Minor

The minor in Applied Statistics is designed to give students in either the social sciences or the physical sciences a cohesive set of statistics courses to deal with the data analytic aspects of their disciplines and to understand the statistical summaries that are encountered in everyday activities.

The requirements for the minor consist of at least 24 and not more than 28 upper-division units in Statistics to include the following:

1. STAT 100A, STAT 100B
2. Eight (8) units from STAT 110, STAT 127/BUS 127, STAT 130, STAT 140, STAT 146
3. Four (4) units from STAT 147, STAT 157
4. Four (4) additional units from 2. or 3. Above

Of the specified upper-division units, a minimum of 16 must be unique to the minor and may not be used to satisfy major requirements.

No more than 4 units may be in courses numbered 190 through 199.

See Minors under the College of Natural and Agricultural Sciences in the Colleges and Programs section of this catalog for additional information on minors.

PROPOSED:

Minor

The minor in Applied Statistics is designed to give students in either the social sciences or the physical sciences a cohesive set of statistics courses to deal with the data analytic aspects of their disciplines and to understand the statistical summaries that are encountered in everyday activities.

The requirements for the minor consist of at least 24 and not more than 28 upper-division units in Statistics to include the following:

1. STAT 100A, STAT 100B, STAT 147
2. Twelve (12) units from STAT 110, STAT 127/BUS 127, STAT 130, STAT 140, STAT 146, STAT 157, STAT 160A, STAT 160B, STAT 160C, STAT 167

Of the specified upper-division units, a minimum of 16 must be unique to the minor and may not be used to satisfy major requirements.

No more than 4 units may be in courses numbered 190 through 199.

See Minors under the College of Natural and Agricultural Sciences in the Colleges and Programs section of this catalog for additional information on minors.
**Justification:**

The changes made to the Minor requirements are to add STAT 160ABC and STAT 167 to the list of courses the students can choose from, to give them more options. The requirements were then reorganized to make them easier to understand.

**Approvals:**

Approved by the faculty of the Department of Statistics: October 16, 2017
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: January 9, 2018
Approved by the Committee on Educational Policy: May 7, 2018
To be adopted:

Proposed Changes to Education, Society, and Human Development (ESHD) Major

<table>
<thead>
<tr>
<th>PRESENT:</th>
<th>PROPOSED:</th>
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<tr>
<td><strong>Education, Society and Human Development Major</strong></td>
<td><strong>Education, Society and Human Development Major</strong></td>
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</table>

The Education, Society, and Human Development Major builds a theoretical foundation, presents applied understandings in the study of education, and explores the varied contexts of learning over the life course.

Program faculty bring multiple disciplinary perspectives to their research and courses, including cognitive sciences, developmental psychology, understanding of the exceptional child, applied behavior analysis, the relationship between education, society and culture, educational policy and leadership, measurement and assessment, and issues in higher education.

The B.A. in Education, Society, and Human Development does not teach a student how to be a teacher. (See Graduate School of Education section on Teaching Credentials and Masters programs.) Students interested in teaching at the elementary or secondary level will benefit from completing the major because they will be exposed to critical theories that investigate how education has been used to create, maintain, and reinforce social stratification. Students will develop a historical and contemporary awareness of different learning settings, and gain a strong foundation in human development, assessment and interventions in the education context. Students who are interested in teaching elementary, middle, or high schools should consult an academic advisor in the GSOE Undergraduate Programs Office about combining an appropriate major and minor or completing a double major in order to develop appropriate expertise in the subject they plan to teach.

Students will benefit from completing the major because they will be exposed to critical theories that investigate how education has been used to create, maintain, and reinforce social stratification. In addition, students will develop a historical and contemporary awareness of different learning settings, and gain a strong foundation in human development, assessment and interventions in the education context. Students who are interested in teaching elementary, middle, or high schools should consult an academic advisor in the GSOE Undergraduate Programs Office about combining an appropriate major and minor or completing a double major in order to develop appropriate expertise in the subject they plan to teach.
Education, Society, and Human Development majors are also prepared for other types of instructional or administrative positions in programs such as those focused on early childcare, out-of-school learning, or adult learning. Additionally, students who complete the major are prepared to enter other education-related careers in programs or organizations such as those focused on early childcare, out-of-school learning, or adult learning. Additionally, students who complete the major are prepared to enter education-related career fields in the private and public sectors including working with special populations, in legal fields, medical environments, and the arts. Students interested in graduate study will be well prepared to pursue advanced degree programs in education or related fields. Undergraduates enrolled in the Education, Society, and Human Development degree are encouraged to complete courses inside and outside of the major to enhance career preparation and pursue personal interests. With advanced planning, students in the major can complete a minor or a second major in another discipline. The B.A. in Education, Society, and Human Development is not a teacher credential program. (See Graduate School of Education section on Teaching Credentials and Masters programs.)
First-Year Freshmen Seminars

The EDUC 093A, EDUC 093B, and EDUC 093C courses are a year-long seminar series designed for first-year freshmen students that meets weekly with several aspirations including community building, orientation to the campus and the major, and academic support. The long-term goal of this seminar series is to not only set the foundation for the major but to build an experience that evolves over the course of students’ experience at UCR.

The seminars are for first-time freshmen in the Education, Society, and Human Development major; freshmen are given enrollment priority. Each seminar carries 2 units of academic credit, although units are not applied toward major requirements. The seminar series is recommended, but not required for completion of the degree. The seminars are graded on an “S/NC” basis.

Transfer Student Seminar

The EDUC 094 course is a 2-unit junior seminar (designed for new, incoming transfer students) that meets weekly for the purpose of community building, orientation to the campus and the Education major, and academic support. The long term goal of this seminar is to not only set the foundation for the major, but to build a learning community experience that follows students over the course of their program at UCR. New, incoming transfer students are given enrollment priority into this course which carries 2 units of academic credit. These units are not applied toward major requirements. The seminar is recommended, but not required for completion of the degree. The seminars are graded on an “S/NC” basis.

Transfer Students

Admission is selective and based on all transferable coursework with a minimum GPA of 2.4 (2.8 for non-residents). There is no prerequisite “Major” coursework required. Meeting the minimum eligibility requirements does not guarantee admission.
University Requirements
See Undergraduate Studies section.

College Requirements
See the Graduate School of Education section.

Major Requirements
The major requirements for the B.A. degree in Education, Society, and Human Development are as follows:

Community Leadership, Policy, and Social Justice Concentration
1. Lower-division requirements (5 courses [at least 20 units])
   (a) EDUC 005
   (b) Any 4 of the following lower-division courses (at least 16 units): EDUC 010, EDUC 020 or EDUC 020S, EDUC 022, EDUC 030 or EDUC 030S, EDUC 040 or EDUC 040S, EDUC 041, EDUC 042, EDUC 050, EDUC 051

2. Upper-division requirements (7 courses [at least 28 units])
   (a) Concentration courses (5 courses [at least 20 units])
      (1) EDUC 109 or EDUC 109S, EDUC 114, EDUC 122, EDUC 123, EDUC 141, EDUC 142, EDUC 143, EDUC 146/ETST 146
   (b) Elective courses (2 courses [at least 8 units])
      (1) EDUC 109 or EDUC 109S, EDUC 110 or EDUC 110S, EDUC 112 or EDUC 112S, EDUC 114, EDUC 116 or EDUC 116S, EDUC 118, EDUC 122, EDUC 123, EDUC 134, EDUC 141, EDUC 142, EDUC 143, EDUC 146/ETST 146, EDUC 160, EDUC 161, EDUC 181, EDUC 182, EDUC 183, EDUC 190
A maximum of 8 units of EDUC 190 may be taken to satisfy elective degree requirements.

3. Practicum Requirement (40 hours total)
   (a) A minimum of 40 hours of field experience or research in an education setting, satisfied in one of two ways:

   (1) Complete 40 hours of field experience or research in conjunction with one or more approved UCR courses that include a practicum. Consult the Education Student Affairs Office or Graduate School of Education Website for Undergraduate Academic Programs for a current list of approved practicum courses.

   (2) By petition to the Education Student Affairs Office or for approval of verifiable hours from courses that are not on the approved practicum course list or hours from educational fieldwork that is not linked to a UCR course (e.g., tutoring experience, instructional experience in a summer program for children, etc.)

(1) For a list of suggested field experiences, research, and/or service learning opportunities and how to demonstrate completion of the 40 hours, please consult with an academic advisor in the Undergraduate Programs Office in the Graduate School of Education and/or the Undergraduate programs section of Graduate School of Education’s website.

Learning and Behavioral Studies
Concentration

1. Lower-division requirements (5 courses [at least 20 units])
   (a) EDUC 005

   (b) Any 4 of the following lower-division courses (at least 16 units): EDUC 010, EDUC 020 or EDUC 020S, EDUC 022, EDUC 030 or EDUC 030S, EDUC 040 or EDUC 040S, EDUC 041, EDUC 042, EDUC 050, EDUC 051

2. Upper-division requirements (7 courses [at least 28 units])
   (a) Developmental courses (2 courses [at least 8 units])
      (1) EDUC 160, EDUC 161, EDUC 172 or EDUC 172S
   (b) Learning courses (2 courses [at least 8 units])

[no change]
1. Core courses (3 courses [at least 12 units])

EDUC 110 or EDUC 110S, EDUC 116 or EDUC 116S, EDUC 134, EDUC 181, EDUC 182, EDUC 183

(c) Education Research Methods and Statistics (1 course [at least 4 units])

EDUC 110 or EDUC 110S, EDUC 116 or EDUC 116S, EDUC 134, EDUC 181, EDUC 182, EDUC 183, EDUC 184

(d) Elective courses (2 courses [at least 8 units])

EDUC 109 or EDUC 109S, EDUC 110 or EDUC 110S, EDUC 112 or EDUC 112S, EDUC 114, EDUC 116 or EDUC 116S, EDUC 118, EDUC 122, EDUC 123, EDUC 133, EDUC 134, EDUC 141, EDUC 142, EDUC 143, EDUC 146/ETST 146, EDUC 160, EDUC 161, EDUC 181, EDUC 182, EDUC 183, EDUC 190

A maximum of 8 units of EDUC 190 may be taken to satisfy elective degree requirements.

3. Practicum Requirement (40 hours total)

(a) A minimum of 40 hours of field experience or research in an education setting, satisfied in one of two ways:

1. Complete 40 hours of field experience or research in conjunction with one or more approved UCR courses that include a practicum. Consult the Education Student Affairs Office or Graduate School of Education Website for Undergraduate Academic Programs for a current list of approved practicum courses.

2. By petition to the Education Student Affairs Office or for approval of verifiable hours from courses that are not on the approved practicum course list or hours from educational fieldwork that is not linked to a UCR course (e.g., tutoring experience, instructional experience in a summer program for children, etc.)

(1) For a list of suggested field experiences, research, and/or service-learning opportunities and how to demonstrate completion of the 40 hours, please consult with an academic advisor in the Undergraduate Programs Office in the Graduate School of Education and/or the Undergraduate programs section of Graduate School of Education’s website.
Student-designed Comparative Concentration

1. Lower-division requirements (5 courses [at least 20 units])
   (a) EDUC 005
   (b) Any 4 of the following lower-division courses (at least 16 units):
       EDUC 010, EDUC 020 or EDUC 020S, EDUC 022, EDUC 030 or EDUC 030S, EDUC 040 or EDUC 040S, EDUC 041, EDUC 042, EDUC 050, EDUC 051

2. Upper-division requirements (7 courses [at least 28 units])
   (a) Concentration courses (5 courses [at least 20 units])
       (1) EDUC 109 or EDUC 109S, EDUC 110 or EDUC 110S, EDUC 112 or EDUC 112S, EDUC 114, EDUC 116 or EDUC 116S, EDUC 118, EDUC 122, EDUC 123, EDUC 134, EDUC 141, EDUC 142, EDUC 143, EDUC 146/ETST 146, EDUC 160, EDUC 161, EDUC 181, EDUC 182, EDUC 183
   (b) Elective courses (2 courses [at least 8 units])
       (1) EDUC 109 or EDUC 109S, EDUC 110 or EDUC 110S, EDUC 112 or EDUC 112S, EDUC 114, EDUC 116 or EDUC 116S, EDUC 118, EDUC 122, EDUC 123, EDUC 134, EDUC 141, EDUC 142, EDUC 143, EDUC 146/ETST 146, EDUC 160, EDUC 161, EDUC 181, EDUC 182, EDUC 183, EDUC 190

3. Practicum Requirement (40 hours total)
   (a) A minimum of 40 hours of field experience or research in an education setting, satisfied in one of two ways:
       (1) Complete 40 hours of field experience or research in conjunction with one or more of the following courses:
       (b) [no change]

Comparative Studies Concentration

1. [no change]

2. [no change]

3. [no change]
   (a) A minimum of 40 hours of field experiences, research, and/or service-learning (activity) in an education setting.
more approved UCR courses that include a practicum. Consult the Education Student Affairs Office or Graduate School of Education Website for Undergraduate Academic Programs for a current list of approved practicum courses.

(2) By petition to the Education Student Affairs Office or for approval of verifiable hours from courses that are not on the approved practicum course list or hours from educational fieldwork that is not linked to a UCR course (e.g., tutoring experience, instructional experience in a summer program for children, etc.)

learning opportunities and how to demonstrate completion of the 40 hours, please consult with an academic advisor in the Undergraduate Programs Office in the Graduate School of Education and/or the Undergraduate programs section of Graduate School of Education’s website.

Education Abroad Program
The Education Abroad Program (EAP) is an excellent opportunity to travel and learn more about another country and its culture while taking courses to earn units toward graduation. Students should plan study abroad well in advance to ensure that the courses taken fit with their overall program at UCR. Consult the departmental student affairs officer for assistance. For further details about study abroad opportunities, visit Study Abroad Programs at studyabroad.ucr.edu or call (951) 827-4113.

See Education Abroad Program in the Educational Opportunities section of this catalog. A list of participating countries is found under Education Abroad Program in the Programs and Courses section. Search for programs by specific areas at uc.eap.ucop.edu.

Justification:

1. We revised the narrative portion at the beginning of our catalog copy to provide clearer language about the opportunities students can pursue with the major.
2. We added language about our first-year freshmen seminar series and the transfer student seminar. The seminar courses will not be part of the requirements for the B.A. degree, but the units can count toward their over 180 degree units to graduate from UCR.
3. We added a section to the catalog regarding the information about the transfer student admission grade point average. We added this information to provide clear information regarding the GPA minimum requirements for transfer student admission. The GPA included in this portion of the catalog is the minimum GPA for admission to UCR. The GPA information is similar as to what is found on page 31 of the 2017-2018 general catalog.
4. We renamed the Student-designed Comparative Concentration to the Comparative Studies Concentration. The name change of the concentration will allow students to have a better understanding of the intention of the concentration. The intention of the concentration is to allow students to create a comparative study experience with courses approved for the major. The previous name gave the impression that students could take any course in the Education roster and they could petition for it to count toward their major.

5. Our faculty continue to develop new courses and revise existing courses for the undergraduate major and we want to officially recognize these courses in our major in their respective concentration and elective areas.
   a. We added EDUC 001, EDUC 002, EDUC 019 (E-Z), EDUC 032A, EDUC 032B, EDUC 032C, EDUC 060, and EDUC 061 to our lower division course options for all three concentrations of the major. We want to recognize these as lower division course options for all three concentrations of the major.
   b. For the Community Leadership, Policy, and Social Justice Concentration, we added EDUC 144, EDUC 150, EDUC 151, and EDUC 152 to the concentration courses. These courses were created by faculty teaching in this concentration of the major. We also added EDUC 117, EDUC 119 (E-Z), EDUC 133, EDUC 144, EDUC 150, EDUC 151, EDUC 152, and EDUC 184 to the elective course options.
   c. For the Learning and Behavioral Studies Concentration, we added EDUC 184 to the Learning Courses section. We also added EDUC 117 to the Education Research Methods and Statistics Section. These courses were created by the faculty teaching in this concentration of the major. Finally, we added EDUC 117, EDUC 119 (E-Z), EDUC 133, EDUC 144, EDUC 150, EDUC 151, EDUC 152, and EDUC 184 to the elective section.
   d. For the re-named Comparative Studies Concentration, we added EDUC 117, EDUC 144, EDUC 150, EDUC 151, EDUC 152, and EDUC 184 to the concentration courses. We also added EDUC 117, EDUC 119 (E-Z), EDUC 133, EDUC 144, EDUC 150, EDUC 151, EDUC 152, and EDUC 184 to the elective course options.

6. We revised the practicum, fieldwork, and service-learning component of the major across all three concentrations. The major still requires 40 hours, but after review and consultation across campus departments, we are collaborating with the Office of Student Life to have students report their hours and experiences by way of the HighlanderLink extra-curricular transcript. Students will learn about this process about finding activities, reporting, and submitting the report prior to graduate to meet the 40 hour minimum requirement for the major during their freshmen or transfer student seminars. We will also have information available on our website and in the GSOE Undergraduate Programs office starting this fall. The information can also be provided to students through advising appointments. The catalog has been updated to reflect how students will be able to obtain the information and where to go to learn more about the current process for reporting the completion of the hours. The revised working in the catalog and new process will reduce student confusion on how to complete the requirement as well as improve the administrative activities associated with helping students complete this requirement.

7. In consultation with the UCR Education Abroad Office, we added information about the Education Abroad Program to encourage students to consider studying abroad as an option as part of their overall educational experience.

**Approvals:**
Approved by the faculty of the Graduate School of Education: March 6, 2018
Approved by the Executive Committee of the Graduate School of Education: March 7, 2018
Reviewed by the Committee on Undergraduate Admissions: April 10, 2018
Approved by the Committee on Educational Policy: May 4, 2018
To be adopted:

Add Business Analytics Concentration to Business Administration Major (BSAD)

<table>
<thead>
<tr>
<th>PRESENT:</th>
<th>PROPOSED:</th>
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<tbody>
<tr>
<td>Business Administration Major</td>
<td>[No Change]</td>
</tr>
<tr>
<td>1. Preparation for Business Administration major (8 courses [at least 32 units])</td>
<td>[No Change]</td>
</tr>
<tr>
<td>Major prerequisites (non-BUS courses may be used to satisfy breadth requirements for the School of Business Administration):</td>
<td>[No Change]</td>
</tr>
<tr>
<td>(1) BUS 010</td>
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<tr>
<td>(2) BUS 020</td>
<td></td>
</tr>
<tr>
<td>(3) ECON 002</td>
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<td>(4) ECON 003</td>
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<td>(5) CS 008</td>
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<td>(6) STAT 048</td>
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<td>(7) MATH 022</td>
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<tr>
<td>(8) ECON 102 or ECON 103</td>
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<tr>
<td>The major requirements for the B.S. in Business Administration are as follows:</td>
<td>[No Change]</td>
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<tr>
<td>2. Upper-division major requirements (18 courses [at least 72 units])</td>
<td>[No Change]</td>
</tr>
<tr>
<td>Core courses (at least 10 courses [at least 40 units]):</td>
<td>[No Change]</td>
</tr>
<tr>
<td>BUS 100W, BUS 101, BUS 102, BUS 103, BUS 104/STAT 104, BUS 105, BUS 106/ ECON 134, BUS 107, BUS 108, BUS 109</td>
<td>[No Change]</td>
</tr>
<tr>
<td>Concentration (At least 20 units): Students in the Business Administration major (BSAD) will be required to declare a concentration at least three quarters prior to graduation, provided they be allowed to change their concentration, if justified. The Office of Undergraduate Business Programs will manage the process. Students can declare one concentration. Choose five courses from one of the concentrations listed below. Courses completed</td>
<td>[No Change]</td>
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to meet upper division core requirements may not be used to meet concentration requirements.


[No Change]

Business Analytics: BUS 123, BUS 124, BUS 125, BUS 130, and at least one of the following: BUS 117, BUS 129, BUS 136, BUS 161

Finance: BUS 132 and at least four of the following: BUS 131, BUS 134, BUS 135, BUS 136, BUS 137, BUS 138, BUS 139, BUS 140E, BUS 147.

[No Change]

Information Systems: BUS 125, BUS 128, BUS 171, BUS 172, BUS 173, BUS 174, BUS 175

[No Change]

Management: BUS 143, BUS 144, BUS 145, BUS 146, BUS 147, BUS 148, BUS 149, BUS 150, BUS 154, BUS 155, BUS 156, BUS 157, ANTH 105/BUS 158, BUS 173

[No Change]

Marketing: BUS 111, BUS 112, BUS 113, BUS 114, BUS 115, BUS 116, BUS 117, BUS 118, BUS 119, BUS 124, BUS 126

[No Change]

Operations and Supply Chain Management: BUS 122, BUS 123, BUS 124, BUS 125, BUS 126, BUS 127/STAT 127, BUS 128, BUS 129, BUS 130, BUS 173

[No Change]

An additional 3 courses (at least 12 units) of Business Administration elective courses from BUS 111-BUS 199H, excluding BUS 190. Courses completed to satisfy the five-course concentration requirement may not be used to meet this requirement. Related courses outside of Business Administration may be approved to satisfy their requirement with the approval of the Associate Dean or Assistant Dean of Undergraduate Student Affairs of SoBA.
**Justification:**

Business Analytics (BA) is an emerging area that uses data and mathematical approaches to improve decision making and performance in business. With increasing availability of business data and computing power, the need for the talent in BA has grown dramatically in recent years. According to the McKinsey Global Institute report (2016), the US is facing a great talent shortage in Business Analytics, and that shortage is expected to continue. To address this shortage, many business schools have offered Business Analytics major or concentration.

The UCR School of Business Administration (SoBA) proposes to offer the Business Analytics concentration in the fall of 2018. Our curriculum is designed based the benchmark study against ten top business schools. In particular, the core courses are designed to provide rigorous training in the fundamental tools and techniques of business analytics, whereas the electives provide interdisciplinary applications in specific functional areas. The rigor of the curriculum will prepare students for careers such as business analyst and consultant, in supply chain, finance, operations, and marketing areas.

The main aims and objectives for the BA concentration are as follows.

- Offer rigorous training in business analytics to highly capable students, and serve corporations and communities in Southern California
- Increase job placements, average salary, and training of UCR alumni
- Help maintain and build critical mass of faculty in Business Analytics and related fields
- Enhance the reputation of SoBA and UCR by enhancing the breadth and depth of the choices

Per SoBA’s undergraduate committee (UG) request, the OSCM area has conducted a benchmark study comparing our curriculum to that of the benchmarked universities. It found that many universities have been already offering a BA concentration/major. For example:

- MIT offers an undergraduate degree in Business Analytics, which is a mixture of topics traditionally taught in Operations Research/Management that includes Statistics and Data Analysis. (http://mitsloan.mit.edu/undergrad/15-2-business-analytics).
- University of Iowa: https://admissions.uiowa.edu/academics/business-analytics-information-systems
- National University of Singapore: https://bschool.nus.edu.sg/analytics-operations
- University of Miami: http://bulletin.miami.edu/undergraduate-academic-programs/business/management-science/management-science-bsba/
- The University of Kansas: https://business.ku.edu/degree-programs/undergraduate/bsb/business-analytics
- University of Tennessee: http://bas.utk.edu/academic-programs/bachelors/business-analytics/default.asp
- Drexel University: http://www.lebow.drexel.edu/academics/undergraduate/areas-of-study/business-analytics

The benchmark study examined the following ten universities in detail: University of California-Irvine, University of California-Berkeley, University of Southern California, Massachusetts Institute of Technology, New York University, Pennsylvania State University, University of Texas-Dallas, Indiana
University, University of Michigan, and University of North Carolina. The study reveals that a vast majority of the benchmarked universities offer either a major or concentration in Business Analytics. In all the universities we considered, such major/concentration is offered and managed by the equivalent of the OSCM area.

SoBA is well-positioned to deliver the BA concentration. (i) For the interdisciplinary applications of business analytics, the majority of professors do empirical research, using statistical analysis to answer business questions. Many of them have taught the applications of business analytics in specific areas, such as operations, marketing, and finance. (ii) For the foundation of business analytics, the OSCM area is uniquely positioned to deliver the core curriculum, including statistical tools, optimization techniques, decision analysis, and programming languages. Indeed, our current curriculum already includes several courses fundamental to business analytics, e.g., BUS 124 (Business Analytics), BUS 125 (Simulation for Business), and Bus 126 (Practical Business Forecasting). In addition, the OSCM area is working on revamping our undergraduate concentration (and hopefully future major). This includes revising content of current courses and introducing new ones such as a programming course suited for business students.

As a result of this benchmark study, we propose a Business Analytics Concentration.

**Approvals:**
Approved by the Executive Committee from the School of Business Administration on: February 27, 2018
Approved by the Committee on Educational Policy: April 11, 2018
To be adopted:

Proposed Changes to the Following Undergraduate Minor:
Business Administration

**Business Administration Minor**

Students declaring a minor in Business Administration will petition the Undergraduate Business Programs Office at least three quarters prior to graduation. That office will publicize the deadlines each quarter to all colleges and major departments.

Prerequisites for the minor in Business Administration are as follows:

1. Three lower-division courses (14 units) (must be completed with no grade lower than “C”):
   BUS 020, ECON 003, STAT 048

Requirements for the minor in Business Administration are as follows:

2. Six upper-division courses (24 units):
   a) Four courses from the following: BUS 101, BUS 102, BUS 103, BUS 104/STAT 104, BUS 105, BUS 106/ECON 134, BUS 108
   b) Two additional upper-division Business Administration courses from BUS 100W–BUS 199H, excluding BUS 190.

   Courses completed to satisfy the four course requirement in section “a)” above may not be used to meet this requirement.

   Additionally, students need to complete four upper-division courses as follows, depending on the minor of their choice, the general
business minor or any of the eight functional business minors (16 units):

**General Business:**
Four core from the following list: BUS 103, BUS 104/STAT104, BUS106/ECON134, BUS 107, BUS 108

**Accounting:**
a) Required: BUS 108, BUS 165A
b) Two additional upper-division Business Administration accounting courses selected from the following: BUS 161, BUS 165B, BUS 165C, BUS 168A, BUS 168B, BUS 169A, BUS 169B, BUS 170

**Business Analytics:**
a) Required: BUS 123, BUS 124, BUS 125
   One additional upper-division business analytics course selected from the following: BUS 115, BUS 117, BUS127, BUS 129, BUS 130, BUS 136, BUS 137, BUS 173

**Finance:**
a) Required: BUS 106, BUS 132
b) Two additional upper-division Business Administration finance courses selected from the following: BUS 131, BUS 134 (highly recommended), BUS 135, BUS 136 (highly recommended), BUS 137, BUS 138, BUS 139, BUS 140E, BUS 141, BUS 147.

**Information Systems**
a) Required: BUS 101
b) Three additional upper-division Business Administration information systems courses selected from the following: BUS 110, BUS 125, BUS 128, BUS 166, BUS 171, BUS 172, BUS 173, BUS 174, BUS 175, BUS179

**Management: Organizational Behavior/Human Resources**
a) Required: BUS 107, BUS 155
b) Two additional upper-division Business Administration organizational behavior or human resources courses selected from the following: BUS 121, BUS 143, BUS 144, BUS 145, BUS 149, BUS 156, BUS 157

Management: Strategy and Entrepreneurship
a) Required: BUS 109, BUS 146
b) Two additional upper-division Business Administration courses selected from the following: BUS 121, BUS 143, BUS 144, BUS 145, BUS 147, BUS 148, BUS 149, BUS 150, BUS 154, BUS 155, BUS 156, BUS 157, BUS 159, BUS 163, BUS 173

Marketing
a) Required: BUS 103
b) Three additional upper-division Business Administration marketing courses selected from the following: BUS 111, BUS 112, BUS 113, BUS 114, BUS 115, BUS 116, BUS 117, BUS 118, BUS 119, BUS 124, BUS 126, BUS 151, BUS 152, BUS 159, BUS 164

Operations and Supply Chain Management
a) Required: BUS 104, BUS 105
b) Two additional upper-division Business Administration operations and supply chain management courses selected from the following: BUS 122, BUS 123, BUS 124 (highly recommended), BUS 125, BUS 126, BUS 127/STAT 127, BUS 128, BUS 129 (highly recommended), BUS 130, BUS 173

Justification:

In conducting the undergraduate business program curriculum update, the UG Committee Members consistently learned:

- UCR departments are interested in encouraging business minors to their students, but given the tight course sequencing of some majors (e.g., Physics, Engineering), it was preferred that fewer courses be required for the minor.
• Per general UCR business minor guidelines (p. 86 of course catalog), the Business Administration Minor is at the upper-bound of courses required with three lower-division pre-requisites and six upper-division courses.

• In a curriculum review of business minors at the top 10 undergraduate business programs (U.S. News and World Report, 2018; see Table 1 on page 6) and the two UCs who also have undergraduate business programs:
  o Nine schools offer business minors, of which six offer functional business minors (e.g., business minor in accounting, business minor in management) and three offer general business minors.
  o Further, across schools offering business minors, the average number of total courses required is ~7 courses (including pre-requisites).
  o For comparison, UCR’s minor is a general business minor with 9 or 10 required courses (the difference in total courses comes in that some of the core courses require additional pre-requisite courses such as CS 008).

Following from this research, the UG Committee members worked with their area coordinators to propose the following 1) decrease the number of total course requirements in the general business minor to be in line with other business minors 2) provide the option of choosing from eight functional business minors to allow for depth of knowledge in a particular field of business. Given that these functional business minors parallel the concentrations offered in the Business Administration Major, the School of Business is well poised to offer the revised general and functional business minor courses.

<table>
<thead>
<tr>
<th>Table 1: Comparison of UC Business Minors</th>
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<td>Program</td>
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<td>UC Davis</td>
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<tr>
<td>UC Santa Barbara</td>
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<td>University of North Carolina (Greensboro)</td>
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<td>University of Virginia</td>
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<td>New York University</td>
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<td>Graduate School of Business Administration</td>
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<td>University of Southern California</td>
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</table>

* Comparison universities based on the US News and World Report "Best Undergraduate Business Programs" 2018

**Approvals:**

Approved by the Executive Committee from the School of Business: February 27, 2018
Approved by the Committee on Educational Policy: April 11, 2018
To be received and placed on file:

Reports of Degrees Awarded – Summer 2017

College of Humanities, Arts and Social Sciences
Bachelor of Arts: ............................................................. 469
Bachelor of Science: ....................................................... 34

Reports of Degrees Awarded - Fall 2017

Bourns College of Engineering
Bachelor of Science: ....................................................... 57

College of Humanities, Arts and Social Sciences
Bachelor of Arts: ............................................................. 157
Bachelor of Science: ....................................................... 16

College of Natural and Agricultural Sciences
Bachelor of Arts: ............................................................. 3
Bachelor of Science: ....................................................... 78

School of Business Administration
Bachelor of Science: ....................................................... 28

Report of Degrees Awarded – Winter 2018

Graduate Division
Master of Arts: ............................................................. 6
Master of Business Administration: ..................................... 6
Master of Education: ........................................................ 7
Master of Finance: ........................................................... 1
Master of Fine Arts: .......................................................... 2
Master of Science: ............................................................ 68
Doctor of Philosophy: ....................................................... 38

The names of the candidates are filed in the official records of the Office of the Registrar.

S. See, Secretary-Parliamentarian
Riverside Division of the Academic Senate
Committee on Courses  
Report to the Riverside Division  
May 29, 2018

To be received and placed on file:
The Committee on Courses has approved the following courses.

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Committee on Courses  
Report to the Riverside Division  
May 29, 2018

To be received and placed on file:
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<td>PHYS 041 A</td>
<td>Introductory Physics for Physics Majors (8)</td>
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<td>PHYS 163</td>
<td>Atomic Physics and Spectroscopy (4)</td>
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<td>Honors Religious Myths and Rituals (4)</td>
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<td>RLST 152</td>
<td>Religion and Oppression (4)</td>
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<td>RLST 153</td>
<td>Religion and Social Justice (4)</td>
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<td>CHANGE</td>
<td>RLST 159</td>
<td>Queer Religiosities (4)</td>
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<tr>
<td>CHANGE</td>
<td>RLST 161</td>
<td>Gender and Sexuality in U.S Religious History (4)</td>
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</tbody>
</table>

**Professional Courses:**

- NEW EDUC 401 Preparation for a School Psychology Internship (2)
- DELETE SWSC 302 Teaching Practicum (1-4)

**Graduate Courses:**

- NEW ANTH 205 Race and Ethnicity in Mexico (4)
- NEW CEE 211 Upstream Processes in Biotechnology (4)
- NEW CEE 238 A Bioprocess Design Laboratory I (2)
- NEW CEE 238 B Bioprocess Design Laboratory II (3)
- NEW CEE 238 C Bioprocess Design Laboratory III (3)
- NEW CEE 248 Quantitative Analysis of Upstream Processes in Biotechnology (4)
- NEW CHEM 229 M Advanced Topics in Analytical Chemistry (3) Analysis of Atmospheric Chemicals
- NEW CS 254 Network Security (4)
- NEW ENSC 240 Multiphase Atmospheric Chemistry (4)
- NEW MATH 210 C Complex Analysis (Riemann Surfaces) (4)
- NEW MCBL 226 Microbiomes (4)
- NEW MGT 251 Marketing Analytics (4)
- NEW PHIL 276 Third And Fourth Year Research Seminar (2-4)
- NEW PHIL 284 A Problems in the History of Philosophy (4)
- NEW PHIL 284 B Problems in the History of Philosophy (4)
To be received and placed on file:

The Committee on Courses has approved the following courses.

<table>
<thead>
<tr>
<th>Action</th>
<th>Course</th>
<th>Title</th>
<th>Course Renumbered</th>
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<tbody>
<tr>
<td>NEW</td>
<td>PHIL 285 A</td>
<td>Problems in Contemporary Philosophy (4)</td>
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<tr>
<td>NEW</td>
<td>PHIL 285 B</td>
<td>Problems in Contemporary Philosophy (4)</td>
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<tr>
<td>NEW</td>
<td>PHYS 209 C</td>
<td>Advanced Topics in Quantum Optics (4)</td>
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<td>NEW</td>
<td>SOC 284</td>
<td>Medical Sociology Graduate Seminar (4)</td>
<td>Practicum in Applied Behavior Analysis: Advanced Behavioral Interventions</td>
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<td>DELETE</td>
<td>EDUC 236 E</td>
<td>(5)</td>
<td>Practicum in Applied Behavior Analysis: Implementation, Management and</td>
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<td>EDUC 236 F</td>
<td>Supervision (5)</td>
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<td>Surface Chemistry of Soils (4)</td>
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<td>SWSC 204</td>
<td>Environmental Organic Chemistry (4)</td>
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<td>DELETE</td>
<td>SWSC 211</td>
<td>Microbial Ecology (3)</td>
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<td>DELETE</td>
<td>SWSC 213</td>
<td>Soil Mineralogy (3)</td>
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<tr>
<td>DELETE</td>
<td>SWSC 213 L</td>
<td>(4)</td>
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<tr>
<td>DELETE</td>
<td>SWSC 217</td>
<td>Vadose Zone Processes (4)</td>
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<tr>
<td>DELETE</td>
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<tr>
<td>DELETE</td>
<td>SWSC 232</td>
<td>Biogeochemistry (4)</td>
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<tr>
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<td>CEE 200</td>
<td>Advanced Engineering Computation (4)</td>
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<td>CHANGE</td>
<td>CEE 202</td>
<td>Transport Phenomena (4)</td>
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<td>CEE 204</td>
<td>Advanced Kinetics and Reaction Engineering (4)</td>
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<td>Advanced Chemical Engineering Thermodynamics (4)</td>
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<tr>
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<td>Advanced Analytical Chemistry: Separation Science (3)</td>
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<td>Advanced Analytical Chemistry: Optical Spectroscopy (3)</td>
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<td>CHEM 221 C</td>
<td>Advanced Analytical Chemistry: Electrochemistry (3)</td>
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<td>CHANGE</td>
<td>CHEM 221 D</td>
<td>Advanced Analytical Chemistry: Mass Spectroscopy (3)</td>
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<tr>
<td>CHANGE</td>
<td>CHEM 221 E</td>
<td>Advanced Analytical Chemistry: Introduction to Bioanalytical Chemistry (3)</td>
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<tr>
<td>CHANGE</td>
<td>CHEM 245</td>
<td>Chemistry and Physics of Aerosols (4)</td>
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<tr>
<td>CHANGE</td>
<td>DNCE 260 (E-Z)</td>
<td>Seminar in Dance History (4)</td>
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<td>CHANGE</td>
<td>EDUC 255 E</td>
<td>Advanced Topics in Applied Behavior Analysis (4)</td>
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<tr>
<td>CHANGE</td>
<td>ENSC 217</td>
<td>Vadose Zone Processes (4)</td>
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<tr>
<td>CHANGE</td>
<td>ENSC 227</td>
<td>Global Change and the Earth System (4)</td>
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<tr>
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<td>ENSC 245</td>
<td>Chemistry and Physics of Aerosols (4)</td>
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<td>CHANGE</td>
<td>ENSC 299</td>
<td>Research for the Thesis or Dissertation (1-12)</td>
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<td>CHANGE</td>
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<td>Chemistry and Physics of Aerosols (4)</td>
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<td>MCBL 211</td>
<td>Microbial Ecology (3)</td>
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<td>CHANGE</td>
<td>MGT 239</td>
<td>Business Modeling and Simulation (4)</td>
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<td>CHANGE</td>
<td>MSE 225 B</td>
<td>Advanced Analytical Chemistry: Optical Spectroscopy (3)</td>
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<td>NEM 250</td>
<td>Seminar in Nematology (1)</td>
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<td>CHANGE</td>
<td>PHYS 208</td>
<td>General Relativity (4)</td>
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<tr>
<td>CHANGE</td>
<td>STAT 293</td>
<td>Methods in Applied Statistics (4)</td>
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Extension Courses & Instructors:

<table>
<thead>
<tr>
<th>COURSE</th>
<th>INSTRUCTOR</th>
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<tbody>
<tr>
<td>ENG XR001A</td>
<td>English 1A, Freshman Composition</td>
</tr>
<tr>
<td>ANTH XR005</td>
<td>Introduction to Archaeology</td>
</tr>
<tr>
<td>HIST XR17A</td>
<td>History 17: The United States to 1877</td>
</tr>
<tr>
<td>MGT X200.1</td>
<td>Global Human Resources</td>
</tr>
<tr>
<td>MGT X200.2</td>
<td>Global Marketing: Integrated Marketing Management</td>
</tr>
<tr>
<td>MGT X200.3</td>
<td>Multinational Financial Management</td>
</tr>
<tr>
<td>MGT X200.4</td>
<td>Building Technology-Centric Organizations</td>
</tr>
<tr>
<td>MGT X200.5</td>
<td>Strategic Management in the Global Environment</td>
</tr>
<tr>
<td>ENG XR001A</td>
<td>English 1A, Freshman Composition , Ruth Nolan, M.F.A.</td>
</tr>
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</table>
To be received and placed on file:
The Committee on Courses has approved the following courses.

<table>
<thead>
<tr>
<th>Action:</th>
<th>Course:</th>
<th>Title:</th>
<th>Instructor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSTRUCTOR</td>
<td>HIST XR17A</td>
<td>History 17: The United States to 1877, Terence Przeklasa, Ph.D.</td>
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<tr>
<td></td>
<td>EDUC X87.50</td>
<td>Overview of Children with Special Needs for Early Care and Education, Adriana Bernal, M.A.Ed.</td>
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<tr>
<td></td>
<td>EDUC X87.55</td>
<td>Curriculum and Strategies for Children with Special Needs, Adriana Bernal, M.A.Ed.</td>
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<tr>
<td></td>
<td>MGT X200.1</td>
<td>Global Human Resources, Gilma Anderson, M.S.</td>
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<tr>
<td></td>
<td>MGT X200.2</td>
<td>Global Marketing: Integrated Marketing Management, Steven Fritzenkotter, M.B.A.</td>
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<tr>
<td></td>
<td>MGT X200.3</td>
<td>Multinational Financial Management, Francisca Beer, Ph.D.</td>
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<tr>
<td></td>
<td>MGT X200.4</td>
<td>Building Technology-Centric Organizations, Darius Vasefi, B.S. PMP</td>
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<tr>
<td></td>
<td>MGT X200.5</td>
<td>Strategic Management in the Global Environment, Joan Branin, Ph.D.</td>
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To be received and placed on file:

The Committee on Courses has approved requests to allow the following instructors to teach upper division courses as indicated:

<table>
<thead>
<tr>
<th>INSTRUCTOR</th>
<th>DEPARTMENT/SCHOOL</th>
<th>LIMITS OF AUTHORIZATION</th>
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<tr>
<td>James, S.</td>
<td>Anthropology</td>
<td>ANTH 120 SS’18 B</td>
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<td>Ramos, F.</td>
<td>Anthropology</td>
<td>ANTH 118 SS’18 A</td>
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<td>Ramos, F.</td>
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<td>ANTH 162 SS’18 A</td>
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<tr>
<td>Santasilia, C.</td>
<td>Anthropology</td>
<td>ANTH 127 SS’18 B</td>
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<tr>
<td>Santasilia, C.</td>
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<td>ANTH 158 SS’18 B</td>
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<td>Chow, M.</td>
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<td>CS 161L S’18</td>
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<td>Ott, J.</td>
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<td>CS 183 S’18</td>
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<td>Horrell, N.</td>
<td>Evolution, Ecology and Organismal Biology</td>
<td>BIOL 178 SS’18 A</td>
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<tr>
<td>Singleton, J.</td>
<td>Evolution, Ecology and Organismal Biology</td>
<td>BIOL 105 SS’18 B</td>
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<td>Arteaga, N.</td>
<td>Graduae School of Education</td>
<td>EDUC 175 SS’18 A</td>
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<td>Laptes-Frangu, M.</td>
<td>Graduae School of Education</td>
<td>EDUC 280L SS’18 B</td>
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<tr>
<td>McMillen, K.</td>
<td>Graduae School of Education</td>
<td>EDUC 257 SS’18 A</td>
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<td>Mireles, D.</td>
<td>Graduae School of Education</td>
<td>EDUC 257 SS’18 A</td>
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<tr>
<td>Nevarez, A.</td>
<td>Graduae School of Education</td>
<td>EDUC 146 SS’18 A</td>
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<tr>
<td>Talerico-Brown, J.</td>
<td>Graduae School of Education</td>
<td>EDUC 260 SS’18 B</td>
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<tr>
<td>Gonzales, O.</td>
<td>Molecular, Cell and Systems Biology</td>
<td>CBNS 130L SS’18 A</td>
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<td>Myers, T.</td>
<td>Molecular, Cell and Systems Biology</td>
<td>CBNS 116 SS’18 A</td>
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<td>Sparks, N.</td>
<td>Molecular, Cell and Systems Biology</td>
<td>CBNS 165 SS’18 B</td>
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<td>Sternburg, E.</td>
<td>Molecular, Cell and Systems Biology</td>
<td>CBNS 101 SS’18 A</td>
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<td>Beglin, D.</td>
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<td>PHIL 167 S’18</td>
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<td>Alamillo, R.</td>
<td>Political Science</td>
<td>POSC 158 SS’18 A</td>
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<tr>
<td>Crespo, R.</td>
<td>Political Science</td>
<td>POSC 150 SS’18 A</td>
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<td>Gregory, C.</td>
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<td>POSC 129 SS’18 B</td>
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<td>Hodaly, H.</td>
<td>Political Science</td>
<td>POSC 164 S’18</td>
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<td>Kono, D.</td>
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<td>POSC 111 SS’18 A</td>
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<td>Luartz, L.</td>
<td>Political Science</td>
<td>POSC 167 SS’18 A</td>
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<tr>
<td>Dooley, M.</td>
<td>Psychology</td>
<td>PSYC 179 S’18</td>
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<td>Moon, C.</td>
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<td>BUS 119 SS’18</td>
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<td>Banister, S.</td>
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<td>Curran, M.</td>
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<td>Fares, P.</td>
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<td>Hughes, E.</td>
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<td>Kushida, M.</td>
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<td>Rodriguez, B.</td>
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<td>Walkington, L.</td>
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<tr>
<td>Sain, D.</td>
<td>Statistics</td>
<td>STAT 100A SS’18 A</td>
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</table>
To be received and placed on file:

The Committee on Courses has approved the following course proposals for deletion, which have been listed in the General Catalog, but for at least four years, have not been offered, been offered with zero enrollment, or have been offered but canceled for deletion with the concurrence of the departments involved.

This following lists courses that were deleted and identified in the 2017-2018 Academic Year as part of the courses not offered for four or more year’s process.

CRWT 042
CRWT 097H
CRWT 143
CRWT 151
CRWT 165
CRWT 175
CRWT 180
CRWT 191

Courses previously approved for deletion:

BCH 111  PSYC 138
BCH 153  PSYC 180
BCH 186  PSYC 192H
                     PSYC 193H
                     PSYC 198T

Courses scheduled to be approved for deletion:

AST 040  CRWT 014
AST 048
AST 049
AST 065

This following lists courses that were deleted and identified in the 2016-2017 Academic Year as part of the courses not offered for four or more year’s process.

Courses previously approved for deletion:

AHS 102  ETST 091  ME 001A  RLST 007W  RLST 103  SOC 006  ENTX 200L
AHS 134  ETST 104  ME 001B  RLST 009  RLST 105  SOC 126  ENTX 211
AHS 148  ETST 134  ME 001C  RLST 012W  RLST 134  SOC 138
AHS 164  ETST 138  RLST 012X  RLST 140  SOC 211
AHS 174  ETST 150  RLST 013  RLST 164  SOC 235
AHS 187  ETST 179  RLST 039  RLST 167  SOC 252
                     RLST 168  SOC 279
                     RLST 170
                     RLST 174
                     RLST 184

Courses scheduled to be approved for deletion:

CPLT 018  CPLT 149  CPLT 272  RLST 124 (E-Z)  RLST 145
CPLT 148  CPLT 153  CPLT 273  RLST 124G  RSLT 158
CPLT 252  CPLT 276  RLST 124K  RSLT 173
CPLT 261  CPLT 284
April 10, 2018

To: Peter Hayashida  
Vice Chancellor for University Advancement

From: Dylan Rodríguez, Chair  
Riverside Division

Re: Request for Consultation: Naming of the Surge Building and University Laboratory Building

Dear Peter:

I am pleased to report that Executive Council discussed the following naming requests at its April 9, 2018 meeting, and there were no objections.

- Surge Building to be named Skye Hall.
- University Laboratory Building to be named Rochelle and Allison Campbell Laboratory Building.

Thank you for your patience.
TO: Campus Naming Committee

Pursuant to UCR Policy 450-25, Naming of University Properties, Programs, & Facilities, I am forwarding a request packet to rename Surge Building to Skyre Hall.

This non-philanthropic naming is proposed as a way to remove the functional but unappealing label and replace it with one that conforms to a campus tradition of Scottish geographic references. This building will be prominent at the University’s new gateway once the Mobility Hub is complete, and the proposed reference will be a better representation of the campus identity and culture.

The UC Policy on Naming University Properties, Academic and Non-Academic Programs, and Facilities specifically addresses naming in recognition of honorees, which is expressly not the case here. My read of the intent of the policy is that it was designed to mitigate exposure in the use of individuals’ names and that a naming of this sort does not create that exposure. I believe we can honor the spirit of the policy with campus consultation without having to seek approval from President Napolitano but welcome discussion if others feel differently.

Please respond to this message indicating your support for or objection to this proposal, which I will record and forward to the Provost and Chancellor. To accommodate the Academic Senate’s committee review process, I request a response by Friday, March 30, 2018. @Dylan, please let me know if this timeframe presents any problems for the Senate.

Let me know if you have questions or need additional information. Thank you in advance for your assistance.

Peter
Initial Request for Approval to Name/Establish a Property, Program, or Facility

This form is designed to allow the UCR Committee on Naming Campus Properties, Programs, and Facilities (UCR Naming Committee) to meet the following requirements:

- Provide due diligence regarding appropriateness of name to be recognized; and
- Review the background information packet for proposed namings and provide feedback to the Provost and Executive Vice Chancellor.

I. Background Information

<table>
<thead>
<tr>
<th></th>
<th>Submitted by:</th>
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<tbody>
<tr>
<td>A.</td>
<td>Provost and Executive Vice Chancellor Cynthia K. Larive</td>
</tr>
<tr>
<td>Title, College/Unit:</td>
<td>Office of the Provost and Executive Vice Chancellor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Property/Facility to be Named:</th>
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<tbody>
<tr>
<td>B.</td>
<td>Surge Building</td>
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<table>
<thead>
<tr>
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<th>Proposed Name:</th>
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<tbody>
<tr>
<td>C.</td>
<td>Skye Hall</td>
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<table>
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<tr>
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<th>Proposed Use(s):</th>
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</thead>
<tbody>
<tr>
<td>D.</td>
<td>Administrative offices and student support functions</td>
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</tbody>
</table>

II. College/UCR/UC Commitment:

<table>
<thead>
<tr>
<th></th>
<th>Will any campus or system resources be sought/required (e.g., space, special facilities, equipment, etc.)? How will they be funded?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>If Property or Facility, has consultation with appropriate campus/UC entities occurred? (Attach proper supporting documents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

III. College/Unit/Faculty Consultation

<table>
<thead>
<tr>
<th></th>
<th>This naming has been reviewed by and received approval from the faculty of the (specific department/school/unit) affected by the named building, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

Submitted by: __________________________
Cynthia K. Larive, Provost & Executive Vice Chancellor
Date 02/21/2018

________________________
Peter A. Hayashida, Vice Chancellor, University Advancement
Date
Isle of Skye, Scotland

Skye, or the Isle of Skye, is the largest and northernmost of the major islands in the Inner Hebrides of Scotland. The island’s peninsulas radiate from a mountainous center dominated by the Cuillins, the rocky slopes of which provide some of the most dramatic mountain scenery in the country. Although it has been suggested that the Gaelic Sgitheanach describes a winged shape there is no definitive agreement as to the name’s origins.

The island has been occupied since the Mesolithic period, and its history includes a time of Norse rule and a long period of domination by Clan MacLeod and Clan Donald. The 18th century Jacobite risings led to the breaking up of the clan system and subsequent Clearances that replaced entire communities with sheep farms, some of which also involved forced emigrations to distant lands. Resident numbers declined from over 20,000 in the early 19th century to just under 9,000 by the closing decade of the 20th century. Skye’s population increased by 4 per cent between 1991 and 2001. About a third of the residents were Gaelic speakers in 2001, and although their numbers are in decline, this aspect of island culture remains important.

The main industries are tourism, agriculture, fishing, and forestry. Skye is part of the Highland Council local government area. The island’s largest settlement is Portree, known for its picturesque harbour. There are links to various nearby islands by ferry and, since 1995, to the mainland by a road bridge. The climate is mild, wet, and windy. The abundant wildlife includes the golden eagle, red deer, and Atlantic salmon. The local flora are dominated by heather moor, and there are nationally important invertebrate populations on the surrounding sea bed. Skye has provided the locations for various novels and feature films and is celebrated in poetry and song.

The first written references to the island are Roman sources such as the Ravenna Cosmography, which refers to Scitis and Scetis, which can be found on a map by Ptolemy. One possible derivation comes from skitis, an early Celtic word for winged, which may describe how the island’s peninsulas radiate out from a mountainous center. Subsequent Gaelic-, Norse- and English-speaking peoples have influenced the history of Skye; the relationships between their names for the island are not straightforward. Various etymologies have been proposed, such as the “winged isle” or “the notched isle” but no definitive solution has been found to date and the placename may be from an earlier, non-Gaelic language.
TO: Campus Naming Committee

Pursuant to UCR Policy 450-25, Naming of University Properties, Programs, & Facilities, I am forwarding a request packet to rename University Laboratory Building to Rochelle and Allison Campbell Laboratory Building.

This philanthropic naming is proposed in recognition of the Campbell family’s aggregate philanthropy, almost all of which has supported renovation of the building’s interior space and support for Dr. Sue Wessler’s Dynamic Genome program that introduces first year students to hands-on scientific research. The Campbell family has contributed almost $4.5 million to UC Riverside. Although their giving has not been anonymous, I ask that you treat this information with discretion and share on a “need to know” basis to respect the donors’ privacy.

Please respond to this message indicating your support for or objection to this proposal, which I will record and forward to the Provost and Chancellor before submitting to President Napolitano for her approval.

To accommodate the Academic Senate’s committee review process, I request a response by Friday, March 30, 2018. @Dylan, please let me know if this timeframe presents any problems for the Senate.

Let me know if you have questions or need additional information. Thank you in advance for your assistance.

Peter
Confidential contents not included
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<td>Marketing an Event Business</td>
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<td>Brian</td>
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<td>D.M.</td>
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* Denotes first time approval for Instructor
To: Dylan Rodriguez, Chair of the Riverside Division of the Academic Senate

From: Thomas Cogswell, UCR Assembly Representative to the UC Academic Senate

RE: Report of the Meeting of the UC Academic Senate Assembly, February 14, 2018

Connoisseurs of Assembly meetings will be pleased to learn that the most recent meeting ran true to form. There were many announcements, some mundane and some promising, and a spirited discussion of proposals relative to Senate Regulation 424.A.3 [d]. Allow me to explain further.

In her remarks, President Napolitano stressed that she has turned over a new leaf – or at least, she was trying to do so. She has added the Systemwide Chair and Vice-Chair to her Advisory Group and appointed our own Dan Hare as her Faculty Advisor.1 Likewise, she hopes to reboot her relationship with the governor and the legislature and to persuade the solons to augment the university’s budget by adding an additional $140 million. Half of that amount would go for a tuition buy-out, a quarter to various campus educational initiatives and a quarter for delayed maintenance. In response to continued complaints from Faculty Welfare, the Academic Council and the Assembly, she is also trying to find more money to begin the task of bring salaries back into line with the Comparison Eight universities. She also named a new Working Group to make recommendations about the Retiree Health Benefits. Finally, she welcomed the findings of the Huron Group [for more, see the report on the Fall Assembly meeting], but added that she would proceed cautiously in implementing any of its suggestions. Not surprisingly, the Academic Council has decided to suspend any formal statement on the President’s actions during the recent State audit in hopes that she remains committed to transparency and shared governance. As is ever the lot of UC faculty members, we must live in hope.

Debate swirled about proposed changes to the admission requirements in Area D, which would increase the minimum from two to three courses, two of which would have to be in Biology, Chemistry and Physics, and change the name of Area D from Laboratory Science to Science. This would bring UC requirements into line with the state’s new common core for high school students. Some Assembly members were concerned about the impact of the changes on underrepresented groups. While 95% of all applicants had taken three or more Area D courses, 5% had not, and of that number, 60% came from underrepresented groups. In this debate, BOARS Chair Sanchez played a major role. He emphasized that of that 5%, half of them would meet the new standards, and he noted that the university’s new commitment to comprehensive review would prevent a student from being rejected solely for their failure to take three science courses. The measure passed by the vote of 29 to 6 with one abstention.

Fiat lux!

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1 When you see Dan, be sure to thank him profusely for taking on this uncompensated assignment.
To: Riverside Division of the Academic Senate

From: Dylan Rodriguez, Chair of the Riverside Division of the Academic Senate

RE: Report of the Meeting of the UC Academic Senate Assembly, April 11, 2018

1. Faculty Salaries Plan

The bulk of the discussion involved strategic conversation about how to push the UC administration to take a more aggressive position on faculty salaries. The UC Senate submitted a salary increase plan to UC administration that received varying levels of support from campus-level administrations. In many cases, campus administrations voiced support for the Senate salary plan, but also stated their belief that UCOP would not be supportive. Assembly members discussed the nuances of how to approach UCOP to argue for the Senate salary plan, and commended the UC Senate leadership for writing the plan to proactively fill the vacuum on this issue (that is, UC admin has not offered any analogous plan to deal with the sagging competitiveness of UC faculty salaries).

Later in the meeting, UC Provost Michael Brown joined the call. Assembly members questioned him on UCOP's general passivity on faculty salary competitiveness, and several members articulated strong positions that improving UC salary competitiveness must be a priority for the UC administration if the UC system is to retain any semblance of its self-stated mission to be a global leader among public research institutions. There was little movement from Provost Brown on this matter.

2. Executive Session: Nominee for Academic Senate Representative to Regents Committee on Health Services

This second agenda point was privileged as an Executive Session.
COMMITTEE ON DISTINGUISHED CAMPUS SERVICE

NOMINATION FOR THE 2017-2018 DISTINGUISHED CAMPUS SERVICE AWARD

Professor Kenneth Barish

The Committee is pleased to nominate Professor Kenneth Barish from the Department of Physics and Astronomy as the recipient of the Campus Distinguished Service Award for the Academic year 2017-2018. Professor Barish’s distinguished Senate service includes membership in the Committee on Planning and Budget (2012-13), a committee he then chaired (2013-16). Under his leadership, this Committee produced an insightful analysis of the budgetary situation of the campus, identifying all major difficulties the administration’s growth plan was to face. These activities provide an important example of the Senate meeting its advisory obligations under shared governance. Prof. Barish then served as Vice-Chair of the University Systemwide Committee on Planning and Budget (2016), a post he resigned to serve as Chair of the Department of Physics and Astronomy (2016-present). Under his leadership, the Department’s graduate program has grown to be one of the largest (more than 100 students) and most selective (10% acceptance rate) on campus. He presided over a major growth period of the Department, now counting 42 faculty members, and the reorganization of the Department committee structure, aimed at supporting the Department’s students and faculty. Among other Senate service, Prof. Barish was a member of the of the Academic Council Special Committee on Agriculture & Natural Resources, (2014-16); he served as UC faculty representative at the Community College Curriculum Institute, which proposed the pilot program for Physics and Chemistry majors (2017). In parallel with these activities, Prof. Barish maintains an outstanding research program and regularly teaches undergraduate courses with notable effectiveness. For his distinguished service to the Senate and the Campus, the Committee believes Prof. Barish is highly deserving of the Campus Distinguished Service Award.
The Committee on Distinguished Teaching is pleased to nominate an outstanding educator as recipient of the 2017-18 Distinguished Teaching Award.

Professor Farah Godrej

Prof. Farah Godrej joined UCR’s Department of Political Science in 2006. Her areas of research include comparative political theory, globalization, and Indian political thought, especially that of Gandhi’s. She has taught a wide range of courses, including lower division introductory courses, upper division lecture courses and seminar, and graduate seminars, covering such topics as political ideologies, environmental political thought, political thinkers in-depth, and non-Western political thought.

Prof. Godrej’s exceptionally effective teaching can be seen in her extremely high scores and the enthusiastic student comments throughout her evaluations. Many students praise her for being passionate, intelligent, well-prepared, clear in elucidating difficult concepts, helpful, inspiring, amazing, and regard her as the best professor they have had at UCR. As evidenced by her stellar evaluations as well as the rave letters from students and colleagues, Prof. Godrej is committed to “fostering students’ thinking about important issues,” and encouraging students’ critical thinking, self-confidence, intellectual development, and spiritual growth, and has exerted a strong positive impact on them. Students point out that Prof. Godrej “challenged us to think deeply and critically about the material we were presented with,” “provided an environment that allowed for open discussion among students to which she reciprocated with insightful feedback”; that she connects very well with students, is “sensitive to student needs,” and is “a good role model” for them. The students who took Dr. Godrej’s undergraduate seminar found it to be a life-changing experience: “the focus on the meditative techniques changed my life forever”; the course “truly opened my mind to new forms of thinking and furthered my self-development,” “made me a nicer person,” and “changed my life and my whole perspective on education.”

For her extraordinary teaching effectiveness and dedication to students’ intellectual and spiritual growth, Dr. Godrej is fully deserving of the Academic Senate’s Distinguished Teaching Award.
GRADUATE COUNCIL

NOMINATION FOR THE 2017-2018 DISSERTATION ADVISOR/MENTORING AWARD

ASSOCIATE PROFESSOR STEPHEN HONG SOHN

Each year the Graduate Council and Graduate Division present the Dissertation Advisor/Mentoring Award to one or two UCR faculty members who have made outstanding contributions to the training of advanced graduate students. It is my pleasure to announce that this year’s winner is Stephen Hong Sohn.

Dr. Sohn is an Associate Professor in the Department of English. He received his Ph.D. at UC Santa Barbara. A former University of California President’s Postdoctoral fellow (2006-2007), Sohn has edited or co-edited a number of different works and special issues, including Transnational Asian American Literature: Sites and Transits (Temple University Press, 2006); Studies in the Literary Imagination (SLI, Vol. 37.1, Spring 2004) on Asian American Literature; MELUS (Winter 2008) on the topic of “Alien/Asian”; and Modern Fiction Studies on the topic of “Theorizing Asian American Fiction” (2010). His first book, “Racial Asymmetries” (New York University Press, 2014), focuses on contemporary Asian American fictional production, social context methodology, and aesthetic practices. Present and former students speak of his supportive and motivational mentoring style. He was praised for being a firm mentor, but not dictating the agenda for his students. His attention to the students’ work was noted as meticulous. One of his colleagues pointed out how he visibly makes a difference in the life of his graduate students. For his many efforts in mentoring graduate students, he is being honored with the Doctoral Dissertation Advisor/Mentoring Award.
From its inception well over half a century ago, the Faculty Research Lecturer Award has been the highest honor that the Academic Senate bestows. This year members of the Academic Senate nominated eight exceptional candidates—at least one in each of the three colleges.

The Committee on Faculty Research Lecturer is delighted to place in nomination Aman Ullah, Distinguished Professor of Economics. We believe that the international acclaim for Professor Ullah’s fundamental research in econometrics (the development and implementation of statistical methods in economics) will add great luster to the award.

As documented in the nomination letter from faculty in his department and in the outside letters from prominent econometricians at some of the finest universities in the world, Professor Ullah has made fundamental contributions in three distinct areas of econometrics: classical statistical and econometric inference, nonparametric and semi-parametric econometrics, and finite-sample econometrics. One distinguished econometrician writes that Professor Ullah “is widely recognized as a leading econometric theorist and one of the most productive scholars in the discipline” and “has helped to shape the discipline of modern econometrics.” Specifically, “[h]is early work on finite sample theory established him as a leading contributor in one of the most challenging areas of econometrics” and his work on nonparametric and semi-parametric methods “helped lay the foundation of this vast field.” A similarly distinguished econometrician writes that “Dr. Ullah is internationally recognized for his significant and path breaking contributions in the area of nonparametric econometrics and finite sample econometrics.”

Professor Ullah’s publication record is remarkable for an econometrician, with ten books and more than 150 journal articles. Two of his books, published by Cambridge University Press and Oxford University Press, serve as the standard references in the important sub-disciplines of nonparametric econometrics and finite sample econometrics. He has published in virtually all of the major economics journals, including several papers in *Econometrica*, the flagship journal of the international economics community. Incredibly, he served as department chair for the past nine years with no adverse effect on his robust productivity.

Professor Ullah’s academic contributions have been internationally recognized by honorific appointments as a Fellow at some 12 universities and professional organizations and journals. His accomplishments also have been recognized by research conferences organized in his honor in China (2011) and at UCR (2015), each attended by prominent econometric scholars from around the world. In addition, the journal *Econometric Reviews* and the book series *Advances in Econometrics* have published special issues in his honor (2015 and 2016, respectively).

Finally, in the words of one of the distinguished letter writers, Professor Ullah “has a spectacular record as a dissertation advisor with more than 50 Ph.D. students to his
credit.” This record, along with his excellent student placement in academic institutions around the world, earned Professor Ullah the Doctoral Dissertation/Mentoring Award in 2005.

Well into his fifth decade in the profession, Professor Ullah shows no sign of slowing down. As the nomination letter points out, “he still continues to tackle challenging and fundamental problems in econometrics (e.g. big data and machine learning) with an extensive list of work in progress.”

For these reasons and many more, we, the undersigned members of the Senate Committee on Faculty Research Lecturer, unanimously and enthusiastically nominate, as Faculty Research Lecturer for 2018-2019, Distinguished Professor Aman Ullah.

Xuemei Chen (Department of Botany and Plant Sciences), Chair
Carl Cranor (Department of Philosophy)
Norman C. Ellstrand, (Department of Botany and Plant Sciences)
John M. Fischer, (Department of Philosophy)
R. Robert Russell (Department of Economics)
NEW BUSINESS
A member proposed a resolution supporting UCR affiliation with Scholars at Risk and the Scholar Rescue Fund and moved for its adoption.

The resolution states:
THEREFORE IT BE RESOLVED THAT THE UCR ACADEMIC SENATE:

1. Commits to making UCR a sustaining member of the SAR/SRF network and requests the Chancellor to effect this as soon as practically feasible;

2. Requests the Committee on Academic Freedom, as per Senate Division Bylaw 8.3.4C to:
   a: Recommend procedures to collaborate with SAR/SRF and with administrative staff in order to facilitate and encourage the invitation of refugee scholars to UCR campus and to shape regular and equitable processes by which these ends can be achieved;
   b: Recommend a process for UCR faculty, Deans and Chairs to consult SAR’s and SRF’s lists to identify and communicate to the Senate committee the names and credentials of scholars they would like to invite as visiting faculty, particularly when regular faculty go on leaves or sabbaticals.

Following a brief discussion, the motion was approved unanimously.
Dear Dylan and Cherysa,

The Committee on Academic Freedom discussed the resolution adopted at the May 23, 2017 Division meeting and has developed procedures to collaborate with SAR/SRF and with administrative staff in order to facilitate and encourage the invitation of refugee scholars to UCR campus and to shape regular and equitable processes by which these ends can be achieved. The enclosed document recommends a process for UCR faculty, Deans and Chairs to consult SAR’s and SRF’s lists to identify and communicate to the Senate committee the names and credentials of scholars they would like to invite as visiting faculty, particularly when regular faculty go on leaves or sabbaticals. The Committee approved of the enclosed document at its April 10th meeting and is submitting the proposal to the Senate for review in hopes that it may be placed on the May 29, 2018 Division agenda.

Best regards,
Genie

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Genie Mulari
Academic Senate

University of California, Riverside
227 University Office Building
Riverside, CA 92521
Phone - (951) 827-5537
Fax - (951) 827-5543
UCR Scholars at Risk Sponsorship Program 2019-2022

Program Objectives

To establish a campus administrative process whereby international scholars-at-risk identified and vetted by the International Institute of Education-Scholar Rescue Fund (IIE-SRF) (NYC) and Scholars at Risk (SAR) (NYC) OR identified by UCR units can be considered for support by and placement with UCR departments, Centers, and labs, for one-year visiting appointments. Exact visiting title at UCR would be determined based on the sponsored scholar’s appointment type in his/her home institution and the appropriate title at UCR. Given the liability of the situations in which many of these scholars find themselves, it is important that these procedures be followed in a timely fashion. Scholar appointments may be renewed if external funding is renewed; the maximum duration of each appointment is two (2) years or six (6) academic quarters.

Funding Commitment

The Provost’s Office will match either external sources from the IIE-SRF OR donor-generated monies, OR campus-, unit- and School/College-based funding for one (1) scholar a year up to a maximum of $25,000 per scholar. Additional fund-raising efforts are underway to support visiting scholars-at-risk; in the interim, it is likely that, in addition to unit-based funding, one of the primary sources for external monies will be IIE-SRF, which provides matching grants of $25,000 / scholar.

Program Duration

The program described here will run for a pilot period of three (3) years, beginning in Fall, 2019, through Spring, 2022, for appointments beginning in Fall, 2019, if not earlier, up through Fall, 2022.

Identification of Potential Candidates

- SAR’s webpage features a current list of SAR-vetted scholars that is carefully updated and maintained. Units are encouraged to consult this list and work with SAR to get additional information. Scroll down to the list here: [https://www.scholarsatrisk.org/actions/host-a-scholar](https://www.scholarsatrisk.org/actions/host-a-scholar) NB: SAR provides support to hosting institutions and the scholars, but no funding.

- IIE-SRF meets four times a year: early-mid June, September, December, and March, and decides which application files to support. Emily Borzcik of IIE-SRF ([eborzcik@iie.org](mailto:eborzcik@iie.org)) would share lists of scholars to be supported by IIE-SRF who have already been vetted by SRF with the VP for
International Affairs at UCR as soon as they are finalized. These lists will be circulated to the Deans and Associate Deans for Personnel in the Schools/Colleges for consideration for placement as UCR receives them. Early indications of interest in a scholar are encouraged, as IIE-SRF and SAR need to be kept informed about hosting possibilities and because the status of some scholars can change very quickly.

- Finally: Units are encouraged to submit for consideration the names/files of proposed scholars whom they have identified independently and whom they may also direct to contact IIE-SRF and SAR (NYC). It is highly recommended that such nominations have been reviewed by IIE-SRF or SAR (NYC) and come with supporting documentation from IIE-SRF or SAR (NYC); nominations with such documentation will be given preference.

**Nomination Procedure:**

- A call for nomination of sponsorship from the unit/departments will be formally announced by the Academic Personnel Office via the School/College Dean’s Offices during the Fall quarter of each pilot year.

- **Proposals from sponsoring units, labs, and Centers are due to the Academic Personnel Office by January 15.**

- Proposals from the Units/Schools/Colleges must be submitted by the Unit Director/Department Chair via the Dean to the Vice Provost of Academic Personnel.

- Decisions will be announced by February 15. Additional proposals may be submitted by May 1 in the event that the Provost funds were not awarded in the first round.

- All applications should include the following:
  1. Scholar CV
  2. A compelling academic/research rationale for the scholar’s appointment that addresses how participation in the program advances the campus commitment to inclusive excellence.
  3. Description of the kinds of activities the scholar will undertake (teaching, research, language courses, if necessary). The scholar will be expected to deliver during the course of their residency at UCR a public lecture, designed in part to draw attention to the program.
  4. A detailed description of how the visiting appointment will be integrated into the departmental/laboratory culture. This might include formal teaching and/or course development activities the
scholar engages in on behalf of the department.
5. The proposed appointment dates, funding package (originating in unit or School/College or in donor funds, etc.).
6. The name of a faculty mentor and of a staff contact person for the scholar, and a guarantee of office/lab space, access to university facilities (libraries, gyms, etc.).
7. The confirmed contact person in the International Center who will work with IIE-SRF or SAR and the unit regarding visa issues and residency permits.

A sample institutional ‘contract’ with IIE-SRF is attached here; the call for UCR SAR Visiting Researcher/Scholar nominations will be designed to meet the requests for information detailed in this contract and to include the categories detailed above.

**Review Procedures:**

- **Review Committee Membership:** The Vice Provost of Academic Personnel will appoint one faculty member from each of the following ‘bundled’ units: 1) CHASS, 2) SPP, 3) GSOE, 4) SOM, 5) BCOE, 6) CNAS, and 7) An at-large member from a UCR academic senate committee (e.g., Academic Freedom or FWC). Committee members will be advised that, in their service on this committee, they will be acting on behalf of the UCR campus and the global academic community rather than as advocates for a particular cause or position in terms of the conflicts and areas from which the endangered scholars may come. Members will be appointed for two (2) and three (3) years in a staggered fashion to ensure continuity of membership and to promote the creation of institutional memory re the process.

- **Meetings:** The Committee will meet up to three (3) times a year, as needed, to rank proposals, and gain an overview of the success of the program. The committee’s rankings will be sent to the Vice Provost of Academic Personnel who will consult with the Provost and make a final decision regarding funding support. The Vice Provost of Academic Personnel will inform the nominating units about their proposals within a month. The units will then work with IIE-SRF and SAR to arrange the appointment, make sure the scholar has the appropriate visas, finds housing, etc.

- **Selection criteria:** The committee will develop a rubric for reviewing the nominations and criteria for ranking in advance of the selection meeting(s). In the call for proposals, units will be informed that in addition to the candidate’s academic qualifications for a visiting appointment at a Research I-university, equally important criteria for selection will be:

  1. Evidence in the nomination that the information provided by the IIE-SRF and SAR vetting procedures and by the scholar’s case officer
about the scholar has been seriously considered by the nominating unit;
2. The fit with the unit / departmental mentor, and
3. Evidence of the mentor’s commitment to integrating the visiting scholar into appropriate support communities on the UCR campus as well as into the mentor’s ongoing research projects, groups, and initiatives, also on a national and international level, so that the visiting scholar can begin to build strong networks of scholarship and support at UCR and elsewhere to enable the scholar either to return to their home institution or to seek additional support and placement after a successful tenure as a IIE-SRF or SAR Visiting Researcher / Scholar at UCR.

Approved by Committe on Academic Freedom: April 10, 2018

Reviewed by Executive Council: April 23, 2018
February 9, 2018

To: Dylan Rodríguez, Chair
    Riverside Division

From: Wee Liang Gan, Chair
      Committee on Courses

Re: Proposed Changes to Committee on Courses General Rules and Policies Governing Courses
    Of Instruction

Attached to this memo is the Committee on Courses proposed changes to the General Rules and Policies
Governing Courses of Instruction. The Committee’s proposed changes provide additional guidance on
repeatability for courses and topics courses in addition to updating policies to account for changes with
the new student information system Banner. Since the switch to Banner, there have been issues with
courses that have the phrase “repeatable as content changes” in the description. According to the
Registrar, students will not be able to automatically repeat courses with this description, regardless of
the maximum repeatable units. (The only exception is if they received a D or F.) “Content changing” is
identified by title or subtitle for the course, and the Registrar does not have another means to monitor
that the content has changed.
The Committee on Courses is established by Bylaw 8.10.1 of the Riverside Division of the Academic Senate. The Committee consists of at least six members selected by the Committee on Committees. Normally at least one member of the Courses Committee represents each of the areas of humanities, social sciences, biological sciences, physical sciences, and each of the colleges/schools. One representative from the UCR libraries and two student members serve as non-voting members, one of the students being nominated by the Graduate Student Council and the other by the Student Senate. One member of the Committee on Courses is also a member of the Committee on Educational Policy. Representatives from the Registrar’s Office serve as consultants to the Committee.

Bylaw 8.10.2 states: “Subject to the provision of 8.10.3, the Committee has authority for final approval of all courses of the Riverside Division, except those courses in University Extension above the 200 series, giving due consideration to the findings of the Graduate Council, the Committee on University Extension, executive committees of the colleges and schools, and officers at Riverside. The committee will report its actions at the next regular meeting of the Division.”

All courses of instruction that are offered for credit, including University Extension, must be approved by the Committee on Courses. Any new course, change in existing course, deletion of course, restoration of a course previously offered, or other action must first be designed and approved by the faculty of the proposing department, committee, or program, and approved by its chair/director. The courses must then be submitted to the Committee via the Course Request and Maintenance System (CRAMS). Once the course proposal is correctly submitted via CRAMS to the Course Specialist, it will be automatically routed to the next review or approval level; upon review or approval, it is again forwarded to the next step until it reaches the Committee on Courses. The routing schedule is listed below:

For Undergraduate Courses
1. Department/Committee/Program Faculty approve
2. Department/Committee/Program Chair approves*
   - BMSC, BSAD/BUS and EDUC courses to route to the Appropriate Executive Committee prior to routing to the Registrar’s Office
3. Registrar’s Office reviews
4. College (or School) Executive Committee approves (except BMSC, BSAD/BUS and EDUC)
5. Committee on Courses

For Undergraduate Honors Courses Campus-wide Honors Courses
1. Honors faculty approves
2. Honors Chair approves

Department-based Honors Courses
1. Department faculty approves
2. Department Chair approves

All Honors Courses
1. UHP Executive Committee approves**
   - If applicable, BMSC, BSAD/BUS and EDUC courses to route to the appropriate Executive Committee prior to routing to the Registrar’s Office
2. Registrar’s Office reviews
3. College Executive Committee(s) approve, if applicable
4. Committee on Courses approves

For Graduate Courses
1. Department/Committee/Program Faculty approve
2. Department/Committee/Program Chair approves*
   - BMSC, EDUC, and MGT courses to route to the appropriate Dean prior to routing to
     the Registrar’s Office
3. Registrar’s Office reviews
4. Dean of the College (or Division) for review
5. Graduate Council approves
6. Committee on Courses approves

For Professional Courses
1. Department/Committee/Program Faculty approve
2. Department/Committee/Program Chair approves
   - If applicable, BMSC, EDUC, and MGT courses to route to the appropriate Executive
     Committee prior to routing to the Registrar’s Office
3. Registrar’s Office reviews
4. College (or Division) Executive Committee
   approves
5. Graduate Council approves
6. Committee on Courses approves

For Extension Courses
1. Dean of University Extension approves
2. Chair of the academic department approves
3. Committee on University Extension approves
4. Committee on Courses approves

Submission deadlines for proposals for courses numbered 001-299 are posted at
http://senate.ucr.edu/Committees/courses/default.htm under the link “Course Submission Deadline
Schedule.” Submission deadlines for courses numbered 300-499 may be obtained from the Course
Specialist (X2-2459).
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In submitting a course proposal form, the following items must be given consideration:

I. Classification and Number of Courses:

   A. Classification: Classification of courses is contained in Senate Regulations (SR) 739, 740, and 742.¹

      SR 740 classifies courses as--

      1. Lower division courses are open to freshmen and sophomores and are numbered 1-99 or are designated by a letter, especially if the subject is usually taught in high school. In no department is a lower division course acceptable for upper division credit.

      2. Upper division courses are numbered 100-199 and are ordinarily open only to students who have completed at least one lower division course in the given subject, or six quarters (or four semesters) of college work. Special study courses for undergraduates are numbered 199.²

      3. Graduate courses are numbered 200-299, and are ordinarily open only to students who have completed at least 18 (or 12 semester) upper division units basic to the subject matter of the course. Graduate courses must be approved by the Graduate Council and by the Committee on Courses.

      4. Professional courses for teachers numbered 300-399, are offered in (the Graduate School of) Education, and in other departments and are specially designed for teachers or prospective teachers.

      5. Other professional courses are numbered 400-499.

      6. Individual study or research graduate courses are numbered 500-599 if they may be used to satisfy minimum higher degree requirements, otherwise they are numbered 600-699.³

The Committee on Courses will apply the following standardization to all courses:

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
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Titles and Numbers for Special Undergraduate Courses

| 90  | Special Studies (1-5) |
| 190  | Special Studies (1-5) |
| 191  | Seminar in__ |
| 192  | Junior Seminar (1-4) |
| 192H  | Junior Honors Seminar (1-4) |
| 193  | Senior Seminar (1-4) |
| 193H  | Senior Honors Seminar (1-4) |
| 194  | Independent Reading (1-2, with a maximum of 4 units) |
| 195 or 195H  | Senior Thesis (4-4-4 or less, maximum 12) |
| 196 or 196H  | Senior Research Paper (1-4, not repeatable) |
| 197  | Research for Undergraduates (1-4) |
| 198G  | Internship, Group (1-12, repeatable to 16) |
| 198H  | Junior Honors Research (1-4) |
| 198I  | Internship, Individual (1-12, repeatable to 16) |
| 199  | Senior Research (1-4) |
| 199H  | Senior Honors Research (1-5) |

¹ Universitywide Manual of the Academic Senate.
² Riverside uses a slight variation from SR 740 in those courses assigned numbers 190-199.
³ 500-699 courses are not in common use in Riverside.
GRADUATE COURSES
200-299

Titles and Numbers for Special Graduate Courses
287  Interdisciplinary Seminar
290  Directed Studies (1-6)
291  Individual Study in Coordinated Areas
292  Concurrent Studies in [Department/Program] (1-4, repeatable for credit; concurrent enrollment by graduate student in undergraduate course, with credit for additional graduate level participation)
297  Directed Research (1-6)
298G  Internship, Group (1-12, repeatable to 16)
298I  Internship, Individual (1-12, repeatable to 16)
299  Research for the Thesis or Dissertation (1-12)

PROFESSIONAL COURSES4
300 - 399  Professional Courses for Teachers
301  "Teaching of ________ at the College Level" or "Directed Studies in the Teaching of ________" (To be graded S/NC. Units must accurately reflect hours of training.)
302  "Apprentice Teaching" or "Teaching Practicum", variable (1-4) units. Open to all appropriate Academic Student Employees (ASE's) with units assigned to reflect teaching activity during the applicable quarter. To be graded S/NC.
398G  Internship, Group (1-12, repeatable to 16)
398I  Internship, Individual (1-12, repeatable to 16)
400 - 499  Other Professional Courses

B. Numbering:

1. A, B, C, D: These letters are used in sequential course titles to indicate the affinity of topics covered in the several quarters (i.e. CHEM 001A, CHEM 001B). Students are generally required to complete the whole series or a substantial portion of it. A, B, C, D, courses do not necessarily indicate sequential presentation of the courses. Each quarter's offering is considered a separate course, and new courses must be proposed separately, indicating as specifically as possible the content of each quarter's course.

   In a new sequence, the letters A, B, C, ... must be used beginning with "A," in order. If a course in a sequence is eliminated, any courses with subsequent letters must be changed to restore the proper sequence. For example, if the "A" course in an A-B-C sequence is deleted, courses "B" and "C" must be changed to "A" and "B" respectively.

   Note: (E-Z) courses do not follow this rule, but rather function as independent courses. Letter suffixes for these courses may be used in any order.

2. E-Z: The letter designations "(E-Z)" immediately following a course number (e.g., HIST 191 (E-Z), Seminar in History) indicate that different segments or topics within the sequence may be taken for credit. These segments are relatively free standing and students are generally not expected to take the whole series or a substantial portion of it. A student may not receive credit for the same lettered segment unless otherwise indicated in the course description.5 The letters "E" through "Z" do not indicate an order or prerequisites.

3. H: The letter "H" immediately following a course number usually designates an honors course.

4. L: The letter "L" immediately following a course number in the sciences usually designates a laboratory course.

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4 See footnote 3 on page 5.
5 For additional information on E-Z courses see pp. 10-16.
5. **S**: The letter “S” is used to designate a “special course” which means there is a parallel course that has additional workload and credit as well as an additional activity as the non-S course. An “S” course will also affect the other’s course credit statement. However, not all courses with an “S” suffix are special courses; E-Z courses may have “S” segments.

6. **W, X, Y, Z**: The letter W, X, Y, or Z following a course number usually designates a Writing Across the Curriculum (WAC) course which satisfies, or partially satisfies, the ENGL 001C requirement.
   a. Letter W indicates a standard WAC course
   b. Letter X indicates either a lower or upper division course that is both a WAC and Honors course.
   c. Letter Y indicates a standard WAC course for half (1/2) credit.
   d. Letter Z indicates either lower or upper division courses that are both half WAC and Honors.

7. **Reusing a Course Number**: In order to avoid duplication of credit problems in General Catalog copy and on student records within the normal period to degree completion, a minimum of three years must elapse before a number is reused to designate a different course. Any variance to this rule must be approved by the Committee.

8. **Renumbering of Existing Courses**:
   a. Renumbering of existing undergraduate course within undergraduate listing; renumbering an existing graduate course within graduate listing:
      
      Proposal is submitted as "Change existing course" to reflect the number change.
   
   b. Renumbering existing undergraduate course as a graduate course, or vice versa:
      Two course proposals are required: one for the “new” course and one for “deletion of course.”

II. **Preparation of Course Proposals**.
   Course proposals are prepared and may be viewed via the Course Request and Maintenance System (CRAMS). Instructions for obtaining access to and using CRAMS are located at [http://crams.registrar.ucr.edu](http://crams.registrar.ucr.edu).

A. **Special Instructions for Completing Sections within the Box on the Course Proposal**

1. **Course Title and Subtitle**: Titles and subtitles should be in English and provide a precise description of content and emphasis. As titles and subtitles that are more than 30 spaces in length will be abbreviated in the Schedule of Classes and on transcripts, care should be taken to ensure brevity and clarity of content.

2. **Units**: SR 760 states: "The value of a course in units shall be reckoned at the rate of one unit for three hours' work per week per term on the part of the student, or the equivalent."

   The academic unit submitting the course must substantiate conformity to SR 760.

3. **Number of Hours**: The number of hours per week proposed by the department should be specified as to lecture, seminar, discussion, workshop, colloquium, laboratory, practicum, research, studio, screening, consultation, field, internship, individual study, extra reading, or term paper. If none of these terms adequately describes the work, the hours may alternately be designated as "activity." The category "activity" may also be used for hours with varying content (e.g., students choose from screening, extra reading, and field trips). **Hours per week per unit of credit may not be less than, but may exceed, those listed in the following guidelines**:

   a. **One unit for each hour per week of lecture, seminar, discussion, workshop, colloquium, or consultation.**
   Discussion is assumed to mean that the class meets regularly each week for the purpose of group consideration of course materials as distinct from lecture. The designation of one hour for "consultation" implies a regularly
assigned meeting of one hour with each student each week. If such consultation is less, the unit assignment must be appropriately adjusted.

It is understood that a minimum of two hours of outside reading or other preparation is expected each week for each hour of lecture, seminar, consultation or discussion. Appendix 1 (parts A and B) contains further information about requirements for faculty contact and non-contact hours in relation to units.

b. **One unit for each two to three hours per week of studio**, which includes performance or individual practice.

c. **One unit for each three hours per week of laboratory, practicum, field work, screening, internship, clinic, thesis, tutorial, and activity.**

d. **One unit for three hours of outside reading or other preparation each week is expected for individual study, research, extra reading, term paper, etc.** These categories imply that the reading or research effort exceeds the standard preparation to support lecture, discussion, etc. (as described in "a" above). The content of these educational activities and the method of evaluation must be described in the syllabus.

e. **Internships:** Internships (courses numbered 198I, 198G, 298I, 298G, 398I and 398G) have additional activity and hour requirements. See section VII in these guidelines.

The Committee on Courses may require academic units to submit course proposals in order to substantiate conformity to these guidelines.

For the actions listed below, the syllabus should conform to whatever activities are listed, and should show how completion of the activities by the student will be evaluated.

- New course
- Restoration of course
- Change of “faculty contact” hours of an existing course
- Addition of “faculty contact” hours to an existing course

For the actions listed below, the syllabus should describe activities that do not involve faculty contact and should show how completion of these activities by the student will be evaluated.

- New course
- Restoration of a course
- Change of the “noncontact” hours of an existing course
- Addition of “noncontact” hours to an existing course

4. **Prerequisites:** Prerequisites for courses are established by the department, committee, or program, and require the approval of the Committee on Courses. Prerequisites for upper-division and graduate courses should ordinarily meet the requirements of SR 740. The Committee interprets SR 740 to mean that the minimum prerequisite(s) for courses numbered 100-199 (inclusive) is/are "upper-division standing or consent of instructor” and/or successful completion of one or more introductory course(s) in the discipline. The minimum prerequisite for courses numbered 200 and above is possession of a bachelor's degree or other evidence of academic maturity. Prerequisites less restrictive than these will be permitted only for extraordinary reasons and will require strong justification. Normally, prerequisites should be limited to the courses necessary for students to comprehend the material presented in the proposed course. More extensive prerequisites must be justified.

A specific prior Grade Point Average may not be listed as a prerequisite for a course, with the exception of honors courses. (A minimum grade, typically C-, in one or a very few specific prerequisite courses may be listed among the

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6 Note: Academic maturity is presently attested to for undergraduates by a GPA in excess of 3.0, consent of the instructor, and evidence of successful completion of upper-division work in the same discipline.
prerequisites for a course.) Redundancy in lists of prerequisite courses should be avoided. For example, lower-
division courses that are already subsumed under upper-division requirements should not be included in the list. For purposes of fulfilling prerequisites for other courses and for issues of overlap with other courses, Honors
courses and corresponding non-Honors courses are equivalent on fulfillment of prerequisites and course overlap.

Should a department wish to restrict enrollment in a course because pedagogically the course requires students to be in a
certain major or class level, this restriction must be added to the course prerequisite statement. A restriction allows all
seats within a course to be held for students who meet a specific criterion; students who do not meet a course restriction
will be prevented from enrolling. Course restrictions may be based on a student's class, college, career level, or major.
Some restriction examples include but are not limited to: courses restricted to freshmen or sophomore students only;
courses that are restricted to a specific major, such as, Ethnic Studies or Computer Science majors only. Any restriction
request requires strong justification, including the following:

a. A report which describes whether any other major or minor programs at UCR, outside the requesting department,
requires this course, either as a specific requirement or on a list of options, in order to satisfy a requirement in the
student's major or minor program. In order to generate this report, the preparer
should request a program search (see below, II. 4, G). If the search indicates that extra departmental major and/or
minor programs will be affected by the restriction, consultation must take place with the affected
departments/programs as to how to minimize adverse effects of the change on all students concerned.

b. Taking into consideration the findings in item a, the department should consider carefully what is the most
appropriate form of enrollment restriction which will achieve access for its students while not unduly limiting access
to other students with appropriate prior knowledge and demonstrated need to take the course.

Departments that wish to enforce priority enrollment, that is, holding seats for a select student population for enrollment
management purposes, must include a priority enrollment statement to the course proposal. Priority enrollment is
approved for a three-year limited duration and will require a new course proposal submission subject to review and
approval to continue beyond the three-year period further details of review below). Additions of prerequisites are
strongly discouraged unless there is an academic reason for adding the prerequisite. Therefore, a justification for a
prerequisite should not simply state that it is for enrollment management purposes or to create priority for students
within the major. Any priority enrollment request requires strong justification, including the following:

a. A report which describes whether any other major or minor programs at UCR, outside the requesting department's,
require this course, either as a specific requirement or on a list of options, in order to satisfy a requirement in the
student's major or minor program. In order to generate this report, the preparer should request a program search
(see below, II. 4, G.) If the search indicates that extra-departmental major and/or minor programs will be affected
by the priority enrollment, these additional majors and/or minors must be added to the priority enrollment
request. If a course is cross-listed it is expected that all departments within the cross-listing will have access to the
course within the priority enrollment request. Requests to deviate from this must be strongly justified to include
demonstrating how students who have the course in their degree requirements will be impacted.

b. Taking into consideration the findings in item a, the department should consider carefully what is the most
appropriate form of priority enrollment that will provide access for its students while not unduly limiting access to
other students with demonstrated need to take the course. This justification needs to include data (i.e. enrollment
history in the course to include majors/class level of students; projections for future need of the course for
students requiring course to graduate, or other department factors) that substantiates the need to implement
priority enrollment and how the department feels priority enrollment will positively impact the circumstance it is
intended to mitigate.

c. When implementing approved priority enrollment in the Student Information System, quota
controls/reserved seating should be utilized in consultation with the Registrar's Office for assistance.
General population students (students who do not meet priority enrollment criteria) should be given access to a
portion of seats when at all possible.

d. Approval for continuation after the three-year period will be based on a comprehensive review of data and
narrative submitted by the department with the course proposal. The objective during this review is for the
department to 1) demonstrate the positive impact the priority enrollment had on the major students,
therefore, meeting the goals of instituting priority enrollment, 2) document the continued need for the priority enrollment with key illustration that the issue still persists and 3) how the department has served the general population during the three year period of the priority enrollment.

Needs for data to support this process can be requested at http://www.data-request.ucr.edu/ and will be supplied by the Registrar’s Office.

5. **Course Description:** The description appears in the catalog and should convey the material, the nature, and the scope of the course in a manner that provides guidance to students as they select courses. Descriptions should comply with campus style guidelines and be 50 words or less, with the word count standard determined by the Registrar's Office.

6. **Grading and Repeatability:** Indicate the grading basis for the course. If the course has special grading or is repeatable, include this information in the appropriate section(s).

**Grading:** Since Senate regulation 1.2.2 offers students broad latitude to take courses not counting toward their major requirements on a S/NC basis, an undergraduate course may not be restricted as “Letter Grade Only” unless it is an honors course that must be Letter Grade only or enrollment is restricted to majors only.

The default grading types for undergraduate courses are:

**Undergraduate Courses (001-199)**
The default grading type is Letter Grade or petition for Satisfactory/No Credit (S/NC), except for Honors courses that must be Letter Grade Only.

**Graduate and Professional Courses (200-499)**
The default grading type is Letter Grade only.

**Appendix 2** presents these and other grading types and standard grading statements available on CRAMS.

**Repeatability:** Normally, undergraduate courses, except for independent study, internship, courses, and the like, are not repeatable for credit. If a department wishes to propose that a course be repeatable as topics change, there must be strong justification demonstrating that a given content will not be repeated frequently, and explaining how the course will be monitored to prevent students from receiving credit for duplication of work.

The repeatability of a course within a single quarter will only rarely be granted. Such a request will need especially strong justification, as will requests to permit students to repeat a course several times.

Where a course with varying topics under a general theme is desired, an (E-Z) umbrella course should be created; then individual courses can be approved under different letter designations, thereby precluding duplication of credit.

**Note:** (E-Z) courses should not generally be marked repeatable because each segment functions as a separate course. Thus two or more (E-Z) segments may be offered and taken by students within a single quarter without being marked as repeatable.

7. **Students may repeat courses for credit if the course allows repeatability under the specific circumstances laid out in this section.**

**Undergraduate Repeatability**

A. Certain categories of undergraduate courses are normally repeatable for credit, and will routinely be approved as repeatable at a department’s request. The repeatability may be unlimited, or may be limited to a specific number of units. In proposing or modifying a course in this category, departments should briefly explain the hours of repeatability that it is requesting, if more than 4 units are possible:

1. **Independent study**
2. **Internship**
3. Research courses

B. Other types of courses may be approved as repeatable in one of two ways:

1. Repeatability may be requested up to a specified number of units as course content changes. The Committee on Courses recommends using the word “Topics” in the course title of any proposal to create such a course; if the word “Topics” is not used, other language in the course title and/or description should indicate that a range of possible topics is covered and that the course is repeatable. For such courses, each iteration of the course receives a subtitle that represents the changing topic of study. Course subtitles do not need to be approved individually by the Committee on Courses; instead, the department informs the Registrar of the course subtitle during planning for a particular quarter’s course offerings.

If a department requests that a course be repeatable as content changes, it should explain in the justification for repeatability why and how course content is expected to change over time. For planning purposes, if subtitles are expected to repeat less often than once every four years, a Topics course with subtitles is appropriate.

2. Repeatability may be requested with a limit for a specific number of units, even if course content does not explicitly change and no subtitles will be used. Requests for this form of repeatability will require detailed justification that explains why the work performed will not be duplicative. Courses in this category should not normally have the word “Topics” in their title.

NOTES

• If a department expects a specific set of topics to be repeated regularly under a general umbrella, a “Topics” course with an E-Z sequence should be created instead of a “Topics” course that is repeatable as content changes (See E-Z Courses). For planning purposes, if most segments are expected to repeat at least once every four years, E-Z segments are appropriate.

• Many E-Z course sequences have the word “Topics” in the title of the umbrella course (See: “Topics courses” and “E-Z courses”). However, using “Topics” in the title does not mean that individual EZ segments are repeatable. Only if a specific segment is approved as repeatable as content changes, or as repeatable to a specific number of units (as described above) is such an E-Z segment repeatable.

• Taking different segments in an EZ sequence never constitutes repetition.

Graduate course repeatability

Any graduate course may be made repeatable for credit, with appropriate justification. For example, in courses such as seminars and colloquia, the material covered varies each time the course is offered, or for each student taking the course. Departments must indicate whether a graduate course is repeatable when proposing or modifying a course, and provide the maximum units of credit that a student can earn from the course. Such courses do not normally, and should not have the word “Topics” in their title.

When their curricular needs make it desirable, departments may also request that graduate courses be repeatable only as content changes. In this case, they should consider creating a course with “Topics” in its title and repeatable as content changes (following the guidelines above under Undergraduate Repeatability).

Departments may also create EZ sequences of courses that cover different topics under a single umbrella. This is particularly suitable when the different topics are expected to be repeated on a regular basis. Taking different segments of an EZ sequence never constitutes repetition.

8. Topics Courses
Courses with the word “Topics” in their title have been used in various ways in the past. In order to clarify the nature of such courses to students, the Committee on Courses recommends the following standardization of Topics courses. These guidelines will be applied to new courses, unless a department provides a careful explanation for variations in the use or non-use of the word “Topics” in courses in the respective categories. The Committee also urges departments revising courses in these categories to also adjust the course title to reflect these policies.

A. Topics courses that constitute EZ sequences

The EZ course format provides a mechanism that allows multiple subtopics to be represented under one broad umbrella topic. (See EZ Courses). Such courses often contain the world “Topics” in the umbrella course title and description.

The use of EZ Topics sequences is appropriate when the majority of segments are regularly offered. A good rule of thumb is that most segments will be repeated at least once every four years.

B. Topics courses with subtitles, which may be repeatable as content and subtitle changes

A course that uses Topics in the course title may use subtitles to convey the specific material covered each time such a course is offered. When such a course is offered, the department assigns each-course section with a subtitle that more precisely describes the specific content involved, and which also appears on students’ transcripts. Putting the word “Topics” in the course title helps make students aware that the specific content varies each time the course is offered. Subtitles are not reviewed by the Committee on Courses, but are rather assigned when the department communicates them to the Registrar’s office during course planning for a particular quarter.

Topics courses with subtitles allow faculty to explore diverse topics relating to a single larger theme without having to propose a new course each time the material changes. Such courses may also be used to take advantage of the expertise of a visiting professor, or for other “one-time” offerings. Topics courses with subtitles may be designated as ‘repeatable as content changes’ at a department’s request. The ‘repeatable as content changes’ option also allows a single course number to cover varying offerings whose content is related to the main course title and description, but which are sufficiently different that students may earn credit for more than one iteration (See Repeatability).

If topics are expected to repeat regularly more often than once every four years, the department should consider creating an EZ sequence instead.

NOTE:

Some repeatable graduate courses currently in the catalog (December 2017) are labelled as “Topics” courses, but do not currently require subtitles. The Committee on Courses urges departments to add subtitles and to adjust repeatability statements (if necessary) for such courses when such courses come up for review or modification. Adding subtitles allows student transcripts to become more informative to future employers or universities, and avoids uncertainty about what material the course covered.

97. Cross-listed Courses: List any cross-listed (identical) courses in the appropriate section.

108. Duplicate or Overlapping Courses: If the course content overlaps with the content of other courses to the extent that credit is awarded for only one of the courses (e.g., HNPG 010A, HMSS 001, and HMSS 002), state so in the Credit Statement section. Credit overlap caused by duplication of content results in a punitive effect to students, as credit may be denied post-facto and this may delay graduation, cost excess staff and student time, etc.

B. Instructor: SR 750 states: “(A) Only regularly appointed officers of instruction holding appropriate instructional titles may have substantial responsibility for the content and conduct of courses which are approved by the Academic Senate. (B) Professors, professors in residence and adjunct instructors, and lecturers may give courses of any grade. Persons holding other instructional titles may teach lower division courses only, unless individually authorized to teach courses of higher grade by the appropriate Committee on Courses or Graduate Council. If a course is given in sections by several instructors, each instructor shall hold the required instructional title. (C) Announcements of special study courses in which
individual students work under the direction of various members of the department may state that presentation is by the staff, but a member of the department shall be designated as the instructor in charge. (D) Only persons approved by the appropriate administrative officer [Dean of the College from which the proposal originates], with the concurrence of the Committee on Courses concerned, may assist in instruction in courses authorized by the Academic Senate. (E) No student may serve as a reader or assistant in a course in which he is enrolled.

All new courses should state the name of the intended instructor(s) or of the Department chair. Changes in existing course(s) should state the name of the instructor(s) who will be teaching the course(s), the name of the instructor in charge, or that of the Department chair [SR750.c.].

C. **Justifications:** For a new course or restoration, describe how the course will strengthen the offerings of the academic unit. For a revision, state the reason for each action proposed. For a deletion, explain why the course is no longer necessary or why it can no longer be taught.

Include descriptions of new E-Z segments that are not described in the catalog description.

D. **Syllabus:** For a new course, restored course, or a course with a substantive change, include a substantive current or proposed syllabus that outlines the course by week, date, or topic and includes weighted grading criteria. To indicate the amount of required reading, provide a reading list that is linked to a week, date, or topic.

An up-to-date syllabus must be provided. The syllabus must reflect the activities proposed to "earn" the units, accounting both for activities during faculty contact hours and outside individual work. If a discussion (or lab, or workshop, studio, etc.) is included in the course, the syllabus must acknowledge at least briefly what will take place during this activity and show how students' accomplishment in this activity will be counted in the evaluation of their achievement. Please remember the rules governing awarding of academic credit stated under II.A.2 above.

When a substantial change is being proposed, the syllabus should be updated by the department to reflect this change. Likewise, syllabi that refer to prior versions of the course at UCR or at other institutions will not be considered and the course proposal will be returned for amendment.

E. **Courses Including Distance Learning Technologies:** Courses or course sections instructed entirely or partially through distance learning must be submitted through the regular procedure for approval. Even when such a course closely imitates an already approved course that does not include on-line components, a separate course syllabus must be prepared. The activities, unit justification, and evaluation methods may be different for such a course; moreover, different regulations apply to the parameters of a distance-learning course, concerning, for example, students' eligibility for financial aid. For additional information on proposals of courses or sections involving online delivery, refer to the appendix, “Guidelines for Remote Learning Courses.”

F. **Course and Program Searches:** Completion of a course search and/or a program search is essential when one of the actions listed below is desired. The purpose of such a search is to identify additional courses as well as major and minor programs that will be affected by the proposed change, so that necessary adjustments may be made at the same time as the requested change. For example, the prerequisites or credit statements for a variety of courses may need to be changed in order to include or exclude the target course as a prerequisite to other courses, or to prevent students from receiving duplicate credit for identical or overlapping course content.

A program search or a course search should be requested as follows:

<table>
<thead>
<tr>
<th>If You Are:</th>
<th>Order a Program Search From:</th>
<th>Order a Course Search From:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deleting the course</td>
<td>Academic Senate Office</td>
<td>Registrar's Office</td>
</tr>
<tr>
<td>Renumbering the course</td>
<td>Academic Senate Office</td>
<td>Registrar's Office</td>
</tr>
<tr>
<td>Changing the Title</td>
<td>Academic Senate Office</td>
<td></td>
</tr>
<tr>
<td>Changing the Units</td>
<td>Academic Senate Office</td>
<td></td>
</tr>
<tr>
<td>Changing the Cross-listing</td>
<td>Academic Senate Office 207</td>
<td>Registrar's Office</td>
</tr>
</tbody>
</table>
Changing the **Credit Statement** | Registrar’s Office
---|---
Changing prerequisite to include a limitation on enrollment to majors and/or minors | Academic Senate Office

Allow 5 working days for receipt of search reports.

**Reviewing the reports:** The Program Search report lists programs, majors, and minors in which the proposed course appears. Review these programs to determine if they will be affected by your course proposal. Course numbers, titles, prerequisites, credit statements, etc. may be affected. Use the information from this report to help you answer questions in CRAMS. If requesting an enrollment restriction to majors and/or minors, use the program search to determine which extra departmental major/minor programs may be affected, and consult with the affected departments, reporting on this in the justification in your request. The Course Search report lists courses that are affected by courses, either in their prerequisite or description. List all courses in this section that are determined to be affected. For Honors courses and Non-honors courses a course search is necessary, but submittal of affected courses are not necessary (Honor and Non-Honors courses are considered equivalent on fulfillment of prerequisites and course overlap).

**G. Requests for Exception to Due Dates for Course Proposals:** The deadlines for proposing new courses and for proposing changes to approved courses with reference to a future effective date (the academic term when the new course can first be offered, or when changes will take effect) are firm, and exceptions are approved infrequently. However, it sometimes becomes necessary for a department/program to request a brief exception to the deadline for reasons that could not have been anticipated. When this occurs, the department should complete the Request for Extension of Course Proposal Submission Deadline Form, which is available on the Committee’s web site ([http://senate.ucr.edu/committee/8/request_for_extension_of_course_request_submission_deadline_for_m.html](http://senate.ucr.edu/committee/8/request_for_extension_of_course_request_submission_deadline_for_m.html)). If the request is approved, a copy of the approved form, and of any other relevant correspondence, must be pasted into the Faculty Correspondence field on CRAMS before the late course proposal is submitted. **Appendix 3** contains a sample copy of the Request for Extension form.

**GENERAL POLICIES**

In approving, disapproving, or recommending changes in course proposals, the Committee will be guided by the rules given above and by the following general policies:

**I. Level and Emphasis of Courses:**

The primary emphasis in the course should be academic and not vocational, stressing the acquiring of a body of knowledge and the understanding of principles and theories rather than the development of skills and techniques for immediate practical application in a vocational sense. The skills and techniques should be taught as means to learning, analyzing, and criticizing theories and principles, not for vocational ends themselves.

**II. Scope and Organization of Courses:**

Although the Committee does not decide general educational policy nor does it intend to infringe upon departmental judgment as to course content, it will use the following criteria for evaluating a course proposal:

The course should have a clear and essential place in the overall offering of the department, division, or school; either filling a gap in the existing course structure, or strengthening that structure without duplication or excessive overlapping.

Basic courses should not constitute proliferation, i.e., the splitting up of a body of knowledge or a field of study into parts too small to warrant separate treatment in themselves. Seminars offer such a specialized approach.

Courses should be organized realistically with respect to quality of understanding versus quantity of material a student is expected to master in the time allotted. The catalog description should make clear the special nature of a particular course.

**III. Course Duplication or Overlap:**
The Committee on Courses is watchful of duplication or overlap of courses offered by other academic units. **It is the responsibility of the department/program to ensure that any new course it proposes does not duplicate nor overlap existing courses offered by other units on campus.** It is imperative that the originating unit provide adequate explanation and/or written concurrence from department(s) where duplication or overlap would exist. (Please see the discussion of duplication of credit under II.A.8 on page 10 above.)

**NOTE:** It is in the department's own interest to provide such an explanation and consent. If the Committee on Courses has any questions concerning potential duplication or overlap of a proposed new course, the proposal will be returned to the originating department/program for evidence that consultation has taken place.

IV. **Guidelines for Cross-Listing of Courses:**

The use of and need for CROSS-LISTING of courses varies widely from program to program.

A. **Policy Statement:**

1. Cross-listed courses are jointly owned and require the agreement of ALL the departments/programs, for which they have been approved, on all aspects of the course including changes subsequent to initial approval.

2. A proposal for cross-listing with an existing course must be accompanied by concurrent course proposals from ALL of the departments and/or programs with whom the course is to be cross-listed. A syllabus is not required for new courses being cross-listed with an existing course.

3. The proposal for a new course, when submitted for cross-listing, must be accompanied by proposal forms from ALL departments and/or programs involved. The information within the "box" on the course proposal form (e.g., title, description, units, etc.), must be the same on the forms submitted by ALL participating departments or programs with the exception of the department name and course number. It is recommended that cross-listed courses have the same number but it is not required.

4. Any and all changes in the description, title, units, etc., of an existing cross-listed course require concurrent agreement and submission of course proposal forms by ALL departments and/or programs involved.

The cross-listing of courses is an established practice which is to be continued. Extreme examples of multiple cross-listing exist, indicating the need for guidelines to be used in the consideration of cross-listing proposals. The guidelines enumerated have been prepared with consideration to the "Recommendations" of the Committee on Educational Policy (3/17/80). The needs and views of the Colleges of Natural and Agricultural Sciences and of Humanities, Arts, and Social Sciences have been solicited and considered.

B. **Guidelines for Approval of Cross-Listed Courses:**

1. Courses created jointly by faculty from more than one department/program will normally be considered for cross-listing.

2. Courses in which instruction is shared by faculty from more than one department/program will be considered for cross-listing. Sharing is interpreted as co-equal responsibility for content, presentation, and the evaluation of student performance. For the purpose of these guidelines, "Guest" lecturers invited from other departments/programs will not be interpreted as adequate justification of cross-listing proposals.

3. New courses prepared for a department or program by a faculty member (or members) from other departments/programs can be considered for cross-listing.

4. Approval of the course's instructor(s) by all departments/programs is required at the time cross-listing of a course is proposed.

5. Recognizing the potential occurrence of “COMPELLING” administrative or educational reasons for proposing cross-listing, such proposals can be considered. Such proposals must be strongly justified by those making the proposal. Cross-listing
proposals in this category are interpreted as occurring in response to truly exceptional circumstances. Cross-listing for the purpose of cross-disciplinary student "advising" will not be considered.

6. If two or more departments/programs deem the content of a course appropriate for inclusion in their respective curricula, the course will be considered for cross listing. If more than three departments propose cross-listing of a single course, the Committee requests strong justification.

7. When deleting multiple cross-listed A,B,C series, all deletions shall have the “Last Effective” term date of the first affected course to avoid any possible confusion in catalog printing.

V. E-Z Courses.

The E-Z course format provides a mechanism whereby many subtopics may be presented under one broad, umbrella topic. The course title covers the broad topic, with the subtitles of lettered segments (E through Z) identifying more specific subject areas. E-Z umbrella courses may be developed within the undergraduate, graduate, and professional school curricula. These offerings may be used to take advantage of the expertise of visiting professors (“one-time only” offerings) and/or to test acceptance of a course topic with an eye to possible formalization of the more popular segments into regularly scheduled courses. Lettered segments within the E-Z umbrella course may be offered at regular or irregular intervals, based upon student and curricular needs. Generally, the letters H and L are not used for segments to alleviate any confusion with Honors courses or Laboratory courses. In addition, W, X, Y, and Z are usually used for Writing Across the Curriculum (WAC) courses which offer full or partial credit for satisfaction of the ENGL 001C requirement. When creating an E-Z course, select the most appropriate of the three formats described below. Course descriptions will appear in the General Catalog as shown in the examples.

E-Z Umbrella Course with Segment Subtitles Listed in Its Description

This format is recommended when the majority of the segments are frequently offered, segments have a similar design, and segment descriptions are not needed to provide guidance to students as they select courses. [See example.]

Example:

MUS 080 (E-Z). Private Instruction: Voice, Keyboard, and Strings (1-2) Studio, .5-1 hour; individual practice, 5-10 hours. Prerequisite(s): MUS 001 or equivalent; consent of instructor. Students take a half- or one-hour lesson and practice 5 to 10 hours each week (see the note regarding fees under the Major Requirements section). Offered as demand indicates. E. Voice; F. Classical Piano; G. Jazz Piano; I. Harpsichord; J. Carillon; K. Jazz Guitar; L. Electronic Bass Guitar; M. Lute; N. Classical Guitar; O. Viola da gamba; P. Piano Proficiency; Q. Organ; R. Violin; S. Viola; T. Violoncello; U. Double Bass Viol. Normally graded Satisfactory (S) or No Credit (NC), but students may petition for a letter grade on the basis of performance before a jury or at a recital. Segments are repeatable.

E-Z Umbrella Course without Segment Subtitles Listed

This format is recommended when the majority of the segments are infrequently offered.

Example:

ENGL 142 (E-Z). Cultural Studies (4) Lecture, 3 hours; reading (extra), 3 hours. Prerequisite(s): upper-division standing or lower-division English course (other than composition) or consent of instructor. The formal, historical, and theoretical analysis of culture in its broadest sense, including popular literature, the mass media, and/or the interplay between "low" and "high" or peasant and elite cultural forms. Topics may be drawn from any historical field.

E-Z Umbrella Course with Segment Subtitles Listed Separately

This format is recommended when the majority of the segments are frequently offered and segment descriptions are needed to provide guidance to students as they select courses.

Example:

RLST 128 (E-Z). Topics in the Bible (4) For hours and prerequisites, see segment descriptions. Academic examination of issues relating to the Bible.

RLST 128E. Contemporary Views of Jesus (4) Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): upper-division standing or consent of instructor. An examination of contemporary ways in which Jesus has been understood by
academically oriented scholarship. Particular attention is given to the question of sources and of the methods used to identify those parts of the preserved tradition that are attributed to Jesus himself.

RLST 128F. Biblical Fictions (4) Lecture, 3 hours; outside research, 3 hours. Prerequisite(s): RLST 010; upper-division standing or consent of instructor. Examines artistic rewritings of biblical narratives from antiquity to the present (ancient Jewish and Christian novels, medieval plays and stories, modern films and novels) to explore the intersections of religion, culture, and society.
A. **Procedure for Approval of an E-Z Umbrella Course.**

Submission of an E-Z umbrella course proposal must follow the same routing as for any permanent course. The Committee on Courses recommends that the segment subtopics to be offered under an E-Z series be identified at the time of submission of the E-Z umbrella course proposal. Segments are regular courses of instruction. Descriptions and course outlines for new segments must be provided.

B. **Procedure for Approval of an E-Z Umbrella Course with Segment Subtitles Listed in Its Description.**

1. An E-Z umbrella course with segment subtitles in its description must follow the same routing as for any permanent course. The course proposal should be for the E-Z umbrella number [i.e., FREN 177 (E-Z)]. The “Catalog Description” should consist of the umbrella description followed by the segment letters and subtitles [in alphabetical order]. The “Justification” for the umbrella should contain the segment descriptions. An outline or syllabus for each segment must be included in the course proposal. The “Closing Notes” section of the course proposal should indicate which segments are being added.

2. New segment letters and subtitles may be added to an existing E-Z series by submission of a course proposal for the umbrella and number. The “Catalog Description” should consist of the umbrella description followed by the existing and proposed segment letters and subtitles. A description of each new segment should be included in the “Justification” and a course outline for each new segment must be included in the course proposal.

   Exception: If the segment is to be offered “one time only” it should be submitted on a separate course proposal. That is, a proposal should be submitted for the E-Z umbrella number with the segment letter (i.e., HIST 111E).

3. A stronger prerequisite than what is stated in the umbrella may be required for a new segment. The specific prerequisite(s) and the segment letter it applies to should be added to the prerequisite(s) for the umbrella.

4. If an academic unit wishes to change or delete a segment letter and subtitle, a course proposal for the umbrella number must be submitted. The “Catalog Description” should consist of the umbrella description followed by the existing segment letters and subtitles [in alphabetical order]. Proposed changes in segment letter(s) and subtitle(s) should be included. Segment letters and subtitles to be deleted should be removed. The “Closing Notes” section of the course proposal should indicate which segments are being changed and/or which segments are being deleted. An explanation for the changes/deletions should be provided in the “Justification.” If the segment change affects the segment description, a new description should be included in the “Justification” and a course outline must be included in the course proposal.

C. **Procedure for Approval of an E-Z Umbrella Course without Segment Subtitles Listed in Its Description**

1. An E-Z umbrella course without segment subtitles in its description must follow the same routing as for any permanent course. The course proposal should be for the E-Z umbrella number and title [i.e., FREN 177 (E-Z)]. The “Catalog Description” should consist of the umbrella description.

2. **Procedure for Approval of an Individual Segment Whose Subtitle Is Not Listed in the Description of Its Umbrella.**

   a. Academic units may choose to establish a segment whose subtitle is not listed in the description of its umbrella course. The complete description of such a segment may or may not be listed in the General Catalog at the unit’s option. However, if the description of one segment of an umbrella is listed in the General Catalog, the descriptions of all other segments of that umbrella must also be listed. "One-time only" segments will be considered as "not for catalog listing."

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b. Academic units may establish segments of this type by submitting a course proposal for the E-Z umbrella number with the segment letter (i.e., HIST 111E). These course proposals must follow the same routing as for any permanent course. The "Catalog Description" would be the segment description and a course outline must be included in the course proposal.

c. Unit requirements are approved at the time the E-Z umbrella is approved. When a segment with unit specifications differing from the umbrella is submitted for approval, a change in the existing umbrella should be submitted at the same time to show the variable units.

d. Existing segments not listed in the catalog can be scheduled for presentation in any quarter.

e. When an academic unit chooses to change or to delete an existing segment, a course proposal for the E-Z Umbrella with the segment letter (i.e., HIST 111E) should be submitted. The proposal must follow the same routing as for any permanent undergraduate or graduate course being changed or deleted.

f. A course proposal for a segment must include the applicable restrictions, special grading, and cross-listing notations from its umbrella course proposal. If restrictions, special grading or cross-listing notations are added, deleted or changed on the umbrella course proposal, course proposals reflecting these changes must be submitted concurrently for the umbrella’s segment.

D. Segment Lettering and Titles.

It is important that letters and subtitles for E-Z segments be assigned carefully and consistently. A student may not receive credit for the same segment unless otherwise indicated in the course description. A student may receive credit for repeating the umbrella course if the segment letter and subtitle is different. Duplication of content by different segments within a series is to be avoided. If an activity within an E-Z umbrella course necessitates reuse of alphabet letters, a minimum of three years should elapse before a letter is reused to designate a different segment subtopic.

VI Special Studies (90-190) and Directed Studies (290) Courses:

A. Special Studies Courses (90 and 190).

The sole purpose of undergraduate Special Studies courses (90 and 190) is to provide students with a means for meeting special curricular requirements or problems on an individual basis and for variable units.

Registration in all special studies courses must be approved by the chair of the department/program concerned, based upon a written proposal submitted to the chair. (SR 546)

B. Directed Studies Courses (290).

The sole purpose of graduate Directed Studies courses (290) is to provide students with a means of conducting individual, supervised research or for studying special topics on an individual basis and for variable units.

Registration in all directed studies courses must be approved, in the form of a written petition, by the instructor and the department chair or graduate advisor. The petition must be filed with the office of the Dean of the Graduate Division. (GR 1.5.10)

VII. Internships:

The internship experience has become an increasingly important component in the academic training of our students. Internships differ from Special Studies (90 and 190) by the involvement of a non-departmental sponsor (generally off campus) in addition to the faculty member/student relationship.
Riverside Division Regulation R1.9 adopted in December 1976 states: “A maximum of 16 units of credit may be obtained through internship courses, with a maximum of 12 units of internship scheduled in a single quarter. Internship course credit is given for academic work related to the experience of the internship, not for the work experience alone.”

Guidelines: The following internship guidelines were also adopted:

1. An academic internship is defined as an educational experience in which the student works under the direct supervision of someone other than a faculty member, normally in an agency/firm/institution outside the campus, with a faculty supervisor ultimately responsible for assigning and evaluating academic work done for course credit in relationship to the experience. Under no circumstances will credit be given for the internship experience alone.

2. Each department wishing to sponsor internships will have a designated ladder faculty member or lecturer who is responsible for seeing that a common standard is applied to all internships and that these guidelines are adhered to in all instances.

3. The course number 198 is required for internships: 198I is suggested for individual internships and 198G for group internships. The course number 298 is required for those internships considered by the department to be “graduate”: 298I is suggested for individual internships and 298G for group internships. These graduate internships will normally carry credit toward a graduate degree. The course number 398 will be required for those internships considered by the department to be “professional”: 398I is suggested for individual internships and 398G for group internships. These professional internships will carry academic credit but will not count toward a degree.

4. For individual and group internships, the student and designated faculty member will submit on an appropriate form a clear-written statement of purpose, field experience content, and academic content of the proposed internship. The proposal must be approved by the chair of the department or program in which the internship is offered.

5. The essential criterion for one unit credit is one hour of academic work plus two or more hours of internship per week. Internship courses should normally be listed as 1-12 units, repeatable to a maximum of 16. The normal expectation is that each local internship will not count for more than 4 or 5 units in a single quarter, larger numbers of units being reserved for quarter-away types of situations.

VIII. X-100 and X-200 Courses in University Extension:

In order to facilitate its review of course proposals in University Extension in the X-100 (undergraduate) and X-200 (graduate) series, the Committee on Courses requires from the chairs of departments and programs a brief statement, accompanying the proposal form, vouchering for the validity of the course proposal and its acceptability for majors in their respective departments.

IX. Summer Session Courses:

Any course listed in the General Catalog may be offered in Summer Session. No additional approval is required for these courses to be offered in Summer Session. New or experimental courses, modifications of catalog courses, and any other instruction not previously approved, which is proposed by a department/pro- gram for presentation in Summer Session must follow the normal Academic Senate procedures for course approval. If a course will be offered in Summer Session only, add the following statement to the end of the course description: Offered in summer only.

X. Continuity of Course Offerings:

Unless otherwise specified, a course that has been approved by the Committee on Courses may be offered in any quarter.
However, if any course has not been offered by a department for four consecutive years the Committee on Courses may request that it be deleted. (See Riverside Division Bylaw 8.10.4.) This policy is intended to ensure that the General Catalog will accurately reflect the departments' regular course offerings and to encourage departments to examine carefully the justification for retaining infrequently offered courses on the basis of the departments' curricular objectives and resources. Courses offered only on an intermittent basis should be considered for inclusion in an appropriate E-Z series.

XI. Policy Statement for Courses that Have Not Been Offered for Four Consecutive Years:

Periodically, the Committee on Courses will send lists of courses that have not been offered during the previous four years and eight years to departments. For courses that have not been offered in four years, the departments should either prepare deletion proposals or advise the Committee on Courses that they intend to offer the course(s) during the upcoming year. For courses that have not been offered in eight or more years, the departments should prepare deletion proposals. A course can be reinstated after deletion by submission of a course proposal for restoration.

XII. “One-Time Only” Courses

Special courses to be taught by visiting instructors or courses that are planned as a single offering should be submitted as “one-time only.” Check the “To be offered once only:” box and fill in the Quarter and year it will be offered. These courses then will be automatically deleted upon completion without additional paperwork.

XIII. Use of Films in Academic Courses:

Courses centering on films should include regular lectures and discussion comprising at least half of the course content. Substantial reading lists, term papers, etc., should be required in addition to screening films. Suggestions on information to be included with the course form can be found in the memo of June 20, 1984, from the Committee on Courses to Department/Program Chairs.

XIV. Courses Containing Experiments Using Recombinant DNA:

Undergraduate and graduate course proposals which contain experiments using recombinant DNA technology must have the experiments approved and certified by the UCR Institutional Biosafety Committee (IBC). The Committee on Courses will not approve such course proposals if the use of recombinant DNA has not been certified.

It is the instructor’s responsibility to complete and forward the “Biological Use Authorization (BUA)” form to the Compliance Officer of the IBC, Office of Research. A copy of the approved registration form should be attached to the course proposal form when it is submitted to the Committee on Courses. If the course changes and the use of DNA is substantially changed, the instructor should submit a written notification to the Compliance Officer of the IBC, Office of Research. A copy of the approved notification should be attached to the change in course proposal form when it is submitted.

XV. Requests For Approval Of Associate Instructors (Associates-In) and of Teaching Fellows

Normally an Associate-in will conduct the entire instruction of a lower division course or for a subgroup of students in a lower division course. An Associate-in may not give an upper division or graduate course or course section except with the approval of the campus Committee on Courses of Instruction. (SR 750)

Academic Personnel Manual 410-20b. states “Subject to the general supervision of a faculty member . . . , a Teaching Fellow should be competent to provide the entire instruction of a lower division course to a group of students, and normally should be given such assignments. Assignment to conduct instruction in an upper division or graduate course or section may not be made except with the approval of the Committee on Courses of Instruction (Regulation of the Academic Senate, 750).”
A request for approval of an Associate-in or teaching fellow to teach an upper division course or graduate course (Teaching Fellow only) should be sent to the Committee on Courses through the college/school dean (who endorses the request) in accordance with published deadlines. The Committee on Courses is under no obligation to consider requests for approval beyond published deadlines.

The request should contain:

- A justification for the necessity of hiring an Associate-In to teach the particular course in question.
- The candidate's complete curriculum vitae (CV); the standard University Biography Form for Academic Personnel (U1501) may be submitted, but departments are urged to work with the candidate to develop a professional CV for submission.
- A summary statement of the individual's qualifications regarding both knowledge of the field and preparation for classroom presentations.
- Copies of teaching evaluations for all lower or upper division course(s) the candidate has recently taught.
- The candidate's graduate transcript, including the current GPA.
- Name(s) of faculty who will monitor course presentation quality. For first time appointments, departments are urged to ensure that monitoring is close and direct.

In cases where the Associate-in is to teach a cross-listed course, a memo of agreement from the relevant department(s) should accompany the request.

XVI. APPENDICES
APPENDIX 1A

MINIMUM HOURS PER WEEK PER UNIT

SR 760 states: "The value of a course in units shall be reckoned at the rate of one unit for three hours' work per week per term on the part of the student, or the equivalent."

The General Rules and Policies Governing Courses of Instruction state that hours per week per unit of credit may not be less than, but may exceed, those listed in the following guidelines:

One unit for each hour per week of lecture, seminar, discussion, workshop, colloquium, or consultation.

One unit for each three hours per week of laboratory, practicum, field work, screening, internship, clinic, thesis, tutorial . . . . One unit for three hours of outside reading or other preparation each week is expected for individual study, research, extra reading, term paper, etc.

The hours referenced in this box are shaded in the examples below. These hours are listed on the course proposal.

**EXAMPLE 1**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Units</th>
<th>Total Required Hours 3 hours per unit or 3 x units</th>
<th>Distribution of Required Hours</th>
<th>Individual Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
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<td>9</td>
<td>Group Hours* contact with instructor or TA</td>
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</tr>
<tr>
<td>Laboratory</td>
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<td>3</td>
<td>Individual Hours no contact with instructor or TA</td>
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<tr>
<td>TOTAL</td>
<td>4</td>
<td>12</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**EXAMPLE 2**

<table>
<thead>
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<th>Activity</th>
<th>Units</th>
<th>Total Required Hours 3 hours per unit or 3 x units</th>
<th>Distribution of Required Hours</th>
<th>Individual Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminar</td>
<td>3</td>
<td>9</td>
<td>Group Hours* contact with instructor or TA</td>
<td>6</td>
</tr>
<tr>
<td>Discussion</td>
<td>1</td>
<td>3</td>
<td>Individual Hours no contact with instructor or TA</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4</td>
<td>12</td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

**EXAMPLE 3**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Units</th>
<th>Total Required Hours 3 hours per unit or 3 x units</th>
<th>Distribution of Required Hours</th>
<th>Individual Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop</td>
<td>3</td>
<td>9</td>
<td>Group Hours* contact with instructor or TA</td>
<td>6</td>
</tr>
<tr>
<td>Extra Reading</td>
<td>1</td>
<td>3</td>
<td>Individual Hours no contact with instructor or TA</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4</td>
<td>12</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

*Usually a class or a consultation.
APPENDIX 1B

June 6, 1997

TO: DEPARTMENT/PROGRAM CHAIRS

FR: COMMITTEE ON COURSES

RE: UNIT DISTRIBUTION AND COURSE APPROVAL FORMS

PLEASE DISTRIBUTE TO ALL FACULTY

Recent course forms filed with the Committee on Courses have been unclear about unit distribution. Recently, a number of the proposed courses presented for consideration by the Committee on Courses have not established the academic rigor associated with 4 unit courses. To ensure that academic quality is maintained on our campus, it is critical that course credits accurately reflect the anticipated student work load. This memorandum is designed to explain these requirements. It is sometimes repetitive in its efforts to clear up any ambiguities; please be patient with it.

Lecture, Seminar, Consultation, and Discussion

In general, 1 hour of lecture, seminar, consultation, or discussion is equivalent to one unit of credit. It is understood that a minimum of 2 hours of outside reading or other work is expected for each hour of lecture, seminar, consultation, or discussion. We are well aware that it is often hard to tell exactly how long reading that supports lecture materials will take, and that some students will work faster than others. However, faculty should have a realistic estimate of the time commitment associated with assigned readings and the readings assigned for lectures should be in alignment with course credit expectations.

The attachment of a current course syllabus is critical for the Committee on Courses to fairly evaluate lecture, seminar, consultation, discussion, and other hours. If consultation hours are proposed, the mechanism for implementing and monitoring this educational activity must be explicitly stated and justified.

Laboratory

Three hours of laboratory work is equivalent to one unit of credit. It is understood that students may need to spend significant additional time in preparation for laboratory or to report laboratory findings.

Outside Reading, Extra Reading, Outside Research, Individual Study, Reading, and “Other hours”

One credit is given for 3 hours per week of outside research, extra reading, etc. These categories indicate that reading materials or research efforts exceed the reading required to support lectures (2 hrs./1 hr. lecture). The use of these educational activities must be clearly justified to the Committee on Courses.
Typical 4-unit course outlines include:
(a) 3 hr. lecture (including approximately 6 hours of reading) and 3 hr. laboratory per week = 4 units
(b) 3 hr. lecture (including approximately 6 hours of reading) and 3 hr. extra reading per week = 4 units

NOTE THAT THIS DOES NOT MEAN FOUR CREDITS FOR THREE HOURS OF LECTURE AND THREE HOURS OF READING, ETC., FOR A TOTAL OF (3 + 3 = 6) SIX HOURS OF WORK PER WEEK.

IT MEANS FOUR CREDITS FOR THREE HOURS OF LECTURE OR SEMINAR PLUS TWO HOURS OF OUTSIDE PREPARATION FOR EACH OF THOSE HOURS, PLUS THREE HOURS OF EXTRA OR ADDITIONAL READING OR OTHER WORK, FOR A TOTAL OF (3 + 6 + 3 = 12) TWELVE HOURS OF WORK PER WEEK.

OFTEN, NEITHER COURSE PROPOSAL NOR THE COURSE SYLLABUS MAKES IT CLEAR HOW THE WORK DONE FOR UNITS ASSIGNED AS "EXTRA READING", "TERM PAPER", OR "OUTSIDE RESEARCH" REPRESENT WORK THAT IS OVER AND ABOVE THE READING OR WORK THAT IS NORMALLY EXPECTED TO BE DONE OUTSIDE OF CLASS.

IN ORDER TO OBTAIN COURSES COMMITTEE APPROVAL AT FOUR UNITS, SOME INDICATION OF THE DIFFERENCE BETWEEN THE SIX HOURS OF READING OR OTHER WORK ORDINARILY ASSOCIATED WITH THE THREE HOURS OF LECTURE, AND THE THREE HOURS OF EXTRA READING, ETC. MUST APPEAR ON THE SYLLABUS OR IN A WRITTEN EXPLANATION ABOUT THE COURSE. It must be indicated that those extra hours are evaluated in some way distinct from the 'regular' six hours expected in connection with the lecture hours.

WE RECOGNIZE THAT COURSE SYLLABI ARE WRITTEN TO COMMUNICATE INFORMATION ABOUT THE CLASS TO STUDENTS AND ARE NOT SPECIFICALLY INTENDED TO PROVIDE ANSWERS TO THE ABOVE QUESTIONS FOR THE COMMITTEE ON COURSES. THEREFORE, ADDITIONAL INFORMATION IS WELCOME, EITHER IN THE FORM OF A MEMO, OR IN THE JUSTIFICATION SECTION OF THE COURSE FORM, TO ASSIST US IN THE EVALUATION OF UNIT DISTRIBUTION.

THE BASIC INFORMATION IS SUMMARIZED BELOW:

*** THE NORM FOR LECTURE, SEMINAR, CONSULTATION, AND DISCUSSION HOURS IS THAT ONE UNIT OF CREDIT IS ASSIGNED FOR EACH HOUR OF INSTRUCTION.

EXAMPLE: THREE UNITS ARE ASSIGNED TO A CLASS THAT MEETS 2 HOURS PER WEEK FOR LECTURE AND ONE HOUR OF DISCUSSION.

*** APPROXIMATELY TWO HOURS OF OUTSIDE READING OR OTHER WORK IS EXPECTED FOR EACH HOUR THE CLASS MEETS PER WEEK.

EXAMPLE: A CLASS THAT MEETS 2 HOURS PER WEEK FOR LECTURE AND ONE HOUR OF DISCUSSION requires 6 HOURS OF OUTSIDE WORK PER WEEK.
*** OTHER WORK, SUCH AS LABORATORY WORK, FIELD WORK, OUTSIDE READING, INDEPENDENT STUDY, TERM PAPER, OR RESEARCH, IS USUALLY COUNTED AT THE RATE OF ONE CREDIT FOR THREE HOURS OF SUCH WORK.

EXAMPLE: A TERM PAPER ASSIGNED IN ADDITION TO THE TWO HOURS PER UNIT WORK NORMALLY EXPECTED SHOULD REQUIRE 3 HOURS PER WEEK THROUGHOUT THE QUARTER TO COMPLETE THE ASSIGNMENT.

We are well aware that it is often hard to tell exactly how long assignments will take, and that some people will work faster than others. Our point here is that THE WORK REQUIRED OF STUDENTS FOR A 4 UNIT COURSE SHOULD REFLECT THE CAMPUS EXPECTATION FOR 4 UNITS OF CREDIT, I.E., THERE SHOULD BE DIFFERENCES BETWEEN WHAT IS ASSIGNED IN 3 AND 4 UNIT COURSES.

******* FOR THE REASONS NOTED ABOVE, A COURSE SYLLABUS SHOULD ACCOMPANY ALL PROPOSALS FOR NEW COURSES AS WELL AS CHANGE FORMS FOR COURSES THAT INVOLVE A REALLOCATION OF UNITS, MAJOR CHANGES TO CONTENT OR NEW INSTRUCTORS.

The Committee on Courses encourages all faculty with questions about the Course Forms and course requirements to clarify all issues prior to submission of a course form. This will ensure a rapid approval of the proposed course through the Committee on Courses and other campus committees.

Faculty and staff should start with the Committee on Courses’ “Course Guidelines”.

Cc: Registrar/Assistant Registrar/Catalog Editor/Courses Coordinator Deans, Colleges/Schools/Graduate Division Chairs, Executive Committees Chairs, Committee on Educational Policy/Graduate Council Administrative Assistants & Graduate/Undergraduate Secretaries
GRADING

DEFAULT GRADING TYPES

Undergraduate Courses (001-199)
The default grading type is Letter Grade or petition for Satisfactory/No Credit (S/NC).

Graduate and Professional Courses (200-499)
The default grading type is Letter Grade only.

When the grading type is the default, do not add a grading statement in CRAMS except to indicate that the course is graded In Progress (IP). Example:
Graded In Progress (IP) until HIST 100A and HIST 100B are completed, at which time a final grade is assigned.

When the grading type is not the default, add a grading statement in CRAMS.

Enter grading types in the Grading Type field. Enter grading statements in the Standard Grading Statement field, or if you need to create your own grading statement, in the Other Grading Statement field. Note: Grading statements are added automatically by CRAMS at the end of the course description in the General Catalog.

<table>
<thead>
<tr>
<th>GRADING TYPES (shaded below) and their STANDARD GRADING STATEMENTS (in italics below)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Letter Grade or petition for Satisfactory/No Credit (S/NC)</strong></td>
</tr>
<tr>
<td>This is the default grading type for undergraduate courses, so no statement is needed.</td>
</tr>
</tbody>
</table>

**Graduate Courses**

May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor

**Letter Grade or Satisfactory/No Credit (S/NC); no petition required**

Students who submit a term paper receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade.

Students who present a seminar receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade.

Students who present a seminar or submit a term paper receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade.

May be taken Satisfactory (S) or No Credit (NC) by students advanced to candidacy for the Ph.D.

Normally graded Satisfactory (S) or No Credit (NC), but students may petition the instructor for a letter grade on the basis of assigned extra work or examination

**Letter Grade only**

Undergraduate Courses

Satisfactory (S) or No Credit (NC) grading is not available.

Graduate and Professional Courses

This is the default grading type for graduate and professional courses, so no statement is needed.

Satisfactory/No Credit (S/NC) only

Graded Satisfactory (S) or No Credit (NC).

This grading type is no longer used.
Request for Extension of Course Proposal Submission Deadline

**Course Number:**

**Course Title:**

**Effective Quarter and Year:**

**Course Action (check all that apply):**

- [ ] New
- [ ] Change
- [ ] Deletion
  - [ ] Course Number
  - [ ] Title
  - [ ] Cross-listing
  - [ ] Restoration

[ ] Credit Statement (e.g., Credit is awarded for only one of BIOL 003 or BIOL 005A)

[ ] Other

If the course is being deleted or its Course Number, Title, Units, Cross-listing, or Credit Statement is being changed, or you are adding a priority enrollment statement; please request reports from your course proposal preparer before completing the fields in this box.

**List other courses affected by course proposal:**

**List programs (e.g., degrees, minors) affected by course proposal:**

**Course proposal needs approval before the following:**

- [ ] Schedule of Classes is published
- [ ] Summer Sessions Catalog is published
- [ ] First day of enrollment
- [ ] First day of instruction
- [ ] Agenda deadline for the next Riverside Division Academic Senate meeting
- [ ] General Catalog is published

**Request extension of deadline to (date):**

**Reason regular deadline was (or will be) missed:**

**Chair of Department/Program:**

**Submitted By:**

**Reviewed by Courses Specialist:**

**Comments:**

[ ] Approved (____ with conditions in Comments field above)  [ ] Denied

**Committee on Courses Chair:**

**Date:**

**Instructions:** Complete the form and save as a Word Document. Submit this request as an attachment to an e-mail addressed to mmiller@ucr.edu and beth.beatty@ucr.edu
APPENDIX 4

GUIDELINES FOR REMOTE LEARNING COURSES
(Updated February 23, 2016)

Preamble

It is the Committee on Educational Policy’s interest to ensure that courses with a significant remote learning (RL) component are reviewed fairly and consistently by the Senate; accordingly the Committee on Educational Policy (CEP) developed the guidelines below in collaboration with the Committee on Courses and Graduate Council. Either CEP or the Committee on Courses may modify or eliminate some of these guidelines as familiarity with remote learning (RL) courses develops and as best practices in the structure and delivery of RL courses are determined and generally adopted; it is to be expected that such modifications will be adopted after a consultation between these two committees in order to insure consistency. These guidelines are not offered as possible changes in the regulations or committee charges.

In considering RL courses the CEP has assumed that once the Senate through the Committee on Courses has approved a course, it has passed the necessary scrutiny to ensure that the expected quality of instruction will be delivered. For the same reason, any instructor approved to give such a course is assumed to have the necessary expertise and should be given all the freedom to modify his/her methods of instruction. Based on this the CEP believes that RL courses should not be associated with a particular instructor, nor with particular choices of software or hardware. In addition, the Committee considers that the repeat policy should apply to courses with equivalent syllabi independently of their being traditional or RL.

This document does not deal with some thorny issues surrounding RL courses, such as revenue sharing and intellectual property. This is not done with the intention to minimize these important concerns, but because they lie well outside the scope of both the Committee on Courses and the CEP.
Guidelines for the approval of Remote Learning courses

Definition

A course shall be labeled remote-learning (RL) if face-to-face contact with an instructor represents less than 1/3 of the total hours of required work per week.\(^1\)

Though this will be the general definition of RL courses, both CEP and the Committee on Courses recognize that there may be cases where this will be inappropriate; the ultimate determination of whether a course is to be considered RL will be made by the Committee on Courses, and may be at variance with the above definition.

SR 760 associates one unit for 3 hours of work per week per term. It is understood, however, that a minimum of two hours of outside reading or other preparation is expected each week for each hour of lecture, seminar, consultation, or discussion. The general definition implies that a course with N units will be an RL course if it has fewer than N face-to-face contact hours/week. For example, a 4-unit course for which the total amount of face-to-face lecture plus discussion plus seminar plus workshop plus laboratory time is less than 4 hours/week, would be an RL course. It is presumed (and verified in the course proposal during the Committee on Courses review) that all additional required contacts between students and instructor(s) occur remotely. The guidelines below are intended, in part, to insure that this type of contacts will allow students to interact with the instructors.

Catalog Description

Courses with standard and RL offerings are considered equivalent. Courses proposals with RL as a possibly delivery mode should include a sample course syllabus for RL delivery in lieu of or in addition to a syllabus for traditional delivery and should include the appropriate requests for repeatability. Courses, such as many lab courses, where physical interaction is an important aspect of the course, are presumptively not equivalent if offered in a RL format. Departments wishing treat RL and traditional delivery courses as non-equivalent are advised to number the courses uniquely and to use the overlap statement to prevent credit being given for both delivery formats.

All RL catalog course entries should include

- A broad description of the blend of traditional and online activities for the course
- Whenever pertinent, a note indicating that some specialized hardware and/or software might be required, referring the students to the course syllabus for specific descriptions

Approval

All RL courses require separate approval of the RL syllabus by the Committee on Courses even if there is an approved traditional course with the same course content.

In considering approval of RL course proposals, the Committee on Courses shall be primarily focused on whether or not the RL course will provide quality of education at the level required by UC. The Committee shall be mindful that the goal of such courses is to provide access to more qualified students; neither possible reduction of graduation time, nor revenue advantages, shall be of relevance in the approval process.

\(^1\) This definition parallels the one used at UC Berkeley.
Given the absence of generally-accepted best practices for remote instruction, the Committee on Courses may opt to initially approve a course or syllabus with the RL format only for a defined period of time, with a favorable review required before granting unrestricted approval. The Committee on Courses may require RL course proposals to provide details not required of traditional courses.

Any substantial modification in the delivery or evaluation methods in an RL course should require separate approval by the Committee on Courses even if the content matter is left unaltered.

When RL courses are proposed in degree programs that are subject to accreditation by external agencies (such as the ABET accreditation for Engineering programs), it is the responsibility of the department/program to insure that the external agency will accept the RL courses in the accreditation process.

Evaluation

In consultation with the college executive committees, the CEP and Committee on Courses will modify the course evaluation form to include items specific to RL courses. These committees will review and update this form every 5 years or earlier if needed.

No RL course is to be associated with a specific instructor. Nor will they be associated with particular software and hardware needed for their implementation; instructors should be free to replace one type of software/hardware with another form offering to offering as they see fit. Any substantial revision of the evaluation method, however, will require a separate approval by the Committee on Courses.

Suggested Guidelines to the Committee on Courses

The following provide a list of points that the Committee on Courses may want to consider when evaluating RL course proposals. Not all points are relevant in all cases and additional ones might be raised for specific instances.

All RL course proposals should

- Conform to the standard schedules of 10-week offerings during the academic year, or 10/5/3/ week for the Summer session; the Committee on Courses can consider alternative scenarios under exceptional circumstances on a case-by-case basis. Any proposal to allow students to take evaluations at different times during the term must also include workable plans to maintain the integrity of the evaluations (see also next bullet).
- Provide a clear description of the evaluation methods including the measures aimed at preventing student dishonesty (especially if online examinations are proposed). In addition, electronic assessment tools must be designed/chosen to insure sufficient variation in the evaluation instruments from offering-to-offering so that the availability of tests from previous offering does not compromise future evaluations.
- Guarantee student access to the instructor in charge of the course. Access to the instructor cannot be delegated to any sort of assistant. The course description should include the frequency, duration and manner of such contact hours. Similarly the number and manner of TA contact hours should be included in the course description.
- Make all reasonable accommodations to insure course access for students with disabilities.
- Rely on generally available hardware since requiring cutting-edge technology will disadvantage some students.
• Insure that all relevant material available to students residing at or near UCR is also available to all
RL students; this includes library material available electronically.
• Insure that all software issues (availability, licensing, etc.) should be resolved prior to the beginning of
the term.
• Specify all software and hardware requirements, and the manner in which course-specific items can be
obtained. This information should be included in the syllabus
• Describe the technical support available to students on and off campus. This should include the option
of dial-in support and not be restricted to online support (so as not to disadvantage students whose
computer is non functional). This information should be included in the syllabus.
• Insure that all TAs are trained in the software and hardware to be used in the course.
• Have a built-in mechanism for assessing learning outcomes. Assessment should measure the
effectiveness of learning in a course, should be used to guide improvement in the course, and, when a
comparable regular course is taught in parallel, may enable comparison of the relative effectiveness of
the RL and the regular course.

In addition:

Courses with a laboratory component require special attention. If the laboratory requires physical
components\(^2\), the simplest solution is to decouple the laboratory into a separate course that is taught on-
site. Budget constraints, however, might force a choice between an on-line laboratory and no laboratory
at all; such situations must be treated on a case- by-case basis weighing the advantages and problems of
the proposal.

Teaching assistants should not be limited to RL courses but should also gain experience by serving in
regular courses. A TA must alternate serving in an RL course with serving in two regular offerings
except in cases where the TA requests to be assigned to RL courses more frequently.
March 6, 2018

To: Dylan Rodríguez, Chair
    Riverside Division

From: Tim Paine, Chair
    Committee on Educational Policy

Re: Proposed Changes to Committee on Courses General Rules and Policies Governing Courses of Instruction

The Committee on Educational Policy reviewed the proposed changes to the Committee on Courses General Rules and Policies Governing Courses of Instruction at their March 2, 2018 meeting. The Committee is supportive of the proposed changes and the effort to clarify “Topics” and E-Z courses.

The Committee recommends that the following underlined edit be made to section 7.A. to provide greater clarity: In proposing or modifying a course in this category, departments should briefly explain the hours of repeatability that it is requesting, if more than 4 units are possible. These categories include:

While supportive of the proposed changes, the Committee still has concerns with how the subtitles of “Topics” and E-Z courses are displayed in the Course Registration System and recommends that subtitles of courses be clearly displayed to students as they register. Additionally, the Committee noted concern that the new student information system Banner is not flexible and causing Senate policies and processes to change rather than administer changes to the student information system.
Graduate Council

March 15, 2018

To: Dylan Rodriguez, Chair
Riverside Division

From: Christiane Weirauch, Chair
Graduate Council

Re: [Campus Review] Change to Campus Guidelines: Proposed Changes to Committee on Courses General Rules & Policies Governing Courses of Instruction

The Graduate Council reviewed the proposed changes to the Committee on Courses General Rules and Policies Governing Courses of Instruction at their March 15, 2018 meeting. The Council found no issues with the proposed revisions and voted in favor of the proposal.
February 28, 2018

TO: Senate Division Chair Dylan Rodriguez

FROM: Maurizio Pellecchia, Chair Executive Committee, School of Medicine

RE: comments on “Proposed Changes to Committee on Courses General Rules and Policies Governing Courses Of Instruction”

The School of Medicine Executive Committee evaluated the document at the February 2018 FEC meeting and has no objections or specific comments in regard.

Kind regards,

Maurizio Pellecchia

Maurizio Pellecchia, Ph.D.
Professor of Biomedical Sciences
School of Medicine Research Building
Office 317 900 University Avenue Riverside,
CA 92521 Tel 951.827.7829
www.medschool.ucr.edu
February 21, 2018

To: Dylan Rodriguez, Chair
Riverside Division

From: Ward Beyermann, Chair, Executive Committee
College of Natural and Agricultural Science

Re: Campus Review: Proposed Changes to Committee on Courses General Rules & Policies Governing Courses of Instruction

The CNAS Executive Committee discussed the proposed changes to the Committee on Courses General Rules & Policies Governing Courses of Instruction at its February 20, 2018 meeting. The committee supports the policy as written with one possible correction. We suggest dropping the phase “or is repeatable” in the sentence following “6 Grading and Repeatability:” since course repeatability is now discussed in the next section.

Yours sincerely,

Ward Beyermann, Chair
CNAS Executive Committee
February 28, 2018

TO: Dylan Rodriguez, Chair
    Academic Senate

FROM: Derek Burrill, Vice Chair
      CHASS Executive Committee

RE: Proposed Changes to Committee on Courses General Rules Policies Governing Courses of Instruction

The CHASS Executive Committee discussed the Proposed Changes to Committee on Courses General Rules Policies Governing Courses of Instruction at the regular meeting on February 28, 2018. There were no objections and the committee approved the changes.

Derek Burrill, Vice Chair
CHASS Executive Committee
February 27, 2018

TO: Dylan Rodriguez, Chair
Riverside Division

FR: Thomas Stahovich, Chair
Executive Committee, Bourns College of Engineering

RE: Proposed Changes to Committee on Courses General Rules and Policies Governing Courses of Instruction

On February 26, 2018, the BCOE Executive Committee reviewed the February 9, 2018 memo on Proposed Changes to Committee on Courses General Rules and Policies Governing Courses of Instruction. The committee wondered why it is not possible to configure the Banner system to properly represent “topics” courses in its database. There is concern that the proposed workaround of using subtitles may lead to other problems. For example, transcripts may be inconsistent with the course catalog as that latter will not contain subtitles. Also, as there is no mechanism to enforce consistency of subtitles, it is possible that the same version (topic) of a course may be listed with different subtitles in different years, thus enabling students to circumvent the prohibition against repeating the course. Finally, it was not clear if the variations in course title could cause difficulties with enforcing prerequisites, performing degree audits, and other analyses of students’ transcripts.
TO: Dylan Rodriguez, Chair  
Riverside Division

FR: Kurt Schwabe, Chair  
Executive Committee, School of Public Policy

RE: Proposed Changes to Committee on Courses General Rules and Policies Governing Courses of Instruction

Date: March 12th, 2018

The Executive Committee of the School of Public Policy is supportive of the Committee on Courses proposed changes on General Rules and Policies Governing Courses of Instruction. Their proposed revisions provide a fuller description of how departments should allow and specify "repeatability" in their courses.

We did notice that SPP is absent from the graduate/professional courses in terms of entity that approves (e.g., Department/Committee/Program Chair approves), and suggest SPP be added. Also, with SPP assuming the undergraduate public policy major this upcoming academic year, it might be worthwhile to include SPP in the Undergraduate section as well. Finally, on page 11, section B.1., a “d” should be added to the word “use” to read, “…the word “Topics” is not used,…”
May 4, 2018

To: Dylan Rodríguez, Chair
    Riverside Division

From: Wee Liang Gan, Chair
    Committee on Courses

Re: Senate Review of Proposed Changes to Committee on Courses General Rules and Policies Governing Courses of Instruction

The Committee on Courses reviewed the responses from the Senate Review of the proposed changes to the Committee on Courses General Rules and Policies Governing Courses of Instruction. The Committee made the following changes that were recommended from Senate Committee’s:

- Section 7.A. of the proposed changes was edited to provide greater clarity with the addition of “these categories include:”
- The phrase “or is repeatable” was removed from the sentence following “6. Grading and repeatability” since course repeatability is discussed in the next section.

In response to several concerns noted in the Senate Review, the Registrar clarified to the Committee that the proposed changes are not a result of Banner not being able to accommodate Senate policy, but rather the proposed changes are being made to address policies that are not being enforced. More precisely, before the change to Banner, the Registrar did not know too whether content is changing in a repeatable course. The Registrar also confirmed that course title and subtitle will be shown on transcripts and will be visible to students during course registration.

The Committee updated the proposed changes with an editorial change to replace the mentions of the Course Request and Maintenance System (CRAMS) with the new Course Request System (CRS). Additionally, several web links were removed from the document as they were inactive and the web page addresses change too frequently to include up to date links in the document.

Attachment: Proposed Changes to Committee on Courses General Rules and Policies Governing Courses of Instruction – Updated May 3, 2018
The Committee on Courses is established by Bylaw 8.10.1 of the Riverside Division of the Academic Senate. The Committee consists of at least six members selected by the Committee on Committees. Normally at least one member of the Courses Committee represents each of the areas of humanities, social sciences, biological sciences, physical sciences, and each of the colleges/schools. One representative from the UCR libraries and two student members serve as non-voting members, one of the students being nominated by the Graduate Student Council and the other by the Student Senate. One member of the Committee on Courses is also a member of the Committee on Educational Policy. Representatives from the Registrar’s Office serve as consultants to the Committee.

Bylaw 8.10.2 states: “Subject to the provision of 8.10.3, the Committee has authority for final approval of all courses of the Riverside Division, except those courses in University Extension above the 200 series, giving due consideration to the findings of the Graduate Council, the Committee on University Extension, executive committees of the colleges and schools, and officers at Riverside. The committee will report its actions at the next regular meeting of the Division.”

All courses of instruction that are offered for credit, including University Extension, must be approved by the Committee on Courses. Any new course, change in existing course, deletion of course, restoration of a course previously offered, or other action must first be designed and approved by the faculty of the proposing department, committee, or program, and approved by its chair/director. The courses must then be submitted to the Committee via the Course Request and Maintenance System (CRAMS CRS). Once the course proposal is correctly submitted via CRAMS CRS to the Course Specialist, it will be automatically routed to the next review or approval level; upon review or approval, it is again forwarded to the next step until it reaches the Committee on Courses. The routing schedule is listed below:

For Undergraduate Courses
1. Department/Committee/Program Faculty approve
2. Department/Committee/Program Chair approves*
   • BMSC, BSAD/BUS and EDUC courses to route to the Appropriate Executive Committee prior to routing to the Registrar’s Office
3. Registrar’s Office reviews
4. College (or School) Executive Committee approves (except BMSC, BSAD/BUS and EDUC)
5. Committee on Courses

For Undergraduate Honors Courses
1. Honors faculty approves
2. Honors Chair approves

Department-based Honors Courses
1. Department faculty approves
2. Department Chair approves

All Honors Courses
1. UHP Executive Committee approves**
   • If applicable, BMSC, BSAD/BUS and EDUC courses to route to the appropriate Executive Committee prior to routing to the Registrar’s Office
2. Registrar’s Office reviews
3. College Executive Committee(s) approve, if applicable
4. Committee on Courses approves

For Graduate Courses
1. Department/Committee/Program Faculty approve
2. Department/Committee/Program Chair approves*
   - BMSC, EDUC, and MGT courses to route to the appropriate Dean prior to routing to the Registrar’s Office
3. Registrar’s Office reviews
4. Dean of the College (or Division) for review
5. Graduate Council approves
6. Committee on Courses approves

For Professional Courses
1. Department/Committee/Program Faculty approve
2. Department/Committee/Program Chair approves
   - If applicable, BMSC, EDUC, and MGT courses to route to the appropriate Executive Committee prior to routing to the Registrar’s Office
3. Registrar’s Office reviews
4. College (or Division) Executive Committee approves
5. Graduate Council approves
6. Committee on Courses approves

For Extension Courses
1. Dean of University Extension approves
2. Chair of the academic department approves
3. Committee on University Extension approves
4. Committee on Courses approves

Submission deadlines for proposals for courses numbered 001-299 are posted at [http://senate.ucr.edu/Committees/courses/default.htm](http://senate.ucr.edu/Committees/courses/default.htm) under the link “Course Submission Deadline Schedule.” on the Committee’s webpage. Submission deadlines for courses numbered 300-499 may be obtained from the Course Specialist (X2-2459).
In submitting a course proposal form, the following items must be given consideration:

I. Classification and Number of Courses:

A. Classification: Classification of courses is contained in Senate Regulations (SR) 739, 740, and 742.¹

SR 740 classifies courses as--

1. Lower division courses are open to freshmen and sophomores and are numbered 1-99 or are designated by a letter, especially if the subject is usually taught in high school. In no department is a lower division course acceptable for upper division credit.

2. Upper division courses are numbered 100-199 and are ordinarily open only to students who have completed at least one lower division course in the given subject, or six quarters (or four semesters) of college work. Special study courses for undergraduates are numbered 199.²

3. Graduate courses are numbered 200-299, and are ordinarily open only to students who have completed at least 18 (or 12 semester) upper division units basic to the subject matter of the course. Graduate courses must be approved by the Graduate Council and by the Committee on Courses.

4. Professional courses for teachers numbered 300-399, are offered in (the Graduate School of) Education, and in other departments and are specially designed for teachers or prospective teachers.

5. Other professional courses are numbered 400-499.

6. Individual study or research graduate courses are numbered 500-599 if they may be used to satisfy minimum higher degree requirements, otherwise they are numbered 600-699.³

The Committee on Courses will apply the following standardization to all courses: UNDERGRADUATE COURSES

1 – 99 Lower Division Courses
100 - 199 Upper Division Courses

Titles and Numbers for Special Undergraduate Courses

90 Special Studies (1-5)
190 Special Studies (1-5)
191 Seminar in __________
192 Junior Seminar (1-4)
192H Junior Honors Seminar (1-4)
193 Senior Seminar (1-4)
193H Senior Honors Seminar (1-4)
194 Independent Reading (1-2, with a maximum of 4 units)
195 or 195H Senior Thesis (4-4-4 or less, maximum 12)
196 or 196H Senior Research Paper (1-4, not repeatable)
197 Research for Undergraduates (1-4)
198G Internship, Group (1-12, repeatable to 16)
198H Junior Honors Research (1-4)
198I Internship, Individual (1-12, repeatable to 16)
199 Senior Research (1-4)
199H Senior Honors Research (1-5)

¹ Universitywide Manual of the Academic Senate.
² Riverside uses a slight variation from SR 740 in those courses assigned numbers 190-199.
³ 500-699 courses are not in common use in Riverside.
GRADUATE COURSES
200-299

Titles and Numbers for Special Graduate Courses
287 Interdisciplinary Seminar
290 Directed Studies (1-6)
291 Individual Study in Coordinated Areas
292 Concurrent Studies in [Department/Program] (1-4, repeatable for credit; concurrent enrollment by graduate student in undergraduate course, with credit for additional graduate level participation)
297 Directed Research (1-6)
298G Internship, Group (1-12, repeatable to 16)
298I Internship, Individual (1-12, repeatable to 16)
299 Research for the Thesis or Dissertation (1-12)

PROFESSIONAL COURSES
300 - 399 Professional Courses for Teachers
301 "Teaching of _______ at the College Level" or "Directed Studies in the Teaching of ________" (To be graded S/NC. Units must accurately reflect hours of training.)
302 "Apprentice Teaching" or "Teaching Practicum", variable (1-4) units. Open to all appropriate Academic Student Employees (ASE's) with units assigned to reflect teaching activity during the applicable quarter. To be graded S/NC.
398G Internship, Group (1-12, repeatable to 16)
398I Internship, Individual (1-12, repeatable to 16)
400 - 499 Other Professional Courses

B. Numbering:
1. A, B, C, D: These letters are used in sequential course titles to indicate the affinity of topics covered in the several quarters (i.e. CHEM 001A, CHEM 001B). Students are generally required to complete the whole series or a substantial portion of it. A, B, C, D, courses do not necessarily indicate sequential presentation of the courses. Each quarter's offering is considered a separate course, and new courses must be proposed separately, indicating as specifically as possible the content of each quarter's course.

   In a new sequence, the letters A, B, C, ... must be used beginning with “A,” in order. If a course in a sequence is eliminated, any courses with subsequent letters must be changed to restore the proper sequence. For example, if the “A” course in an A-B-C sequence is deleted, courses “B” and “C” must be changed to “A” and “B” respectively.

   Note: (E-Z) courses do not follow this rule, but rather function as independent courses. Letter suffixes for these courses may be used in any order.

2. E-Z: The letter designations "(E-Z)" immediately following a course number (e.g., HIST 191 (E-Z), Seminar in History) indicate that different segments or topics within the sequence may be taken for credit. These segments are relatively free standing and students are generally not expected to take the whole series or a substantial portion of it. A student may not receive credit for the same lettered segment unless otherwise indicated in the course description. The letters "E" through "Z" do not indicate an order or prerequisites.

3. H: The letter "H" immediately following a course number usually designates an honors course.

4. L: The letter "L" immediately following a course number in the sciences usually designates a laboratory course.

4 See footnote 3 on page 5.
5 For additional information on E-Z courses see pp. 10-16.
5. **S**: The letter “S” is used to designate a “special course” which means there is a parallel course that has additional workload and credit as well as an additional activity as the non-S course. An “S” course will also affect the other’s course credit statement. However, not all courses with an “S” suffix are special courses; E-Z courses may have “S” segments.

6. **W, X, Y, Z**: The letter W, X, Y, or Z following a course number usually designates a Writing Across the Curriculum (WAC) course which satisfies, or partially satisfies, the ENGL 001C requirement.
   a. Letter W indicates a standard WAC course
   b. Letter X indicates either a lower or upper division course that is both a WAC and Honors course.
   c. Letter Y indicates a standard WAC course for half (1/2) credit.
   d. Letter Z indicates either lower or upper division courses that are both half WAC and Honors.

7. **Reusing a Course Number**: In order to avoid duplication of credit problems in General Catalog copy and on student records within the normal period to degree completion, a minimum of three years must elapse before a number is reused to designate a different course. Any variance to this rule must be approved by the Committee.

8. **Renumbering of Existing Courses**:
   a. Renumbering of existing undergraduate course within undergraduate listing; renumbering an existing graduate course within graduate listing:
      Proposal is submitted as "Change existing course" to reflect the number change.
   b. Renumbering existing undergraduate course as a graduate course, or vice versa:
      Two course proposals are required: one for the “new” course and one for “deletion of course.”

II. **Preparation of Course Proposals**.

Course proposals are prepared and may be viewed via the Course Request and Maintenance System (CRAMSCRS). Instructions for obtaining access to and using CRAMS are located at http://crams.registrar.ucr.edu.

A. **Special Instructions for Completing Sections within the Box on the Course Proposal**

1. **Course Title and Subtitle**: Titles and subtitles should be in English and provide a precise description of content and emphasis. As titles and subtitles that are more than 30 spaces in length will be abbreviated in the Schedule of Classes and on transcripts, care should be taken to ensure brevity and clarity of content.

2. **Units**: SR 760 states: "The value of a course in units shall be reckoned at the rate of one unit for three hours' work per week per term on the part of the student, or the equivalent."
   The academic unit submitting the course must substantiate conformity to SR 760.

3. **Number of Hours**: The number of hours per week proposed by the department should be specified as to lecture, seminar, discussion, workshop, colloquium, laboratory, practicum, research, studio, screening, consultation, field, internship, individual study, extra reading, or term paper. If none of these terms adequately describes the work, the hours may alternately be designated as "activity." The category "activity" may also be used for hours with varying content (e.g., students choose from screening, extra reading, and field trips). **Hours per week per unit of credit may not be less than, but may exceed, those listed in the following guidelines**:
   a. One unit for each hour per week of lecture, seminar, discussion, workshop, colloquium, or consultation. Discussion is assumed to mean that the class meets regularly each week for the purpose of group consideration of course materials as distinct from lecture. The designation of one hour for "consultation" implies a regularly
assigned meeting of one hour with each student each week. If such consultation is less, the unit assignment must be appropriately adjusted.

It is understood that a minimum of two hours of outside reading or other preparation is expected each week for each hour of lecture, seminar, consultation or discussion. Appendix 1 (parts A and B) contains further information about requirements for faculty contact and non-contact hours in relation to units.

b. **One unit for each two to three hours per week of studio**, which includes performance or individual practice.

c. **One unit for each three hours per week of laboratory, practicum, field work, screening, internship, clinic, thesis, tutorial, and activity.**

d. **One unit for three hours of outside reading or other preparation each week is expected for individual study, research, extra reading, term paper, etc.** These categories imply that the reading or research effort exceeds the standard preparation to support lecture, discussion, etc. (as described in “a” above). The content of these educational activities and the method of evaluation must be described in the syllabus.

e. **Internships:** Internships (courses numbered 198I, 198G, 298I, 298G, 398I and 398G) have additional activity and hour requirements. See section VII in these guidelines.

The Committee on Courses may require academic units to submit course proposals in order to substantiate conformity to these guidelines.

For the actions listed below, the syllabus should conform to whatever activities are listed, and should show how completion of the activities by the student will be evaluated.

- New course
- Restoration of course
- Change of “faculty contact” hours of an existing course
- Addition of “faculty contact” hours to an existing course

For the actions listed below, the syllabus should describe activities that do not involve faculty contact and should show how completion of these activities by the student will be evaluated.

- New course
- Restoration of a course
- Change of the “noncontact” hours of an existing course
- Addition of “noncontact” hours to an existing course

### 4. Prerequisites

Prerequisites for courses are established by the department, committee, or program, and require the approval of the Committee on Courses. Prerequisites for upper-division and graduate courses should ordinarily meet the requirements of SR 740. The Committee interprets SR 740 to mean that the minimum prerequisite(s) for courses numbered 100-199 (inclusive) is/are "upper-division standing or consent of instructor" and/or successful completion of one or more introductory course(s) in the discipline. The minimum prerequisite for courses numbered 200 and above is possession of a bachelor's degree or other evidence of academic maturity. Prerequisites less restrictive than these will be permitted only for extraordinary reasons and will require strong justification. Normally, prerequisites should be limited to the courses necessary for students to comprehend the material presented in the proposed course. More extensive prerequisites must be justified.

A specific prior Grade Point Average may not be listed as a prerequisite for a course, with the exception of honors courses. (A minimum grade, typically C-, in one or a very few specific prerequisite courses may be listed among the

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6 Note: Academic maturity is presently attested to for undergraduates by a GPA in excess of 3.0, consent of the instructor, and evidence of successful completion of upper-division work in the same discipline.
prerequisites for a course.) Redundancy in lists of prerequisite courses should be avoided. For example, lower-
division courses that are already subsumed under upper-division requirements should not be included in the list.
For purposes of fulfilling prerequisites for other courses and for issues of overlap with other courses, Honors
courses and corresponding non-Honors courses are equivalent on fulfillment of prerequisites and course overlap.

Should a department wish to restrict enrollment in a course because pedagogically the course requires students to be in a
certain major or class level, this restriction must be added to the course prerequisite statement. A restriction allows all
seats within a course to be held for students who meet a specific criterion; students who do not meet a course restriction
will be prevented from enrolling. Course restrictions may be based on a student’s class, college, career level, or major.
Some restriction examples include but are not limited to: courses restricted to freshmen or sophomore students only;
courses that are restricted to a specific major, such as, Ethnic Studies or Computer Science majors only. Any restriction
request requires strong justification, including the following:

a. A report which describes whether any other major or minor programs at UCR, outside the requesting department,
requires this course, either as a specific requirement or on a list of options, in order to satisfy a requirement in the
student’s major or minor program. In order to generate this report, the preparer
should request a program search (see below, II. 4, G). If the search indicates that extra departmental major and/or
minor programs will be affected by the restriction, consultation must take place with the affected
departments/programs as to how to minimize adverse effects of the change on all students concerned.

b. Taking into consideration the findings in item a, the department should consider carefully what is the most
appropriate form of enrollment restriction which will achieve access for its students while not unduly limiting access
to other students with appropriate prior knowledge and demonstrated need to take the course.

Departments that wish to enforce priority enrollment, that is, holding seats for a select student population for enrollment
management purposes, must include a priority enrollment statement to the course proposal. Priority enrollment is
approved for a three-year limited duration and will require a new course proposal submission subject to review and
approval to continue beyond the three-year period further details of review below). Additions of prerequisites are
strongly discouraged unless there is an academic reason for adding the prerequisite. Therefore, a justification for a
prerequisite should not simply state that it is for enrollment management purposes or to create priority for students
within the major. Any priority enrollment request requires strong justification, including the following:

a. A report which describes whether any other major or minor programs at UCR, outside the requesting department's,
require this course, either as a specific requirement or on a list of options, in order to satisfy a requirement in the
student's major or minor program. In order to generate this report, the preparer
should request a program search (see below, II. 4, G.) If the search indicates that extra-departmental major and/or
minor programs will be affected by the priority enrollment, these additional majors and /or minors must be added to the priority enrollment
request. If a course is cross-listed it is expected that all departments within the cross-listing will have access to the
course within the priority enrollment request. Requests to deviate from this must be strongly justified to include
demonstrating how students who have the course in their degree requirements will be impacted.

b. Taking into consideration the findings in item a, the department should consider carefully what is the most
appropriate form of priority enrollment that will provide access for its students while not unduly limiting access to
other students with demonstrated need to take the course. This justification needs to include data (i.e. enrollment
history in the course to include majors/class level of students; projections for future need of the course for
students requiring course to graduate, or other department factors) that substantiates the need to implement
priority enrollment and how the department feels priority enrollment will positively impact the circumstance it is
intended to mitigate.

c. When implementing approved priority enrollment in the Student Information System, quota
controls/reserved seating should be utilized in consultation with the Registrar's Office for assistance.
General population students (students who do not meet priority enrollment criteria) should be given access to a
portion of seats when at all possible.

d. Approval for continuation after the three-year period will be based on a comprehensive review of data and
narrative submitted by the department with the course proposal. The objective during this review is for the
department to 1) demonstrate the positive impact the priority enrollment had on the major students,
therefore, meeting the goals of instituting priority enrollment, 2) document the continued need for the priority enrollment with key illustration that the issue still persists and 3) how the department has served the general population during the three year period of the priority enrollment.

Needs for data to support this process can be requested at http://www.data-request.ucr.edu/ and will be supplied by the Registrar’s Office.

5. **Course Description**: The description appears in the catalog and should convey the material, the nature, and the scope of the course in a manner that provides guidance to students as they select courses. Descriptions should comply with campus style guidelines and be 50 words or less, with the word count standard determined by the Registrar’s Office.

6. **Grading and Repeatability**: Indicate the grading basis for the course. If the course has special grading or is repeatable, include this information in the appropriate section(s).

   **Grading**: Since Senate regulation 1.2.2 offers students broad latitude to take courses not counting toward their major requirements on a S/NC basis, an undergraduate course may not be restricted as “Letter Grade Only” unless it is an honors course that must be Letter Grade only or enrollment is restricted to majors only.

   The default grading types for undergraduate courses are:

   **Undergraduate Courses (001-199)**
   The default grading type is Letter Grade or petition for Satisfactory/No Credit (S/NC), except for Honors courses that must be Letter Grade Only.

   **Graduate and Professional Courses (200-499)**
   The default grading type is Letter Grade only.

   **Appendix 2** presents these and other grading types and standard grading statements available on CRAMSCRS.

   **Repeatability**: Normally, undergraduate courses, except for independent study, internship, courses, and the like, are not repeatable for credit. If a department wishes to propose that a course be repeatable as topics change, there must be strong justification demonstrating that a given content will not be repeated frequently, and explaining how the course will be monitored to prevent students from receiving credit for duplication of work.

   The repeatability of a course within a single quarter will only rarely be granted. Such a request will need especially strong justification, as will requests to permit students to repeat a course several times.

   Where a course with varying topics under a general theme is desired, an (E-Z) umbrella course should be created; then individual courses can be approved under different letter designations, thereby precluding duplication of credit.

   **Note**: (E-Z) courses should not generally be marked repeatable because each segment functions as a separate course. Thus two or more (E-Z) segments may be offered and taken by students within a single quarter without being marked as repeatable.

7. **Students may repeat courses for credit if the course allows repeatability under the specific circumstances laid out in this section.**

   **Undergraduate Repeatability**

   A. Certain categories of undergraduate courses are normally repeatable for credit, and will routinely be approved as repeatable at a department’s request. The repeatability may be unlimited, or may be limited to a specific number of units. In proposing or modifying a course in this category, departments should briefly explain the hours of repeatability that it is requesting, if more than 4 units are possible. These categories include:

   1. Independent study
   2. Internship
3. Research courses

B. Other types of courses may be approved as repeatable in one of two ways:

1. Repeatability may be requested up to a specified number of units as course content changes. The Committee on Courses recommends using the word “Topics” in the course title of any proposal to create such a course; if the word “Topics” is not used, other language in the course title and/or description should indicate that a range of possible topics is covered and that the course is repeatable. For such courses, each iteration of the course receives a subtitle that represents the changing topic of study. Course subtitles do not need to be approved individually by the Committee on Courses; instead, the department informs the Registrar of the course subtitle during planning for a particular quarter’s course offerings.

If a department requests that a course be repeatable as content changes, it should explain in the justification for repeatability why and how course content is expected to change over time. For planning purposes, if subtitles are expected to repeat less often than once every four years, a Topics course with subtitles is appropriate.

2. Repeatability may be requested with a limit for a specific number of units, even if course content does not explicitly change and no subtitles will be used. Requests for this form of repeatability will require detailed justification that explains why the work performed will not be duplicative. Courses in this category should not normally have the word “Topics” in their title.

NOTES

• If a department expects a specific set of topics to be repeated regularly under a general umbrella, a “Topics” course with an E-Z sequence should be created instead of a “Topics” course that is repeatable as content changes (See E-Z Courses). For planning purposes, if most segments are expected to repeat at least once every four years, E-Z segments are appropriate.

• Many E-Z course sequences have the word “Topics” in the title of the umbrella course (See: “Topics courses” and “E-Z courses”). However, using “Topics” in the title does not mean that individual EZ segments are repeatable. Only if a specific segment is approved as repeatable as content changes, or as repeatable to a specific number of units (as described above) is such an E-Z segment repeatable.

• Taking different segments in an EZ sequence never constitutes repetition.

Graduate course repeatability

Any graduate course may be made repeatable for credit, with appropriate justification. For example, in courses such as seminars and colloquia, the material covered varies each time the course is offered, or for each student taking the course. Departments must indicate whether a graduate course is repeatable when proposing or modifying a course, and provide the maximum units of credit that a student can earn from the course. Such courses do not normally, and should not have the word “Topics” in their title.

When their curricular needs make it desirable, departments may also request that graduate courses be repeatable only as content changes. In this case, they should consider creating a course with “Topics” in its title and repeatable as content changes (following the guidelines above under Undergraduate Repeatability).

Departments may also create EZ sequences of courses that cover different topics under a single umbrella. This is particularly suitable when the different topics are expected to be repeated on a regular basis. Taking different segments of an EZ sequence never constitutes repetition.

8. Topics Courses
Courses with the word “Topics” in their title have been used in various ways in the past. In order to clarify the nature of such courses to students, the Committee on Courses recommends the following standardization of Topics courses. These guidelines will be applied to new courses, unless a department provides a careful explanation for variations in the use or non-use of the word “Topics” in courses in the respective categories. The Committee also urges departments revising courses in these categories to also adjust the course title to reflect these policies.

A. Topics courses that constitute EZ sequences

The EZ course format provides a mechanism that allows multiple subtopics to be represented under one broad umbrella topic. (See EZ Courses). Such courses often contain the word “Topics” in the umbrella course title and description.

The use of EZ Topics sequences is appropriate when the majority of segments are regularly offered. A good rule of thumb is that most segments will be repeated at least once every four years.

B. Topics courses with subtitles, which may be repeatable as content and subtitle changes

A course that uses Topics in the course title may use subtitles to convey the specific material covered each time such a course is offered. When such a course is offered, the department assigns each-course section with a subtitle that more precisely describes the specific content involved, and which also appears on students’ transcripts. Putting the word “Topics” in the course title helps make students aware that the specific content varies each time the course is offered. Subtitles are not reviewed by the Committee on Courses, but are rather assigned when the department communicates them to the Registrar’s office during course planning for a particular quarter.

Topics courses with subtitles allow faculty to explore diverse topics relating to a single larger theme without having to propose a new course each time the material changes. Such courses may also be used to take advantage of the expertise of a visiting professor, or for other “one-time” offerings. Topics courses with subtitles may be designated as ‘repeatable as content changes’ at a department’s request. The ‘repeatable as content changes’ option also allows a single course number to cover varying offerings whose content is related to the main course title and description, but which are sufficiently different that students may earn credit for more than one iteration (See Repeatability).

If topics are expected to repeat regularly more often than once every four years, the department should consider creating an EZ sequence instead.

NOTE:

Some repeatable graduate courses currently in the catalog (December 2017) are labelled as “Topics” courses, but do not currently require subtitles. The Committee on Courses urges departments to add subtitles and to adjust repeatability statements (if necessary) for such courses when such courses come up for review or modification. Adding subtitles allows student transcripts to become more informative to future employers or universities, and avoids uncertainty about what material the course covered.

97. Cross-listed Courses: List any cross-listed (identical) courses in the appropriate section.

108. Duplicate or Overlapping Courses: If the course content overlaps with the content of other courses to the extent that credit is awarded for only one of the courses (e.g., HNPG 010A, HMSS 001, and HMSS 002), state so in the Credit Statement section. Credit overlap caused by duplication of content results in a punitive effect to students, as credit may be denied post-facto and this may delay graduation, cost excess staff and student time, etc.

B. Instructor: SR 750 states: “(A) Only regularly appointed officers of instruction holding appropriate instructional titles may have substantial responsibility for the content and conduct of courses which are approved by the Academic Senate. (B) Professors, professors in residence and adjunct instructors, and lecturers may give courses of any grade. Persons holding other instructional titles may teach lower division courses only, unless individually authorized to teach courses of higher grade by the appropriate Committee on Courses or Graduate Council. If a course is given in sections by several instructors, each instructor shall hold the required instructional title. (C) Announcements of special study courses in which
individual students work under the direction of various members of the department may state that presentation is by the 
staff, but a member of the department shall be designated as the instructor in charge. (D) Only persons approved by the 
appropriate administrative officer [Dean of the College from which the proposal originates], with the concurrence of the 
Committee on Courses concerned, may assist in instruction in courses authorized by the Academic Senate.  (E) No student 
may serve as a reader or assistant in a course in which he is enrolled.”

All new courses should state the name of the intended instructor(s) or of the Department chair. Changes in existing 
course(s) should state the name of the instructor(s) who will be teaching the course(s), the name of the instructor in 
charge, or that of the Department chair [SR750.c.].

C. Justifications: For a new course or restoration, describe how the course will strengthen the offerings of the academic unit. 
For a revision, state the reason for each action proposed. For a deletion, explain why the course is no longer necessary or 
why it can no longer be taught.

Include descriptions of new E-Z segments that are not described in the catalog description.

D. Syllabus: For a new course, restored course, or a course with a substantive change, include a substantive current or 
proposed syllabus that outlines the course by week, date, or topic and includes weighted grading criteria. To indicate the 
amount of required reading, provide a reading list that is linked to a week, date, or topic.

An up-to-date syllabus must be provided. The syllabus must reflect the activities proposed to "earn" the units, 
accounting both for activities during faculty contact hours and outside individual work. If a discussion (or lab, or 
workshop, studio, etc.) is included in the course, the syllabus must acknowledge at least briefly what will take place 
during this activity and show how students' accomplishment in this activity will be counted in the evaluation of their 
achievement. Please remember the rules governing awarding of academic credit stated under II.A.2 above.

When a substantial change is being proposed, the syllabus should be updated by the department to reflect this change. 
Likewise, syllabi that refer to prior versions of the course at UCR or at other institutions will not be considered and the 
course proposal will be returned for amendment.

E. Courses Including Distance Learning Technologies: Courses or course sections instructed entirely or partially through distance 
learning must be submitted through the regular procedure for approval. Even when such a course closely imitates an 
already approved course that does not include on-line components, a separate course syllabus must be prepared. The 
activities, unit justification, and evaluation methods may be different for such a course; moreover, different regulations 
apply to the parameters of a distance-learning course, concerning, for example, students' eligibility for financial aid. For 
additional information on proposals of courses or sections involving online delivery, refer to the appendix, “Guidelines for 
Remote Learning Courses.”

F. Course and Program Searches: Completion of a course search and/or a program search is essential when one of the actions 
listed below is desired. The purpose of such a search is to identify additional courses as well as major and minor programs 
that will be affected by the proposed change, so that necessary adjustments may be made at the same time 
as the requested change. For example, the prerequisites or credit statements for a variety of courses may need to be 
changed in order to include or exclude the target course as a prerequisite to other courses, or to prevent students from 
receiving duplicate credit for identical or overlapping course content.

A program search or a course search should be requested as follows:

<table>
<thead>
<tr>
<th>If You Are:</th>
<th>Order a Program Search From:</th>
<th>Order a Course Search From:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deleting the course</td>
<td>Academic Senate Office</td>
<td>Registrar's Office</td>
</tr>
<tr>
<td>Renumbering the course</td>
<td>Academic Senate Office</td>
<td>Registrar's Office</td>
</tr>
<tr>
<td>Changing the Title</td>
<td>Academic Senate Office</td>
<td></td>
</tr>
<tr>
<td>Changing the Units</td>
<td>Academic Senate Office</td>
<td></td>
</tr>
<tr>
<td>Changing the Cross-listing</td>
<td>Academic Senate Office</td>
<td>Registrar's Office</td>
</tr>
</tbody>
</table>
Allow 5 working days for receipt of search reports.

**Changing the Credit Statement**

Changing prerequisite to include a limitation on enrollment to majors and/or minors

| Changing prerequisite to include a limitation on enrollment to majors and/or minors | Academic Senate Office |

**Reviewing the reports:** The Program Search report lists programs, majors, and minors in which the proposed course appears. Review these programs to determine if they will be affected by your course proposal. Course numbers, titles, prerequisites, credit statements, etc. may be affected. Use the information from this report to help you answer questions in CRAMSCRS. If requesting an enrollment restriction to majors and/or minors, use the program search to determine which extra departmental major/minor programs may be affected, and consult with the affected departments, reporting on this in the justification in your request. The Course Search report lists courses that are affected by courses, either in their prerequisite or description. List all courses in this section that are determined to be affected. For Honors courses and Non-honors courses a course search is necessary, but submittal of affected courses are not necessary (Honors and Non-Honors courses are considered equivalent on fulfillment of prerequisites and course overlap).

**G. Requests for Exception to Due Dates for Course Proposals:** The deadlines for proposing new courses and for proposing changes to approved courses with reference to a future effective date (the academic term when the new course can first be offered, or when changes will take effect) are firm, and exceptions are approved infrequently. However, it sometimes becomes necessary for a department/program to request a brief exception to the deadline for reasons that could not have been anticipated. When this occurs, the department should complete the Request for Extension of Course Proposal Submission Deadline Form, which is available on the Committee’s web site, [http://senate.ucr.edu/committee/8/request_for_extension_of_course_request_submission_deadline_form.html](http://senate.ucr.edu/committee/8/request_for_extension_of_course_request_submission_deadline_form.html). If the request is approved, a copy of the approved form, and of any other relevant correspondence, must be pasted into the Faculty Correspondence field on CRAMS CRS before the late course proposal is submitted. Appendix 3 contains a sample copy of the Request for Extension form.

**GENERAL POLICIES**

In approving, disapproving, or recommending changes in course proposals, the Committee will be guided by the rules given above and by the following general policies:

**I. Level and Emphasis of Courses:**

The primary emphasis in the course should be academic and not vocational, stressing the acquiring of a body of knowledge and the understanding of principles and theories rather than the development of skills and techniques for immediate practical application in a vocational sense. The skills and techniques should be taught as means to learning, analyzing, and criticizing theories and principles, not for vocational ends themselves.

**II. Scope and Organization of Courses:**

Although the Committee does not decide general educational policy nor does it intend to infringe upon departmental judgment as to course content, it will use the following criteria for evaluating a course proposal:

The course should have a clear and essential place in the overall offering of the department, division, or school; either filling a gap in the existing course structure, or strengthening that structure without duplication or excessive overlapping.

Basic courses should not constitute proliferation, i.e., the splitting up of a body of knowledge or a field of study into parts too small to warrant separate treatment in themselves. Seminars offer such a specialized approach.

Courses should be organized realistically with respect to quality of understanding versus quantity of material a student is expected to master in the time allotted. The catalog description should make clear the special nature of a particular course.

**III. Course Duplication or Overlap:**

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The Committee on Courses is watchful of duplication or overlap of courses offered by other academic units. **It is the responsibility of the department/program to ensure that any new course it proposes does not duplicate nor overlap existing courses offered by other units on campus.** It is imperative that the originating unit provide adequate explanation and/or written concurrence from department(s) where duplication or overlap would exist. (Please see the discussion of duplication of credit under II.A.8 on page 10 above.)

**NOTE:** It is in the department's own interest to provide such an explanation and consent. If the Committee on Courses has any questions concerning potential duplication or overlap of a proposed new course, the proposal will be returned to the originating department/program for evidence that consultation has taken place.

### IV. Guidelines for Cross-Listing of Courses:

The use of and need for CROSS-LISTING of courses varies widely from program to program.

#### A. Policy Statement:

1. Cross-listed courses are jointly owned and require the agreement of **ALL** the departments/programs, for which they have been approved, on all aspects of the course including changes subsequent to initial approval.

2. A proposal for cross-listing with an existing course must be accompanied by concurrent course proposals from **ALL** of the departments and/or programs with whom the course is to be cross-listed. A syllabus is not required for new courses being cross-listed with an existing course.

3. The proposal for a new course, when submitted for cross-listing, must be accompanied by proposal forms from **ALL** departments and/or programs involved. The information within the "box" on the course proposal form (e.g., title, description, units, etc.), must be the same on the forms submitted by **ALL** participating departments or programs with the exception of the department name and course number. It is recommended that cross-listed courses have the same number but it is not required.

4. Any and all changes in the description, title, units, etc., of an existing cross-listed course require concurrent agreement and submission of course proposal forms by **ALL** departments and/or programs involved.

The cross-listing of courses is an established practice which is to be continued. Extreme examples of multiple cross-listing exist, indicating the need for guidelines to be used in the consideration of cross-listing proposals. The guidelines enumerated have been prepared with consideration to the "Recommendations" of the Committee on Educational Policy (3/17/80). The needs and views of the Colleges of Natural and Agricultural Sciences and of Humanities, Arts, and Social Sciences have been solicited and considered.

#### B. Guidelines for Approval of Cross-Listed Courses:

1. Courses created jointly by faculty from more than one department/program will normally be considered for cross-listing.

2. Courses in which instruction is shared by faculty from more than one department/program will be considered for cross-listing. Sharing is interpreted as co-equal responsibility for content, presentation, and the evaluation of student performance. For the purpose of these guidelines, "Guest" lecturers invited from other departments/programs will not be interpreted as adequate justification of cross-listing proposals.

3. New courses prepared for a department or program by a faculty member (or members) from other departments/programs can be considered for cross-listing.

4. Approval of the course's instructor(s) by all departments/programs is required at the time cross-listing of a course is proposed.

5. Recognizing the potential occurrence of "COMPELLING" administrative or educational reasons for proposing cross-listing, such proposals can be considered. Such proposals must be strongly justified by those making the proposal.
Cross-listing proposals in this category are interpreted as occurring in response to truly exceptional circumstances. Cross-listing for the purpose of cross-disciplinary student "advising" will not be considered.

6. If two or more departments/programs deem the content of a course appropriate for inclusion in their respective curricula, the course will be considered for cross listing. If more than three departments propose cross-listing of a single course, the Committee requests strong justification.

7. When deleting multiple cross-listed A,B,C series, all deletions shall have the “Last Effective” term date of the first affected course to avoid any possible confusion in catalog printing.

V. E-Z Courses

The E-Z course format provides a mechanism whereby many subtopics may be presented under one broad, umbrella topic. The course title covers the broad topic, with the subtitles of lettered segments (E through Z) identifying more specific subject areas. E-Z umbrella courses may be developed within the undergraduate, graduate, and professional school curricula. These offerings may be used to take advantage of the expertise of visiting professors ("one-time only" offerings) and/or to test acceptance of a course topic with an eye to possible formalization of the more popular segments into regularly scheduled courses. Lettered segments within the E-Z umbrella course may be offered at regular or irregular intervals, based upon student and curricular needs. Generally, the letters H and L are not used for segments to alleviate any confusion with Honors courses or Laboratory courses. In addition, W, X, Y, and Z are usually used for Writing Across the Curriculum (WAC) courses which offer full or partial credit for satisfaction of the ENGL 001C requirement. When creating an E-Z course, select the most appropriate of the three formats described below. Course descriptions will appear in the General Catalog as shown in the examples.

E-Z Umbrella Course with Segment Subtitles Listed in Its Description
This format is recommended when the majority of the segments are frequently offered, segments have a similar design, and segment descriptions are not needed to provide guidance to students as they select courses. [See example.]

Example:
MUS 080 (E-Z). Private Instruction: Voice, Keyboard, and Strings (1-2) Studio, .5-1 hour; individual practice, 5-10 hours. Prerequisite(s): MUS 001 or equivalent; consent of instructor. Students take a half- or one-hour lesson and practice 5 to 10 hours each week (see the note regarding fees under the Major Requirements section). Offered as demand indicates. E. Voice; F. Classical Piano; G. Jazz Piano; I. Harpsichord; J. Carillon; K. Jazz Guitar; L. Electronic Bass Guitar; M. Lute; N. Classical Guitar; O. Viola da gamba; P. Piano Proficiency; Q. Organ; R. Violin; S. Viola; T. Violoncello; U. Double Bass Viol. Normally graded Satisfactory (S) or No Credit (NC), but students may petition for a letter grade on the basis of performance before a jury or at a recital. Segments are repeatable.

E-Z Umbrella Course without Segment Subtitles Listed
This format is recommended when the majority of the segments are infrequently offered.

Example:
ENGL 142 (E-Z). Cultural Studies (4) Lecture, 3 hours; reading (extra), 3 hours. Prerequisite(s): upper-division standing or lower-division English course (other than composition) or consent of instructor. The formal, historical, and theoretical analysis of culture in its broadest sense, including popular literature, the mass media, and/or the interplay between "low" and "high" or peasant and elite cultural forms. Topics may be drawn from any historical field.

E-Z Umbrella Course with Segment Subtitles Listed Separately
This format is recommended when the majority of the segments are frequently offered and segment descriptions are needed to provide guidance to students as they select courses.

Example:
RLST 128 (E-Z). Topics in the Bible (4) For hours and prerequisites, see segment descriptions. Academic examination of issues relating to the Bible.
RLST 128E. Contemporary Views of Jesus (4) Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): upper-division standing or consent of instructor. An examination of contemporary ways in which Jesus has been understood by
academically oriented scholarship. Particular attention is given to the question of sources and of the methods used to identify those parts of the preserved tradition that are attributed to Jesus himself.

RLST 128F. Biblical Fictions (4) Lecture, 3 hours; outside research, 3 hours. Prerequisite(s): RLST 010; upper-division standing or consent of instructor. Examines artistic rewritings of biblical narratives from antiquity to the present (ancient Jewish and Christian novels, medieval plays and stories, modern films and novels) to explore the intersections of religion, culture, and society.
A. Procedure for Approval of an E-Z Umbrella Course.

Submission of an E-Z umbrella course proposal must follow the same routing as for any permanent course. The Committee on Courses recommends that the segment subtopics to be offered under an E-Z series be identified at the time of submission of the E-Z umbrella course proposal. Segments are regular courses of instruction. Descriptions and course outlines for new segments must be provided.

B. Procedure for Approval of an E-Z Umbrella Course with Segment Subtitles Listed in Its Description.

1. An E-Z umbrella course with segment subtitles in its description must follow the same routing as for any permanent course. The course proposal should be for the E-Z umbrella number [i.e., FREN 177 (E-Z)]. The “Catalog Description” should consist of the umbrella description followed by the segment letters and subtitles [in alphabetical order]. The “Justification” for the umbrella should contain the segment descriptions. An outline or syllabus for each segment must be included in the course proposal. The “Closing Notes” section of the course proposal should indicate which segments are being added.

2. New segment letters and subtitles may be added to an existing E-Z series by submission of a course proposal for the umbrella and number. The “Catalog Description” should consist of the umbrella description followed by the existing and proposed segment letters and subtitles. A description of each new segment should be included in the “Justification” and a course outline for each new segment must be included in the course proposal.

   Exception: If the segment is to be offered “one time only” it should be submitted on a separate course proposal. That is, a proposal should be submitted for the E-Z umbrella number with the segment letter (i.e., HIST 111E).

3. A stronger prerequisite than what is stated in the umbrella may be required for a new segment. The specific prerequisite(s) and the segment letter it applies to should be added to the prerequisite(s) for the umbrella.

4. If an academic unit wishes to change or delete a segment letter and subtitle, a course proposal for the umbrella number must be submitted. The “Catalog Description” should consist of the umbrella description followed by the existing segment letters and subtitles [in alphabetical order]. Proposed changes in segment letter(s) and subtitle(s) should be included. Segment letters and subtitles to be deleted should be removed. The “Closing Notes” section of the course proposal should indicate which segments are being changed and/or which segments are being deleted. An explanation for the changes/deletions should be provided in the “Justification.” If the segment change affects the segment description, a new description should be included in the “Justification” and a course outline must be included in the course proposal.

C. Procedure for Approval of an E-Z Umbrella Course without Segment Subtitles Listed in Its Description

1. An E-Z umbrella course without segment subtitles in its description must follow the same routing as for any permanent course. The course proposal should be for the E-Z umbrella number and title [i.e., FREN 177 (E-Z)]. The “Catalog Description” should consist of the umbrella description.


   a. Academic units may choose to establish a segment whose subtitle is not listed in the description of its umbrella course. The complete description of such a segment may or may not be listed in the General Catalog at the unit’s option. However, if the description of one segment of an umbrella is listed in the General Catalog, the descriptions of all other segments of that umbrella must also be listed. "One-time only" segments will be considered as "not for catalog listing."
b. Academic units may establish segments of this type by submitting a course proposal for the E-Z umbrella number with the segment letter (i.e., HIST 111E). These course proposals must follow the same routing as for any permanent course. The "Catalog Description" would be the segment description and a course outline must be included in the course proposal.

c. Unit requirements are approved at the time the E-Z umbrella is approved. When a segment with unit specifications differing from the umbrella is submitted for approval, a change in the existing umbrella should be submitted at the same time to show the variable units.

d. Existing segments not listed in the catalog can be scheduled for presentation in any quarter.

e. When an academic unit chooses to change or to delete an existing segment, a course proposal for the E-Z Umbrella with the segment letter (i.e., HIST 111E) should be submitted. The proposal must follow the same routing as for any permanent undergraduate or graduate course being changed or deleted.

f. A course proposal for a segment must include the applicable restrictions, special grading, and cross-listing notations from its umbrella course proposal. If restrictions, special grading or cross-listing notations are added, deleted or changed on the umbrella course proposal, course proposals reflecting these changes must be submitted concurrently for the umbrella’s segment.

D. Segment Lettering and Titles.

It is important that letters and subtitles for E-Z segments be assigned carefully and consistently. A student may not receive credit for the same segment unless otherwise indicated in the course description. A student may receive credit for repeating the umbrella course if the segment letter and subtitle is different. Duplication of content by different segments within a series is to be avoided. If an activity within an E-Z umbrella course necessitates reuse of alphabet letters, a minimum of three years should elapse before a letter is reused to designate a different segment subtopic.

VI Special Studies (90-190) and Directed Studies (290) Courses:

A. Special Studies Courses (90 and 190).

The sole purpose of undergraduate Special Studies courses (90 and 190) is to provide students with a means for meeting special curricular requirements or problems on an individual basis and for variable units.

Registration in all special studies courses must be approved by the chair of the department/program concerned, based upon a written proposal submitted to the chair. (SR 546)

B. Directed Studies Courses (290).

The sole purpose of graduate Directed Studies courses (290) is to provide students with a means of conducting individual, supervised research or for studying special topics on an individual basis and for variable units.

Registration in all directed studies courses must be approved, in the form of a written petition, by the instructor and the department chair or graduate advisor. The petition must be filed with the office of the Dean of the Graduate Division. (GR 1.5.10)

VII. Internships:

The internship experience has become an increasingly important component in the academic training of our students. Internships differ from Special Studies (90 and 190) by the involvement of a non-departmental sponsor (generally off campus) in addition to the faculty member/student relationship.
Riverside Division Regulation R1.9 adopted in December 1976 states: “A maximum of 16 units of credit may be obtained through internship courses, with a maximum of 12 units of internship scheduled in a single quarter. Internship course credit is given for academic work related to the experience of the internship, not for the work experience alone.”

Guidelines: The following internship guidelines were also adopted:

1. An academic internship is defined as an educational experience in which the student works under the direct supervision of someone other than a faculty member, normally in an agency/firm/institution outside the campus, with a faculty supervisor ultimately responsible for assigning and evaluating academic work done for course credit in relationship to the experience. Under no circumstances will credit be given for the internship experience alone.

2. Each department wishing to sponsor internships will have a designated ladder faculty member or lecturer who is responsible for seeing that a common standard is applied to all internships and that these guidelines are adhered to in all instances.

3. The course number 198 is required for internships: 198I is suggested for individual internships and 198G for group internships. The course number 298 is required for those internships considered by the department to be “graduate”: 298I is suggested for individual internships and 298G for group internships. These graduate internships will normally carry credit toward a graduate degree. The course number 398 will be required for those internships considered by the department to be “professional”: 398I is suggested for individual internships and 398G for group internships. These professional internships will carry academic credit but will not count toward a degree.

4. For individual and group internships, the student and designated faculty member will submit on an appropriate form a clear-written statement of purpose, field experience content, and academic content of the proposed internship. The proposal must be approved by the chair of the department or program in which the internship is offered.

5. The essential criterion for one unit credit is one hour of academic work plus two or more hours of internship per week. Internship courses should normally be listed as 1-12 units, repeatable to a maximum of 16. The normal expectation is that each local internship will not count for more than 4 or 5 units in a single quarter, larger numbers of units being reserved for quarter-away types of situations.

VIII. X-100 and X-200 Courses in University Extension:

In order to facilitate its review of course proposals in University Extension in the X-100 (undergraduate) and X-200 (graduate) series, the Committee on Courses requires from the chairs of departments and programs a brief statement, accompanying the proposal form, vouching for the validity of the course proposal and its acceptability for majors in their respective departments.

IX. Summer Session Courses:

Any course listed in the General Catalog may be offered in Summer Session. No additional approval is required for these courses to be offered in Summer Session. New or experimental courses, modifications of catalog courses, and any other instruction not previously approved, which is proposed by a department/program for presentation in Summer Session must follow the normal Academic Senate procedures for course approval. If a course will be offered in Summer Session only, add the following statement to the end of the course description: Offered in summer only.

X. Continuity of Course Offerings:

Unless otherwise specified, a course that has been approved by the Committee on Courses may be offered in any quarter.
However, if any course has not been offered by a department for four consecutive years the Committee on Courses may request that it be deleted. (See Riverside Division Bylaw 8.10.4.) This policy is intended to ensure that the General Catalog will accurately reflect the departments' regular course offerings and to encourage departments to examine carefully the justification for retaining infrequently offered courses on the basis of the departments' curricular objectives and resources. Courses offered only on an intermittent basis should be considered for inclusion in an appropriate E-Z series.

XI. Policy Statement for Courses that Have Not Been Offered for Four Consecutive Years:

Periodically, the Committee on Courses will send lists of courses that have not been offered during the previous four years and eight years to departments. For courses that have not been offered in four years, the departments should either prepare deletion proposals or advise the Committee on Courses that they intend to offer the course(s) during the upcoming year. For courses that have not been offered in eight or more years, the departments should prepare deletion proposals. A course can be reinstated after deletion by submission of a course proposal for restoration.

XII. “One-Time Only” Courses

Special courses to be taught by visiting instructors or courses that are planned as a single offering should be submitted as “one-time only.” Check the “To be offered once only:” box and fill in the Quarter and year it will be offered. These courses then will be automatically deleted upon completion without additional paperwork.

XIII. Use of Films in Academic Courses:

Courses centering on films should include regular lectures and discussion comprising at least half of the course content. Substantial reading lists, term papers, etc., should be required in addition to screening films. Suggestions on information to be included with the course form can be found in the memo of June 20, 1984, from the Committee on Courses to Department/Program Chairs.

XIV. Courses Containing Experiments Using Recombinant DNA:

Undergraduate and graduate course proposals which contain experiments using recombinant DNA technology must have the experiments approved and certified by the UCR Institutional Biosafety Committee (IBC). The Committee on Courses will not approve such course proposals if the use of recombinant DNA has not been certified.

It is the instructor’s responsibility to complete and forward the “Biological Use Authorization (BUA)” form to the Compliance Officer of the IBC, Office of Research. A copy of the approved registration form should be attached to the course proposal form when it is submitted to the Committee on Courses. If the course changes and the use of DNA is substantially changed, the instructor should submit a written notification to the Compliance Officer of the IBC, Office of Research. A copy of the approved notification should be attached to the change in course proposal form when it is submitted.

XV. Requests For Approval Of Associate Instructors (Associates-In) and of Teaching Fellows

Normally an Associate-in will conduct the entire instruction of a lower division course or for a subgroup of students in a lower division course. An Associate-in may not give an upper division or graduate course or course section except with the approval of the campus Committee on Courses of Instruction. (SR 750)

Academic Personnel Manual 410-20b. states “Subject to the general supervision of a faculty member . . . , a Teaching Fellow should be competent to provide the entire instruction of a lower division course to a group of students, and normally should be given such assignments. Assignment to conduct instruction in an upper division or graduate course or section may not be made except with the approval of the Committee on Courses of Instruction (Regulation of the Academic Senate, 750).”
A request for approval of an Associate-in or teaching fellow to teach an upper division course or graduate course (Teaching Fellow only) should be sent to the Committee on Courses through the college/school dean (who endorses the request) in accordance with published deadlines. The Committee on Courses is under no obligation to consider requests for approval beyond published deadlines.

The request should contain:

- A justification for the necessity of hiring an Associate-In to teach the particular course in question.
- The candidate's complete curriculum vitae (CV); the standard University Biography Form for Academic Personnel (U1501) may be submitted, but departments are urged to work with the candidate to develop a professional CV for submission.
- A summary statement of the individual's qualifications regarding both knowledge of the field and preparation for classroom presentations.
- Copies of teaching evaluations for all lower or upper division course(s) the candidate has recently taught.
- The candidate's graduate transcript, including the current GPA.
- Name(s) of faculty who will monitor course presentation quality. For first time appointments, departments are urged to ensure that monitoring is close and direct.

In cases where the Associate-in is to teach a cross-listed course, a memo of agreement from the relevant department(s) should accompany the request.

XVI. APPENDICES
APPENDIX 1A

MINIMUM HOURS PER WEEK PER UNIT

SR 760 states: "The value of a course in units shall be reckoned at the rate of one unit for three hours' work per week per term on the part of the student, or the equivalent."

The General Rules and Policies Governing Courses of Instruction state that hours per week per unit of credit may not be less than, but may exceed, those listed in the following guidelines:

One unit for each hour per week of lecture, seminar, discussion, workshop, colloquium, or consultation.

One unit for each three hours per week of laboratory, practicum, field work, screening, internship, clinic, thesis, tutorial . . . . One unit for three hours of outside reading or other preparation each week is expected for individual study, research, extra reading, term paper, etc.

The hours referenced in this box are shaded in the examples below. These hours are listed on the course proposal.

### EXAMPLE 1

<table>
<thead>
<tr>
<th>Activity</th>
<th>Units</th>
<th>Total Required Hours 3 hours per unit or 3 x units</th>
<th>Distribution of Required Hours</th>
<th>Individual Hours</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
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<td>9</td>
<td><strong>Group Hours</strong>&lt;br&gt;contact with instructor or TA</td>
<td><strong>Individual Hours</strong>&lt;br&gt;no contact with instructor or TA</td>
</tr>
<tr>
<td>Laboratory</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>6</td>
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<tr>
<td>TOTAL</td>
<td>4</td>
<td>12</td>
<td>6</td>
<td>6</td>
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</tbody>
</table>

### EXAMPLE 2

<table>
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<th>Units</th>
<th>Total Required Hours 3 hours per unit or 3 x units</th>
<th>Distribution of Required Hours</th>
<th>Individual Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminar</td>
<td>3</td>
<td>9</td>
<td><strong>Group Hours</strong>&lt;br&gt;contact with instructor or TA</td>
<td><strong>Individual Hours</strong>&lt;br&gt;no contact with instructor or TA</td>
</tr>
<tr>
<td>Discussion</td>
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<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

### EXAMPLE 3

<table>
<thead>
<tr>
<th>Activity</th>
<th>Units</th>
<th>Total Required Hours 3 hours per unit or 3 x units</th>
<th>Distribution of Required Hours</th>
<th>Individual Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop</td>
<td>3</td>
<td>9</td>
<td><strong>Group Hours</strong>&lt;br&gt;contact with instructor or TA</td>
<td><strong>Individual Hours</strong>&lt;br&gt;no contact with instructor or TA</td>
</tr>
<tr>
<td>Extra Reading</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4</td>
<td>12</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

*Usually a class or a consultation.
APPENDIX 1B

June 6, 1997

TO: DEPARTMENT/PROGRAM CHAIRS
FR: COMMITTEE ON COURSES
RE: UNIT DISTRIBUTION AND COURSE APPROVAL FORMS

PLEASE DISTRIBUTE TO ALL FACULTY

Recent course forms filed with the Committee on Courses have been unclear about unit distribution. Recently, a number of the proposed courses presented for consideration by the Committee on Courses have not established the academic rigor associated with 4 unit courses. To ensure that academic quality is maintained on our campus, it is critical that course credits accurately reflect the anticipated student work load. This memorandum is designed to explain these requirements. It is sometimes repetitive in its efforts to clear up any ambiguities; please be patient with it.

Lecture, Seminar, Consultation, and Discussion

In general, 1 hour of lecture, seminar, consultation, or discussion is equivalent to one unit of credit. It is understood that a minimum of 2 hours of outside reading or other work is expected for each hour of lecture, seminar, consultation, or discussion. We are well aware that it is often hard to tell exactly how long reading that supports lecture materials will take, and that some students will work faster than others. However, faculty should have a realistic estimate of the time commitment associated with assigned readings and the readings assigned for lectures should be in alignment with course credit expectations.

The attachment of a current course syllabus is critical for the Committee on Courses to fairly evaluate lecture, seminar, consultation, discussion, and other hours. If consultation hours are proposed, the mechanism for implementing and monitoring this educational activity must be explicitly stated and justified.

Laboratory

Three hours of laboratory work is equivalent to one unit of credit. It is understood that students may need to spend significant additional time in preparation for laboratory or to report laboratory findings.

Outside Reading, Extra Reading, Outside Research, Individual Study, Reading, and “Other hours”

One credit is given for 3 hours per week of outside research, extra reading, etc. These categories indicate that reading materials or research efforts exceed the reading required to support lectures (2 hrs./1 hr. lecture). The use of these educational activities must be clearly justified to the Committee on Courses.
Typical 4-unit course outlines include:

(a) 3 hr. lecture (including approximately 6 hours of reading) and 3 hr. laboratory per week = 4 units
(b) 3 hr. lecture (including approximately 6 hours of reading) and 3 hr. extra reading per week = 4 units

NOTE THAT THIS DOES NOT MEAN FOUR CREDITS FOR THREE HOURS OF LECTURE AND THREE HOURS OF READING, ETC., FOR A TOTAL OF \((3 + 3 = 6)\) SIX HOURS OF WORK PER WEEK.

IT MEANS FOUR CREDITS FOR THREE HOURS OF LECTURE OR SEMINAR PLUS TWO HOURS OF OUTSIDE PREPARATION FOR EACH OF THOSE HOURS, PLUS THREE HOURS OF EXTRA OR ADDITIONAL READING OR OTHER WORK, FOR A TOTAL OF \((3 + 6 + 3 = 12)\) TWELVE HOURS OF WORK PER WEEK.

OFTEN, NEITHER COURSE PROPOSAL NOR THE COURSE SYLLABUS MAKES IT CLEAR HOW THE WORK DONE FOR UNITS ASSIGNED AS "EXTRA READING", "TERM PAPER", OR "OUTSIDE RESEARCH" REPRESENT WORK THAT IS OVER AND ABOVE THE READING OR WORK THAT IS NORMALLY EXPECTED TO BE DONE OUTSIDE OF CLASS.

IN ORDER TO OBTAIN COURSES COMMITTEE APPROVAL AT FOUR UNITS, SOME INDICATION OF THE DIFFERENCE BETWEEN THE SIX HOURS OF READING OR OTHER WORK ORDINARILY ASSOCIATED WITH THE THREE HOURS OF LECTURE, AND THE THREE HOURS OF EXTRA READING, ETC. MUST APPEAR ON THE SYLLABUS OR IN A WRITTEN EXPLANATION ABOUT THE COURSE. It must be indicated that those extra hours are evaluated in some way distinct from the 'regular' six hours expected in connection with the lecture hours.

WE RECOGNIZE THAT COURSE SYLLABI ARE WRITTEN TO COMMUNICATE INFORMATION ABOUT THE CLASS TO STUDENTS AND ARE NOT SPECIFICALLY INTENDED TO PROVIDE ANSWERS TO THE ABOVE QUESTIONS FOR THE COMMITTEE ON COURSES. THEREFORE, ADDITIONAL INFORMATION IS WELCOME, EITHER IN THE FORM OF A MEMO, OR IN THE JUSTIFICATION SECTION OF THE COURSE FORM, TO ASSIST US IN THE EVALUATION OF UNIT DISTRIBUTION.

THE BASIC INFORMATION IS SUMMARIZED BELOW:

*** THE NORM FOR LECTURE, SEMINAR, CONSULTATION, AND DISCUSSION HOURS IS THAT ONE UNIT OF CREDIT IS ASSIGNED FOR EACH HOUR OF INSTRUCTION.

EXAMPLE: THREE UNITS ARE ASSIGNED TO A CLASS THAT MEETS 2 HOURS PER WEEK FOR LECTURE AND ONE HOUR OF DISCUSSION.

*** APPROXIMATELY TWO HOURS OF OUTSIDE READING OR OTHER WORK IS EXPECTED FOR EACH HOUR THE CLASS MEETS PER WEEK.

EXAMPLE: A CLASS THAT MEETS 2 HOURS PER WEEK FOR LECTURE AND ONE HOUR OF DISCUSSION REQUIRE 6 HOURS OF OUTSIDE WORK PER WEEK.
OTHER WORK, SUCH AS LABORATORY WORK, FIELD WORK, OUTSIDE READING, INDEPENDENT STUDY, TERM PAPER, OR RESEARCH, IS USUALLY COUNTED AT THE RATE OF ONE CREDIT FOR THREE HOURS OF SUCH WORK.

EXAMPLE: A TERM PAPER ASSIGNED IN ADDITION TO THE TWO HOURS PER UNIT WORK NORMALLY EXPECTED SHOULD REQUIRE 3 HOURS PER WEEK THROUGHOUT THE QUARTER TO COMPLETE THE ASSIGNMENT.

We are well aware that it is often hard to tell exactly how long assignments will take, and that some people will work faster than others. Our point here is that THE WORK REQUIRED OF STUDENTS FOR A 4 UNIT COURSE SHOULD REFLECT THE CAMPUS EXPECTATION FOR 4 UNITS OF CREDIT, I.E., THERE SHOULD BE DIFFERENCES BETWEEN WHAT IS ASSIGNED IN 3 AND 4 UNIT COURSES.

FOR THE REASONS NOTED ABOVE, A COURSE SYLLABUS SHOULD ACCOMPANY ALL PROPOSALS FOR NEW COURSES AS WELL AS CHANGE FORMS FOR COURSES THAT INVOLVE A REALLOCATION OF UNITS, MAJOR CHANGES TO CONTENT OR NEW INSTRUCTORS.

The Committee on Courses encourages all faculty with questions about the Course Forms and course requirements to clarify all issues prior to submission of a course form. This will ensure a rapid approval of the proposed course through the Committee on Courses and other campus committees.

Faculty and staff should start with the Committee on Courses’ “Course Guidelines”.

Cc: Registrar/Assistant Registrar/Catalog Editor/Courses Coordinator
    Deans, Colleges/Schools/Graduate Division
    Chairs, Executive Committees
    Chairs, Committee on Educational Policy/Graduate Council
    Administrative Assistants & Graduate/Undergraduate Secretaries
APPENDIX 2

GRADING

DEFAULT GRADING TYPES

Undergraduate Courses (001-199)
The default grading type is Letter Grade or petition for Satisfactory/No Credit (S/NC).

Graduate and Professional Courses (200-499)
The default grading type is Letter Grade only.

When the grading type is the default, do not add a grading statement in CRAMS CRS except to indicate that the course is graded In Progress (IP). Example:
Graded In Progress (IP) until HIST 100A and HIST 100B are completed, at which time a final grade is assigned.

When the grading type is not the default, add a grading statement in CRAMS CRS.

Enter grading types in the Grading Type field. Enter grading statements in the Standard Grading Statement field, or if you need to create your own grading statement, in the Other Grading Statement field. Note: Grading statements are added automatically by CRAMS CRS at the end of the course description in the General Catalog.

GRADING TYPES (shaded below) and their STANDARD GRADING STATEMENTS (in italics below)

Letter Grade or petition for Satisfactory/No Credit (S/NC)
This is the default grading type for undergraduate courses, so no statement is needed.

May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor

Letter Grade or Satisfactory/No Credit (S/NC); no petition required
Students who submit a term paper receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade.

Students who present a seminar receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade.

Students who present a seminar or submit a term paper receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade.

May be taken Satisfactory (S) or No Credit (NC) by students advanced to candidacy for the Ph.D.

Normally graded Satisfactory (S) or No Credit (NC), but students may petition the instructor for a letter grade on the basis of assigned extra work or examination

Letter Grade only

Undergraduate Courses
Satisfactory (S) or No Credit (NC) grading is not available.

Graduate and Professional Courses
This is the default grading type for graduate and professional courses, so no statement is needed.

Satisfactory/No Credit (S/NC) only
Graded Satisfactory (S) or No Credit (NC).

Other
This grading type is no longer used.
APPENDIX 3

Request for Extension of Course Proposal Submission Deadline

Course Number:
Course Title:
Effective Quarter and Year:

Course Action (check all that apply):

___ New    ___ Change    ___ Deletion
___ Course Number
___ Title
___ Cross-listing
___ Restoration

_____ Credit Statement (e.g., Credit is awarded for only one of BIOL 003 or BIOL 005A)

_____ Other

If the course is being deleted or its Course Number, Title, Units, Cross-listing, or Credit Statement is being changed, or you are adding a priority enrollment statement; please request reports from your course proposal preparer before completing the fields in this box.

List other courses affected by course proposal:

List programs (e.g., degrees, minors) affected by course proposal:

Course proposal needs approval before the following:

___ Schedule of Classes is published
___ Summer Sessions Catalog is published
___ First day of enrollment
___ First day of instruction
___ Agenda deadline for the next Riverside Division Academic Senate meeting
___ General Catalog is published

Request extension of deadline to (date):

Reason regular deadline was (or will be) missed:

Chair of Department/Program: Date:
Submitted By: Date:
Reviewed by Courses Specialist: Date:
Comments:

___ Approved (___ with conditions in Comments field above)    ___ Denied

Committee on Courses Chair: Date:

Instructions: Complete the form and save as a Word Document. Submit this request as an attachment to an e-mail addressed to mmiiller@ucr.edu and beth.beatty@ucr.edu
APPENDIX 4

GUIDELINES FOR REMOTE LEARNING COURSES
(Updated February 23, 2016)

Preamble

It is the Committee on Educational Policy’s interest to insure that courses with a significant remote learning (RL) component are reviewed fairly and consistently by the Senate; accordingly the Committee on Educational Policy (CEP) developed the guidelines below in collaboration with the Committee on Courses and Graduate Council. Either CEP or the Committee on Courses may modify or eliminate some of these guidelines as familiarity with remote learning (RL) courses develops and as best practices in the structure and delivery of RL courses are determined and generally adopted; it is to be expected that such modifications will be adopted after a consultation between these two committees in order to insure consistency. These guidelines are not offered as possible changes in the regulations or committee charges.

In considering RL courses the CEP has assumed that once the Senate through the Committee on Courses has approved a course, it has passed the necessary scrutiny to insure that the expected quality of instruction will be delivered. For the same reason, any instructor approved to give such a course is assumed to have the necessary expertise and should be given all the freedom to modify his/her methods of instruction. Based on this the CEP believes that RL courses should not be associated with a particular instructor, nor with particular choices of software or hardware. In addition, the Committee considers that the repeat policy should apply to courses with equivalent syllabi independently of their being traditional or RL.

This document does not deal with some thorny issues surrounding RL courses, such as revenue sharing and intellectual property. This is not done with the intention to minimize these important concerns, but because they lie well outside the scope of both the Committee on Courses and the CEP.
Guidelines for the approval of Remote Learning courses

Definition

A course shall be labeled remote-learning (RL) if face-to-face contact with an instructor represents less than 1/3 of the total hours of required work per week.1

Though this will be the general definition of RL courses, both CEP and the Committee on Courses recognize that there may be cases where this will be inappropriate; the ultimate determination of whether a course is to be considered RL will be made by the Committee on Courses, and may be at variance with the above definition.

SR 760 associates one unit for 3 hours of work per week per term. It is understood, however, that a minimum of two hours of outside reading or other preparation is expected each week for each hour of lecture, seminar, consultation, or discussion. The general definition implies that a course with N units will be an RL course if it has fewer than N face-to-face contact hours/week. For example, a 4-unit course for which the total amount of face-to-face lecture plus discussion plus seminar plus workshop plus laboratory time is less than 4 hours/week, would be an RL course. It is presumed (and verified in the course proposal during the Committee on Courses review) that all additional required contacts between students and instructor(s) occur remotely. The guidelines below are intended, in part, to insure that this type of contacts will allow students to interact with the instructors.

Catalog Description

Courses with standard and RL offerings are considered equivalent. Courses proposals with RL as a possibly delivery mode should include a sample course syllabus for RL delivery in lieu of or in addition to a syllabus for traditional delivery and should include the appropriate requests for repeatability. Courses, such as many lab courses, where physical interaction is an important aspect of the course, are presumptively not equivalent if offered in a RL format. Departments wishing treat RL and traditional delivery courses as non-equivalent are advised to number the courses uniquely and to use the overlap statement to prevent credit being given for both delivery formats.

All RL catalog course entries should include

- A broad description of the blend of traditional and online activities for the course
- Whenever pertinent, a note indicating that some specialized hardware and/or software might be required, referring the students to the course syllabus for specific descriptions

Approval

All RL courses require separate approval of the RL syllabus by the Committee on Courses even if there is an approved traditional course with the same course content.

In considering approval of RL course proposals, the Committee on Courses shall be primarily focused on whether or not the RL course will provide quality of education at the level required by UC. The Committee shall be mindful that the goal of such courses is to provide access to more qualified students; neither possible reduction of graduation time, nor revenue advantages, shall be of relevance in the approval process.

1 This definition parallels the one used at UC Berkeley.
Given the absence of generally-accepted best practices for remote instruction, the Committee on Courses may opt to initially approve a course or syllabus with the RL format only for a defined period of time, with a favorable review required before granting unrestricted approval. The Committee on Courses may require RL course proposals to provide details not required of traditional courses.

Any substantial modification in the delivery or evaluation methods in an RL course should require separate approval by the Committee on Courses even if the content matter is left unaltered.

When RL courses are proposed in degree programs that are subject to accreditation by external agencies (such as the ABET accreditation for Engineering programs), it is the responsibility of the department/program to insure that the external agency will accept the RL courses in the accreditation process.

**Evaluation**

In consultation with the college executive committees, the CEP and Committee on Courses will modify the course evaluation form to include items specific to RL courses. These committees will review and update this form every 5 years or earlier if needed.

No RL course is to be associated with a specific instructor. Nor will they be associated with particular software and hardware needed for their implementation; instructors should be free to replace one type of software/hardware with another form offering as they see fit. Any substantial revision of the evaluation method, however, will require a separate approval by the Committee on Courses.

**Suggested Guidelines to the Committee on Courses**

The following provide a list of points that the Committee on Courses may want to consider when evaluating RL course proposals. Not all points are relevant in all cases and additional ones might be raised for specific instances.

All RL course proposals should

- Conform to the standard schedules of 10-week offerings during the academic year, or 10/5/3/ week for the Summer session; the Committee on Courses can consider alternative scenarios under exceptional circumstances on a case-by-case basis. Any proposal to allow students to take evaluations at different times during the term must also include workable plans to maintain the integrity of the evaluations (see also next bullet).
- Provide a clear description of the evaluation methods including the measures aimed at preventing student dishonesty (especially if online examinations are proposed). In addition, electronic assessment tools must be designed/chosen to insure sufficient variation in the evaluation instruments from offering-to-offering so that the availability of tests from previous offering does not compromise future evaluations.
- Guarantee student access to the instructor in charge of the course. Access to the instructor cannot be delegated to any sort of assistant. The course description should include the frequency, duration and manner of such contact hours. Similarly the number and manner of TA contact hours should be included in the course description.
- Make all reasonable accommodations to insure course access for students with disabilities.
- Rely on generally available hardware since requiring cutting-edge technology will disadvantage some students.
• Insure that all relevant material available to students residing at or near UCR is also available to all RL students; this includes library material available electronically.
• Insure that all software issues (availability, licensing, etc.) should be resolved prior to the beginning of the term.
• Specify all software and hardware requirements, and the manner in which course-specific items can be obtained. This information should be included in the syllabus.
• Describe the technical support available to students on and off campus. This should include the option of dial-in support and not be restricted to online support (so as not to disadvantage students whose computer is non functional). This information should be included in the syllabus.
• Insure that all TAs are trained in the software and hardware to be used in the course.
• Have a built-in mechanism for assessing learning outcomes. Assessment should measure the effectiveness of learning in a course, should be used to guide improvement in the course, and, when a comparable regular course is taught in parallel, may enable comparison of the relative effectiveness of the RL and the regular course.

\textit{In addition:}

Courses with a laboratory component require special attention. If the laboratory requires physical components\textsuperscript{2}, the simplest solution is to decouple the laboratory into a separate course that is taught on-site. Budget constraints, however, might force a choice between an on-line laboratory and no laboratory at all; such situations must be treated on a case-by-case basis weighing the advantages and problems of the proposal.

Teaching assistants should not be limited to RL courses but should also gain experience by serving in regular courses. A TA must alternate serving in an RL course with serving in two regular offerings except in cases where the TA requests to be assigned to RL courses more frequently.
May 8, 2018

Executive Council comment regarding the proposed revisions to Regulation GR1.6: Professional Development Requirement for Graduate Students

Dear Senate Colleagues:

I am communicating Executive Council’s discussion of Graduate Council’s proposal to change the professional development regulation. Executive Council held its discussion during its May 7, 2018 meeting and was satisfied with the revisions that were made in response to the initial consultation. It supports the proposal.

Sincerely yours,

Dylan Rodriguez
Chair of the Riverside Division
Graduate Council

March 16, 2018

To: Dylan Rodriguez, Chair
Riverside Division

From: Christiane Weirauch, Chair
Graduate Council

Re: Proposed revisions to Regulation GR1.6 Professional Development Requirement for Graduate Students – second round

Based on feedback provided by various Senate committees, the Graduate Council has revised the proposed revisions to Regulation GR1.6. Attached, please find the revised version of the Regulation as well as an explanation of the revisions based on the feedback provided. Please reroute this to committees for review and approval.
<table>
<thead>
<tr>
<th>CURRENT</th>
<th>PROPOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>In addition to the specific degree requirements listed below, professional development training is a requirement of for the M.A., M.S., M.F.A. and Ph.D. degrees. Each degree program determines the format, content, and extent of its training. A program may provide all of its training independently, or it may partner with other programs or utilize services provided by other campus units or professional organizations. Training must be for unit credit and may be delivered as a single course or as portions of multiple courses.</td>
<td>Professional development training is required for all MS, MA, MFA, MPP, and Ph.D. programs. Such training is ideally designed to help students achieve mastery of some core competencies including communication (e.g., writing and publishing, presentation skills, networking); academic development (e.g., skill building in teaching and mentoring, grant writing); leadership and professionalism (e.g., abilities in research/scholarship, professional ethics, and inclusiveness); and career development (e.g., strategies for success in graduate school and the profession, maintaining work/life balance, time management, and career and job market guidance). This list is not meant to be exhaustive or prescriptive, but rather to reflect the range of skills our students need to be successful. Each program determines the format, content, and extent of its training in order to make it specific to, and appropriate for, the discipline. Training must be for unit credit and may be delivered as a single course or as portions of multiple courses. The courses must be listed in the catalogue and clearly noted as serving to meet the professional development requirement.</td>
</tr>
</tbody>
</table>
Professional development training is required for all MS, MA, MFA, MPP, and Ph.D. programs. Such training is ideally designed to help students achieve mastery of some core competencies including communication (e.g., writing and publishing, presentation skills, networking); academic development (e.g., skill building in teaching and mentoring, grant writing); leadership and professionalism (e.g., abilities in research/scholarship, professional ethics, and inclusiveness); and career development (e.g., strategies for success in graduate school and the profession, maintaining work/life balance, time management, and career and job market guidance). This list is not meant to be exhaustive or prescriptive, but rather to reflect the range of skills our students need to be successful.

Each program determines the format, content, and extent of its training in order to make it specific to, and appropriate for, the discipline. Training must be for unit credit and may be delivered as a single course or as portions of multiple courses. The courses must be listed in the catalogue and clearly noted as serving to meet the professional development requirement.
Justification: Six years after the professional development (PD) requirement for graduate students was approved by the Graduate Council (GC), compliance among programs still seems to be inconsistent and of varying quality. GC has taken steps to remedy this problem, namely, approval of the amended questionnaire for program reviews and modification of the guidelines for program review self-study reports, both of which aim to probe whether students are indeed receiving any PD training.

In the same spirit, the committee is proposing to change the text both in the Graduate Division Regulation GR 1.6 and in the Professional Development section in the catalog (Page 62). The proposed text puts PD training into the widely accepted “core competency” framework. We believe this text expresses what is expected of programs more clearly, and the core competency framework facilitates the design of PD training the programs will provide.

Approved by Graduate Council: March 15, 2018
The Committee on Rules & Jurisdiction finds the wording to be consistent with the code of the Academic Senate: December 4, 2017
Reviewed by Executive Council: May 7, 2018
Hi Sarah,

I am commenting between the lines below, and attaching a revised version addressing the easy stuff.

SPP Exec Committee – One concern we have is why the MPP program, as well as the MBA program, are not included in the regulation? Speaking on behalf of the MPP program, our students would likely benefit from the regulation being applied to our program as well. A second, and more minor issue, is that among the litany of items listed to describe what the content might consist of and focus on, including “time management” might be useful as well.

I have no problem adding MPP. I agree with time management as well, and I think the best place to fit that is as an example to the core competency of “career development”. I made the changes accordingly.

Committee on Diversity & Equal Opportunity - Overall the committee approves of the proposed language, but encourages programs pay mind to inclusiveness when determining what appropriate professional development training is for the discipline.

"and inclusiveness" has been added to the first paragraph where leadership and professionalism is discussed.

Academic Freedom - The Committee on Academic Freedom considered the proposed regulation change to GR1.6 and did not find any academic freedom issues. However, the committee offers a friendly amendment to the following sentence: “The courses must be listed in the catalogue and clearly noted as the course serving to meet the professional development requirement.”

I also agree with this and made the changes.

CHASS Exec Committee - The committee also noted that some non-compliant programs may benefit from guidance regarding the typical content of such courses, perhaps via a repository of representative syllabi from compliant programs. Aside from this suggestion, the committee had no objections to the revised regulation.

I completely agree and we should team up with the Grad Council to help programs implement their Professional Development, and a repository of representative syllabi is an excellent idea in that direction. But clearly, we cannot address that in this text.
Planning & Budget - P&B discussed the proposed regulation change and felt that the changes do not seem to modify the requirement but may involve additional faculty time and commitment that should include teaching credit. The committee generally supported the proposal.

Faculty do get credit when they teach a professional development course. And again, I don’t think this text is the place to address faculty load. Update: The GC has drafted a memo to all Deans that reminds them that faculty should be receiving credit for teaching these courses.

Rules & Jurisdiction - Although these changes do not violate the code of the Academic Senate, the Committee has the following suggestions: Provide a briefer and more concise version of what has been stated; keeping the first paragraph as is, and to concentrate on the second paragraph and just add on the suggested sentence about the need for a course listing in the catalogue.

I propose to remove the second sentence “A program may … or professional organizations.” I made that change in the attached document as well.

Thanks,
Ertem
To: Dylan Rodriguez, Chair  
   Riverside Division of the Academic Senate

From: John Levin, Chair  
   Committee on Academic Freedom

Re: Proposed Regulation Change to GR1.6 from Graduate Council

The Committee on Academic Freedom considered the proposed regulation change to GR1.6 and did not find any academic freedom issues. However, the committee offers a friendly amendment to the following sentence:

“The courses must be listed in the catalogue and clearly noted as the course serving to meet the professional development requirement.”
December 07, 2017

TO: Dylan Rodriguez, Chair
Academic Senate

FROM: Kate Sweeny, Chair
CHASS Executive Committee

RE: Proposed Regulation Change to GR1.6

The CHASS Executive Committee discussed the Proposed Regulation Change to GR1.6 at the regular meeting on November 29, 2017. The committee appreciated the effort to clarify expectations for the content of the required professional development training for graduate students. However, the committee also noted that some non-compliant programs may benefit from guidance regarding the typical content of such courses, perhaps via a repository of representative syllabi from compliant programs. Aside from this suggestion, the committee had no objections to the revised regulation.

Kate Sweeny, Chair
CHASS Executive Committee
January 3, 2018

To: Dylan Rodriguez  
Riverside Division Academic Senate  

From: Suveen Mathaudhu, Chair  
Committee on Diversity & Equal Opportunity  

Re: Proposed Regulation Change to GR1.6 from Graduate Council

The Committee on Diversity and Equal Opportunity considered the proposed regulation change to RG1.6 at its December 7th meeting. Overall the committee approves of the proposed language, but encourages programs pay mind to inclusiveness when determining what appropriate professional development training is for the discipline.
PLANNING & BUDGET

December 12, 2017

To: Dylan Rodriguez, Chair
   Riverside Division

From: Christian Shelton, Chair
      Committee on Planning and Budget

RE: Regulation Review: Proposed Regulation Change to GR1.6 from Graduate Council

P&B discussed the proposed regulation change and felt that the changes do not seem to modify the requirement but may involve additional faculty time and commitment that should include teaching credit. The committee generally supported the proposal.
December 4, 2017

To: Dylan Rodríguez, Chair
Riverside Division

From: Kambiz Vafai
Chair, Committee on Rules and Jurisdiction

Re: 17-18. [Campus Review] Regulation Review: Proposed Regulation Change to GR1.6 from Graduate Council

The Committee on Rules and Jurisdiction reviewed the proposed changes to Regulation GR1.6 from Graduate Council.

Although these changes do not violate the code of the Academic Senate, the Committee has the following suggestions: Provide a briefer and more concise version of what has been stated; keeping the first paragraph as is, and to concentrate on the second paragraph and just add on the suggested sentence about the need for a course listing in the catalogue.
TO:    Dylan Rodriguez, Chair
       Riverside Division

FR:    Kurt Schwabe, Chair
       Executive Committee, School of Public Policy

RE:    Proposed Regulation Change to GR1.6 from Graduate Council

Date:  December 20, 2017

The Executive Committee of the School of Public Policy is in support of more clarity surrounding the expectations and understanding of Graduate Division Regulation GR 1.6 and in the Professional Development section in the catalog. One concern we have is why the MPP program, as well as the MBA program, are not included in the regulation? Speaking on behalf of the MPP program, our students would likely benefit from the regulation being applied to our program as well. A second, and more minor issue, is that among the litany of items listed to describe what the content might consist of and focus on, including “time management” might be useful as well.
A Proposal for an Interdepartmental Program of Graduate Studies in Biophysics for the M.S. and Ph.D. Degrees

UC RIVERSIDE | College of Natural & Agricultural Sciences

Prepared September 14, 2016; revised August 22, 2017; re-revised March 21, 2018

Contact Information
Russ Hille
Distinguished Professor
Department of Biochemistry
2404B Boyce Hall
ph. 823-6354
e-mail russ.hille@ucr.edu

Executive Summary

An interdepartmental graduate program in the field of Biophysics is proposed, justified on the basis of the intrinsic importance of the field in the life sciences and the growing number of faculty at UC Riverside who are presently working in the area as broadly defined. The intent is to provide a means to recruit and train a new cadre of graduate students to UCR that will complement existing graduate programs on campus and provide trainees for the research programs of the participating faculty. Areas of existing expertise on campus include macromolecular structure determination, spectroscopic methods of various sorts, photosynthesis, physiological ecology and ecosystem processes, computational/mathematical modeling of biological systems, biological electron transfer, neurobiophysics and protein engineering. Formal course requirements will consist of a core curriculum and electives that amount to approximately one full academic year of coursework, and will be comprised of existing classes. Training in professional integrity and the responsible conduct of research will be explicit components of the curriculum. Basic requirements for the M.S. Plan II degree will consist of successful completion of the coursework and passing a Comprehensive Examination prepared and graded by the participating faculty. For the Ph.D. degree, in addition to the requirements for the M.S. Plan II degree, students will be expected to complete a Qualifying Examination consisting of the preparation and defense of a research proposal based on their dissertation research and prepared in the format of a regular grant proposal to the National Science Foundation or National Institutes of Health. Upon successfully completing the Qualifying Examination, Ph.D. students will be expected to complete an independent research project under the direction of a three-member dissertation committee chaired by a faculty member in the Program who will serve as the student’s dissertation advisor. The dissertation advisor will be responsible for direction of the research, including providing an appropriate environment and other resources required to undertake the research. The Dissertation Committee will provide general guidance in the course of research, and be responsible for administering the final oral defense of the dissertation arising from the research, which will consist of a public presentation of the principal findings of the research followed by a private defense of the dissertation.

The Program will be administered by a Director and a three-member Executive Committee. The members of the Executive Committee will be responsible for graduate admissions, graduate oversight and curriculum, with each chairing a standing committee comprised of two additional participating faculty members from the Program. The Director, in conjunction with an administrator from the CNAS Graduate Student Affairs Center, will be responsible for the day-to-day operation of the program, including admissions, student advising and monitoring students’ progress through the Program.
Section 1. Introduction

1.1) Aims and objectives of the program. The objectives of the proposed interdepartmental graduate program are to provide graduate training leading to the M.S. and Ph.D. degrees in Biophysics, and to promote teaching and research in the field of Biophysics by students and faculty at the University of California, Riverside. Biophysics is a major area of study and research in the life sciences, and attracts a considerable number of students. Biophysicists are needed by institutions of higher learning, and by federal, state and private research organizations in order to fulfill their respective missions. UC Riverside has considerable strength in the area of Biophysics, but this strength has a relatively low level of national visibility given the broad dispersal of the faculty working in the area on campus and the absence of a cohesive training environment.

1.2) Historical development of the field. Biophysics as an academic discipline arose in the mid-19th Century out of studies by a group of German physicians and physiologists whose work focused on various aspects of electrophysiology and sensory stimulus, which in turn had grown out of the earlier work of Galvani and Volta. By the mid-20th Century, a formal Biophysical Society had been created in the US as an outgrowth of the American Physiological Society, and the Biological Physics Division of the American Physical Society had been established. At this time the discipline had grown to encompass a great many areas of research utilizing a variety of physical methods to study biological phenomena, as well as computational modeling of same. Examples include: structural biology, spectroscopy, electrophysiology, bioenergetics and biomechanics, neural networks, single-molecule dynamics, theoretical biology and a wide range of computational methods. Today the combined membership of the Biophysical Society and the APS Division of Biological Physics includes over 10,000 scientists, a large and thriving intellectual community. Here at UC Riverside, there has been significant investment in faculty hiring in the area of biophysics in several departments, and an undergraduate track in Biophysics already exists as part of the BS major in Physics. A number of graduate and undergraduate courses are in place in the Physics and Astronomy Department, as well as the departments of Biochemistry and Chemistry. Significantly, substantial expertise already exists on campus in areas recognized as lying within Biophysics, including: macromolecular structure determination, spectroscopic methods of various sorts, photosynthesis, physiological ecology and ecosystem processes, biological electron transfer, computational/mathematical modeling of biological systems, neurobiophysics and protein engineering. The departments Biochemistry, Chemistry and Physics and Astronomy have all made multiple hires in the area of biophysics over the past few years, and the rapid growth of the biophysics community has provided the impetus for the creation of a graduate program in Biophysics. The proposed program will be essential to maximize the growth and vigor of the research programs of both existing and future faculty at UC Riverside working in the area.

1.3) Timetable for development of the program. Upon approval of the Program, a Director will be appointed by the Dean of the Graduate Division and the program’s standing committees established as described in Section 8 below. A website describing the new program and the research interests of its participating faculty will be created to advertise the program, and graduate admissions will commence, focusing on Ph.D. applicants. We anticipate a graduate admission rate of 5-10 students per year over the first several years of the Program, and 5-15 thereafter. Assuming an average matriculation-to-graduation time of 4.5 to 5 years, the Program will eventually grow to approximately 45 students. Given the significant amount of faculty recruitment in Biophysics that has taken and continues to take place on campus, the number of participating faculty is expected to grow, which may well lead to even more rapid growth of the Program. Table 1 provides a timetable for anticipated Ph.D. enrollment.
Table 1

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<th># graduating</th>
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</tbody>
</table>

1.4) Relation of the proposed program to existing programs and to the Campus Academic Plan. Biophysics is inherently interdisciplinary, and the proposed program will effectively complement existing graduate programs in the Departments of Biochemistry, Chemistry and Physics and Astronomy. The majority of participating faculty also come from these academic units, and the proposed Program will provide them with a new source of trainees to participate in their individual research programs. The intent is to create a mechanism for the recruitment of a cadre of graduate students interested in studying and training in biophysics that would not otherwise have considered UC Riverside. For this reason, it is to be expected that there will be negligible negative impact on existing programs on campus. The proposed program is also consistent with the growth of the graduate student population at UC Riverside anticipated by the Graduate Division, and former Dean Joe Childers was specifically enthusiastic about the creation of the program. A major focus of the Campus Academic Plan is growth of UC Riverside’s research portfolio (particularly the NIH-supported component), and achieving AAU accreditation. Much of the field of biophysics in fact has immediate biomedical relevance, and creation of a Biophysics Program is thus fully aligned with the Campus Academic Plan. Graduate programs are the engine of the research enterprise in the laboratory sciences, and creation of a graduate program in Biophysics can be expected to facilitate the development of new and expanded research programs by the participating faculty. Creation of the program is also justified by the significant level of faculty recruitment in the area at UC Riverside over the past several years in several departments, with a critical mass of faculty now having been achieved. Indeed, a major impetus for the creation of the program was the insufficiently large pool of graduate students available to the participating faculty, particularly junior faculty eager to establish their laboratories. Additional faculty growth in the area of biophysics is a specific component of the strategic plans for (minimally) the departments of Biochemistry, Chemistry and Physics, and the demand for graduate students will only increase in future. As part of this growth, and consistent with UC Riverside’s Strategic Plan, the program is committed to diversity, both in the participating faculty as the home departments of the participating faculty recruit and in the demographic make-up of the graduate students accepted into the program. The campus’s nationally recognized standing as an institution committed to developing and sustaining a pipeline of underrepresented minorities and women in STEM disciplines will be leveraged to ensure a diverse academic community in biophysics.

1.5) Interrelationship of the program with other UC institutions. Biophysics programs at other UC campuses fall into two principal groups: Berkeley, Davis and San Francisco have interdepartmental graduate programs in Biophysics similar to that being proposed here, while Los Angeles, Santa Barbara, Santa Cruz and San Diego have competing tracks or sections in both their Physics and Chemistry/Biochemistry Departments. Additionally, Irvine has a Department of Physiology and Biophysics in its School of Medicine, and Merced has a Biophysics track in the Ph.D. program of its Department of Physics. Given the distribution of the participating faculty at UC Riverside, the interdepartmental graduate program model seen at Berkeley, Davis and San Francisco is considered the more appropriate for UC Riverside, and the solicited letters from the Directors of the
interdepartmental graduate programs at both Berkeley and Davis are very supportive (see Appendix III); clearly, there is no perceived concern regarding competition between campuses. Indeed, given the important role of Biophysics in the biological sciences, all research universities involved in graduate training in the biological sciences would be well served by providing a degree program in biophysics. UC Riverside is no exception.

1.6) **Administration.** As described in detail in Section 8 below, the Program will be administered by a Director and a three-member Executive Committee. The members of the Executive Committee will be responsible for Graduate Admissions, Graduate Oversight and Curriculum, with each chairing a standing committee comprised of two additional participating faculty members from the Program. The Director, in conjunction with an administrator from the CNAS Graduate Student Affairs Center, will be responsible for the day-to-day operation of the program, including admissions, student advising and monitoring students’ progress through the Program. The Graduate Student Affairs Center presently oversees the administration of 16 graduate programs, and the addition of one more does not significantly increase the workload of its staff. Indeed, a staff member has already been assigned to take responsibility for the proposed program. The Chair of the Graduate Oversight Committee will serve as graduate advisor and will be responsible for administering the Cumulative Examination, which will consist of questions provided by the participating faculty.

1.7) **Plan for evaluation of the program.** In the first two years, the participating faculty will self-evaluate the graduate program prior to the normal third-year review to be conducted by Graduate Council that is required for all new graduate programs at UC Riverside. Thereafter, the program will be evaluated by an external team of experts every 6-7 years, as is the standard practice the Graduate Division at UC Riverside.

**Section 2. Program Description**

2.1) **Undergraduate preparation for admission.** Students admitted to the Biophysics Graduate Program will be expected to have completed a bachelor’s degree in Biochemistry, Biology, Chemistry or Physics (or related fields) at an accredited 4-year college or university, and to have attained an undergraduate academic record that meets or exceeds the standards established by the Graduate Division of UC Riverside. Students will have completed coursework in chemistry (minimally, one year each of introductory and organic, including laboratories), physics (minimally, one year introductory, including laboratory), mathematics (minimally, one year calculus, plus one upper division course), biochemistry (minimally, one year introductory, including laboratory) and biology (minimally, one year introductory, including laboratory) in addition to upper-division courses in their major. Students with strong academic records may be admitted with coursework deficiencies, provided these are remediated during the first two years of graduate study. Entry into the program will require adequate performance on the Graduate Record Examination (GRE), as well as the Subject Examination in Physics, Chemistry, Biochemistry or Biology.

2.2) **Foreign language competency.** None required.

2.3) **Program of study.**

2.3a) **Specific fields of emphasis.** The program will offer a Master’s (M.S.) Plan II and a doctoral (Ph.D.) degree in Biophysics. Students enrolled in the program are expected to complete core coursework consisting of a one-year (three quarter) series of graduate coursework. Students are also expected to participate in seminars and colloquia, and to become informed about the major technological methods and advances that provide the
essential underpinnings to new discoveries in the field. Upon entry, each student will work
with the program’s Graduate Oversight Committee to develop an appropriate course of
study given the student’s interests, including the assignment of laboratory rotations
(tentatively BPHY 297) with three different participating faculty as part of the preceptor
selection process.

2.3b) Plans. M.S. Master’s students will complete core coursework in biophysics, and will take
at least one graduate seminar course each quarter that they are enrolled. They must take
and pass a Comprehensive Examination at the end of their coursework. Ph.D. Doctoral
students will be expected to fulfill all requirements for the M.S. degree; the expectation for
satisfactory performance on the Comprehensive Examination will be higher than for the
M.S. degree. Doctoral students must also pass a combined written and oral Qualifying
Examination consisting of: (1) the preparation of a research proposal based on the
student’s dissertation work and taking the form of a grant proposal to NSF or NIH; and (2)
defense of same before a faculty committee consisting of a Chair and three additional
program faculty, plus one external member to ensure fairness (see Section 2.5 below).
The student will also undertake a research project leading to a dissertation, with annual
presentations to the dissertation committee to assess progress toward degree.
Publications in peer-reviewed journals are also expected. In the course of their studies,
Ph.D. students will be expected to complete a minimum of two quarters as teaching
assistant to gain experience in instruction.

2.3c) Unit requirements. M.S. 36 units of 100 or 200 series courses, of which at least 18 units
must be in the graduate 200 series. This coursework will include the program’s graduate
core curriculum and courses from a list of approved electives (see Section 5). Ph.D. 36
units of 100 or 200 series courses, of which at least 24 units must be in the graduate 200
series. This coursework will include the program’s graduate core curriculum and courses
from a list of approved electives (see Section 5). A minimum of 16 units of coursework
other than courses in the 290 series must be completed in fulfillment of the 24-unit
program requirement for graduate coursework.

2.3d) Required and recommended courses. All students will be required to take a three-
quarter sequence of introductory biophysics (consisting of BCH 184, BIOL 203 and PHYS
246), as well as a series of four five-week research rotations in laboratories of participating
faculty under the auspices of BPHY 297, as part of the thesis advisor selection process.
Participation in the Biophysics Graduate Seminar (tentatively BPHY 252) is also required
each quarter that the student is enrolled, and each student is expected to present a formal
research seminar in this course prior to graduation. Students will also be required to
complete the Responsible Conduct of Research program provided by the Office of
Research Integrity. To complete the 36 unit requirements for degree, students will select
courses from a list of approved electives to meet unit requirements (see Section 5).

2.3e) Comprehensive Examination. Both Master’s and doctoral students will be required to
pass a three-hour Comprehensive Examination consisting of questions provided by the
participating faculty, with topics taken form the core curriculum. The Comprehensive
Examination will be graded by those submitting questions, and the results presented to the
participating faculty for a decision of PhD Pass, MS Pass, or Fail in each student’s case.
The expectation for satisfactory performance on the Comprehensive Examination will be
higher for doctoral students than for Master’s students.
2.3f) **Licensing/certification requirements**. None.

**Professional development and training** – The program of study described above incorporates a number of aspects that contribute to the professional development and training of the program’s graduate students. These include:

- The written component of the General Examination, which is intended to provide experience in the preparation of grant proposals to be submitted to federal granting agencies;
- The oral component of the General Examination, the requirement for an annual research evaluation and requirement to present in BPHY 252, which provide the opportunity to develop presentation skills that will complement those developed in research group meetings and journal clubs that the student may participate in;
- The TA requirement, which includes participation in the Teaching Assistant Development Program administered by the Graduate Division of UC Riverside, which is intended to develop pedagogical skills; and
- Involvement in the Office of Research Integrity’s Responsible Conduct of Research program, which is intended to reinforce a strong sense of professional ethics.
- Participation in national and international scientific conferences, providing the opportunity to develop presentation skills and personal networking opportunities.
- Participation in professional development programs run by organizations such as The Department of Education, the National Science Foundation, the National Institutes of Health, the American Association for the Advancement of Science, the Association of Women in Science, the Biophysical Society and the Biological Division of the American Physical Society.

2.4) **Field examinations**. None.

2.5) **Ph.D. Qualifying Examination**. Doctoral students must pass a written qualifying examination that, as indicated above, will consist of the preparation of a research proposal based on their dissertation work and taking the form of a grant application to the National Science Foundation or National Institutes of Health. The proposal will be evaluated by an Oral Qualifying Exam committee consisting of a participating faculty member selected by the Director in consultation with the student’s dissertation advisor and three additional program faculty selected by the student and his/her preceptor, and approved by the Program Director. All members of the Oral Qualifying Examination Committee must be members of the Academic Senate, and the Committee will include one external examiner whose principal is to ensure the fairness of the examination; for a total of five committee members. The Committee will not include the student’s dissertation advisor. Once the written proposal is deemed satisfactory by the Committee, the student must pass an oral examination that will consist of a defense of the written research proposal before the student's Qualifying Examination committee. Upon successful completion of all coursework and passing of the Qualifying Examination, the student will advance to Candidacy.

2.6) **Thesis and/or dissertation**. Having completed the four required laboratory rotations in BPHY 297 in their first year, students will be expected to have selected a dissertation advisor by the end of their first academic year. The student’s dissertation advisor will chair a Ph.D. Dissertation Committee that will consist of a minimum of two additional members of the Academic Senate, who will normally also be participating members of the Biophysics Graduate Program. All committee members should be able to provide guidance and judge the scholarship of the dissertation
research. The student is expected to meet with his/her Dissertation Committee once a year in an Annual Research Evaluation, in which the student formally presents his/her work to date and progress is assessed and input to the research project provided by the committee. During this time, students will be enrolled in sufficient credits of directed research (tentatively BPHY 299) to ensure good standing in the Graduate Division. A written dissertation will be completed by each student in the program.

2.7) **Final examination.** Doctoral candidates will defend their dissertations in a public, oral presentation at a time announced to members of the University community. The public presentation will be followed by a private defense of the dissertation to the Dissertation Committee, which will make a recommendation to the Graduate Division as to whether the degree of Ph.D. should be conferred.

2.8) **Explanation of special requirements.** None.

2.9) **Relationship of M.S. and Ph.D. programs.** Students will normally be admitted to the Ph.D. program. Upon passing the Qualifying Examination and advancement to Candidacy, the student may petition the Graduate Division for conferral of the M.S. degree.

2.10) **Special preparation for careers in teaching.** Not applicable.

2.11) **Sample Ph.D. program.** Students enrolled in the proposed program will be expected to complete an individualized curriculum that will include the core coursework described in Section 2.3d above, with additional coursework tailored to the student's research interests and background (including remediation of deficiencies identified upon admission to the program). Table 2 provides a sample program designed to meet the needs of a student wishing to work in the area of structural biology, with an emphasis in protein structure determination as elucidated by NMR.

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<th>Year 1</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<td>BIOL 203 (Intro)</td>
<td>BCH 184 (Intro)</td>
<td>PHYS 246 (Intro)</td>
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<td>BPHY 252 (Seminar)</td>
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<td>Year 2</td>
<td>CHEM 209M (Intro)</td>
<td>CHEM 229Q (Advanced</td>
<td>BCH 210 (Bch Macromol)</td>
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<td>BPHY 252 (Seminar)</td>
<td>NMR)</td>
<td>BPHY 252 (Seminar)</td>
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<td>BPHY 297 (Research)</td>
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2.12) **Normative time from matriculation to degree.** A typical doctoral student will be expected to complete all degree requirements in approximately five years.
Section 3. Projected Need

3.1) **Student demand for the program.** The National Research Council recognizes Biochemistry, Biophysics and Structural Biology as major disciplines in the Life Sciences, and specifically ranks Ph.D. programs in these areas. Biophysics and Computational Biology is also a major section of *Proc. Natl. Acad. Sci. (USA)*, emphasizing its importance as a discipline. Significant breakthroughs over the past decade in protein structure determination and a variety of imaging methodologies, new insights into the dynamic behavior of individual protein molecules and advances in understanding the relationship of structure to function (in systems ranging from nitrogen fixation and photosynthesis to the replisome and signal transduction) have brought great attention to Biophysics. These advances in turn have attracted students eager to participate in such discoveries. At the same time, a wide range of career opportunities await individuals trained in biophysics, including positions in the pharmaceutical and chemical industries, academia and both public and private research institutions. The proposed graduate program will provide a coherent, campus-wide umbrella organization under which faculty efforts and resources can be marshaled, faculty and student interactions and research/grant productivity facilitated, and the overall reputation of the campus in the field enhanced. This will then generate even greater interest among potential students who will be attracted to the program. While students interested in the research programs of the participating faculty are already entering one or another existing departmental graduate program, a formal interdepartmental program will provide prospective students with greater educational and training opportunities and be of greater interest to students specifically seeking a degree in Biophysics. Again, the expectation is that the proposed program will attract a cadre of students who would not otherwise consider coming to UC Riverside and is not expected to have a negative impact on existing graduate programs. It will also address a significant manpower need on the part of the research programs of present and future faculty working in the area. As indicated above, the program is committed to the development of a diverse graduate student population that will contribute to the campus, indeed national, priority of developing an increasingly robust pipeline of under-represented minorities and women in STEM disciplines.

3.2) **Opportunities for placement of graduates.** There is high demand for biophysicists in a broad range of areas. The development of new drugs in the pharmaceutical industry is increasingly guided by the detailed three-dimensional structures of therapeutic targets (*e.g.*, reverse transcriptases, viral coat protein maturases, membrane channel proteins) and by the modeling of their dynamic behavior and interaction with potential drugs. Similarly, the chemical industry has become increasingly invested in the use of individual enzymes and even entire metabolic pathways in the development of more efficient methods to produce a wide range of commodity and fine chemicals. The US National Laboratories have had a long-standing and strategic interest in the application of sophisticated physical methods to understand biological systems and processes, as have private research institutions such as the Scripps Research Institute and Howard Hughes Medical Institute. Finally, recruitment of biophysicists has become a priority in academia nationwide, and particularly in biomedically relevant areas. This national trend is reflected in recent faculty recruitment at UC Riverside in the Departments of Biochemistry, Bioengineering and Chemistry, and to a lesser extent the Department of Physics. There is every reason to believe that students receiving a Ph.D. in Biophysics from UC Riverside will have excellent job prospects.

3.3) **Importance to the discipline.** Biophysics is an inherently interdisciplinary enterprise, with strong components drawn from Physics, Biochemistry, Mathematics and Chemistry, as well as other life sciences. Having a Ph.D. program that will provide a coherent training program to students across disciplinary lines will provide students with an exceptionally broad perspective that will make them...
extremely well-qualified to contribute at the cutting edge of modern research in the area. The broad
disciplinary distribution of participating faculty in the proposed program will greatly contribute to the
breadth of training provided at UC Riverside.

3.4) Ways in which the Program will meet societal needs. Over the past 50 years, many of the
most important advances in our understanding of the processes of life have been made by
biophysicists. Signal contributions include: discovery of the atomic-resolution structure of DNA;
elucidation of the genetic code and mechanism of information transfer in biological systems; structure
of the ribosome, photosynthetic and nitrogen-fixation systems; behavior of individual molecules of the
replisome, topoisomerase, helicase and other complex enzymatic systems working on DNA; the
physical basis of transmembrane ion transport, particularly as relates to neuronal function; and
visualization/analysis of neural networks. These and other advances have contributed enormously to
our understanding of various disease states, including cancer and heart disease, and to the
improvement of human health. Students in the proposed Biophysics Program will be able to
participate in either basic or applied research in these and other emerging areas and thus contribute to
a deeper understanding biological processes and to improved human health. And to reiterate, the
program is committed to the development of a diverse graduate student population that will contribute
to the national priority of developing an increasingly robust pipeline of under-represented minorities
and women in STEM disciplines.

3.5) Relationship of the Program to research interests of the faculty. Many faculty members at
UC Riverside are engaged in biophysics-related research, including a significant number of new hires
in the Departments of Biochemistry, Chemistry and Physics. The participating faculty are spread
across five different departments, and an interdepartmental graduate program such as proposed will
provide an effective and much-needed mechanism for facilitating productive interactions among the
participating faculty and for generating an enriched training environment for its students.

3.6) Program differentiation. Most UC campuses have graduate programs in biophysics (UC
Irvine has a Department of Physiology and Biophysics in its School of Medicine), and a biophysics
program on each campus is easily justified in light of the information provided in Sections 3.1 - 3.5
above. The strongly supportive letters from the Directors of the interdepartmental graduate programs
in Biophysics at Berkeley and Davis (Appendix III) attest to the lack of perceived competition with
existing programs at other UC campuses. The proposed program is distinctive in the range of specific
physical methods employed by its participating faculty as well as the breadth of the particular
biological systems and processes under investigation, factors which combine to provide a unique
training environment. In addition, UC Riverside’s nationally recognized leadership in the education of
under-represented minorities will provide the proposed program with opportunities to contribute to the
STEM pipeline.

Section 4. Faculty
The 27 participating faculty in the proposed Biophysics Graduate Program are self-identified from
among five departments in the College of Natural and Agricultural Sciences; of these eight are women
and eleven are minority. Each has a significant component of biophysics in his or her research
program. Detailed curricula vitae are provided in Appendix I, and individual letters of participation in
Appendix II. Letters from the Chairs of the Departments of Biochemistry, Biology, Botany and Plant
Sciences, Chemistry and Physics and Astronomy are provided in Appendix III, along with letters from
the Directors of interdepartmental graduate programs at UC Berkeley, UC Davis and UC San
Francisco. Letters of support from the Dean of CNAS can be found in Appendix IV, and a memorandum from the Executive Committee of CNAS in Appendix V.

**Biochemistry**
- Gregor Blaha (Assistant Professor, Ph.D.)
- Richard Debus (Professor, Ph.D.)
- Li Fan (Associate Professor, Ph.D.)
- Russ Hille (Distinguished Professor, Ph.D.)
- Seán O’Leary (Assistant Professor, Ph.D.)
- Jeff Perry (Assistant Professor, Ph.D.)
- Jikui Song (Assistant Professor, Ph.D.)

**Biology**
- Richard Cardullo (Professor, Ph.D.)
- Theodore Garland (Distinguished Professor, Ph.D.)
- Nicole Rafferty (assistant Professor, Ph.D.)

**Botany and Plant Sciences**
- Darrel Jenerette (Associate Professor, Ph.D.)
- Dawn Nagel (Assistant Professor, Ph.D.)
- Carolyn Rasmussen (Assistant Professor, Ph.D.)
- Louis Santiago (Associate Professor, Ph.D.)

**Chemistry**
- Huiwang Ai (Assistant Professor, Ph.D.)
- Chia-en Chang (Associate Professor, Ph.D.)
- Joseph Genereux (Assistant Professor, Ph.D.)
- Richard Hooley (Associate Professor, Ph.D.)
- Ryan Julian (Professor, Ph.D.)
- Len Mueller (Professor, Ph.D.)
- Yinsheng Wang (Professor, Ph.D.)
- Min Xue (Assistant Professor, Ph.D.)
- Wenwang Zhong (Professor, Ph.D.)

**Physics**
- Mark Alber (Distinguished Professor, Ph.D.)
- John Barton (Assistant Professor, Ph.D., arriving 1/1/18)
- Umar Mohideen (Professor, Ph.D.)
- Roya Zandi (Professor, Ph.D.)

### Section 5. Courses

No new didactic courses are required to implement the proposed program, although new Biophysics Seminar (tentatively BPHY 252), Research Rotation (tentatively BPHY 297) and Dissertation Research (tentatively BPHY 299) courses will need to be established. Three existing courses, BCH 184 (Physical Biochemistry, 4 units), BIOL 203 (Cellular Biophysics, 3 units) and PHYS 246 (Biophysics, 4 units each) will constitute the core curriculum for the proposed program. Syllabi for these three courses along with their catalog descriptions are provided in Appendix VI.

Additional elective courses appropriate for the program include:

- BCH 186 (Topics in Molecular Bioenergetics, 3 units)
- BCH 187 (Fundamentals of Enzymology, 3 units)
- BCH 210 (Biochemistry of Macromolecules, 4 units)
- BCH 230F (Advanced Topics in Biochemistry: Enzymology)
- CHEM 201A (Advanced Physical Chemistry: Quantum Mechanics, 3 units)
- CHEM 201B (Advanced Physical Chemistry: Quantum Mechanics and Spectroscopy, 3 units)
- CHEM 201C (Advanced Physical Chemistry: Elementary Statistical Mechanics, 3 units)
CHEM 201D (Advanced Physical Chemistry: Thermodynamics, 3 units)
CHEM 201E (Advanced Physical Chemistry: Kinetics, 3 units)
CHEM 206A (Introduction to Computational Quantum Chemistry, 3 units)
CHEM 206B (Modeling Chemical and Biochemical Molecules, 3 units)
CHEM 209M (Introduction to NMR, 3 units)
CHEM 211D (Spectrometry in Organic Structure Analysis, 3 units)
CHEM 229M (Introduction to NMR, 3 units)
PHYS 145ABC (Biophysics, 4 units each)
PHYS 212A (Thermodynamics and Statistical Mechanics I, 4 units)
PHYS 212B (Thermodynamics and Statistical Mechanics II, 4 units)

Catalog descriptions of the above courses are provided in Appendix VII. All courses are currently offered, (some in alternate years), and all are currently staffed. New elective courses can be added upon approval as described in Section 8.

Section 6. Resource Requirements

6.1) **FTE faculty.** No additional faculty positions are sought, although new or replacement positions awarded to departments with participating faculty in the proposed program can reasonably be expected to expand the program over time. The process for admitting new faculty to the program is described in Section 8, in Article II.1 of the by-laws. Administrative support will be provided by the Graduate Student Affairs Center of CNAS, which presently administers 16 graduate programs; as indicated above one staff member has already been identified to work with the proposed program. Support for the Director will be provided by CNAS commensurate with that provided other Directors of interdepartmental graduate programs (e.g., Cell, Molecular and Developmental Biology; Genetics, Genomics and Bioinformatics; Environmental Toxicology), as described in the letters provided by CNAS Dean Uhrich and Divisional Deans Umar Mohideen (Physical Sciences and Mathematics) and Frances Sladek (Life Sciences) (Appendix IV).

6.2) **Library acquisition.** The UCR library system, in particular the Science Library, currently subscribes to all the major journals relevant to Biophysics, and also purchases the important books, monographs and the like in the field. No increase in demand for new acquisitions is anticipated.

6.3) **Computing costs.** No increases in computing costs are anticipated beyond those associated with UC Riverside’s projected growth in faculty and research portfolio, as laid out in the campus’s Strategic Plan. Personal computer facilities are available in the laboratories of all the participating faculty, providing access to the Internet. The computer facilities of the Science Library are also available to student and participating faculty of the program. More advanced computing capabilities are available in the laboratories of several of the participating faculty, who also have access to off-campus supercomputing facilities as needed.

6.4) **Equipment.** No new equipment is required to implement the proposed program, although one of the expected benefits accruing from its creation is that greater interaction among laboratories will identify common equipment needs for which extramural funds will be sought. While institutional matching funds are typically required of granting agencies in making such awards, these are usually modest relative to the total cost of the instrumentation. As a particular example, plans are being made for the submission of a proposal for a 900 MHz NMR instrument that will be used by several of the participating faculty of the proposed program, to be housed in space already available in the Chemical Sciences Building.
6.5) **Space and other capital facilities.** None, although again plans are being made for the submission of a proposal for a 900 MHz NMR instrument that will be used by several of the participating faculty of the proposed program, to be housed in specifically designed space already available in the Chemical Sciences Building. Additional space may be made available in the MRB1 building that is presently under construction, scheduled for completion at the end of 2018.

6.6) **Other operating costs.** As indicated above, support for the Director of the proposed program will be provided by CNAS, consistent with its policies as outlined in the Deans’ letters (Appendix IV). Additionally, administrative services will be provided by the CNAS Graduate Student Affairs Center as discussed above. Again, this Center already provides administrative support for 16 graduate programs, and the proposed program does not substantively increase its workload. A staff member of the Center has already been identified to serve the proposed program.

**Section 7. Graduate Student Support**

Graduate students in the proposed program will be supported by a combination of sources. Support in the first year will be provided by fellowships through the Graduate Division, and creation of the program is consistent with the Graduate Division’s projected growth of graduate fellowships as the number of UCR faculty grows. In consultation with the Graduate Division, former Dean Childers was enthusiastic about creation of the program. At the end of the first year students will have selected a dissertation advisor and will typically be supported thereafter as research assistants on grants awarded to their dissertation advisors, individual pre-doctoral fellowships from federal granting agencies and private foundations, and/or teaching assistantships provided either by the home department of the student’s dissertation advisor or through the Teaching Assistantship Allocation Committee (TAAC), which makes assignments for all graduate programs in the Life Sciences. The TAAC has a strong track record of providing support for graduate students in 16 different graduate programs, specifically including successful interdepartmental graduate programs such as Cell, Molecular and Developmental Biology and Genetics, Genomics and Genomics. While the Graduate Division has no formal requirement for 301/302-level coursework to provide training in becoming a teaching assistant, biophysics students holding teaching assistantships in departments that require 301/302 coursework will take them. As laid out in the Deans’ letters provided in Appendix IV, the CNAS leadership is strongly committed to ensuring continuous funding for all the program’s students in good academic standing throughout their time in the proposed program as described in. It is to be emphasized that CNAS has demonstrated an outstanding track record to support for graduate students that is clearly articulated in the Deans’ letters in Appendix IV and is far more specific than letters of support for past proposals for the creation on interdepartmental graduate programs (e.g., GGB, CMDB and Materials Science). Students in the proposed program can thus expect to have the benefit of appropriate support from the college.

**Section 8. Governance**

The Program will be administered by a Director and a three-member Executive Committee. The Director, in conjunction with an administrator from the CNAS Graduate Affairs Center, will be responsible for the day-to-day operation of the program, including admissions, student advising and monitoring students' progress through the Program. The members of the Executive Committee will chair subcommittees for Graduate Admissions, Graduate Oversight and Curriculum, with each subcommittee comprised of two additional participating faculty members from the Program.

The proposed graduate program will be governed by the following by-laws:
Article I. Objective

The proposed Biophysics Graduate Program is intended to encourage broad-based study of and post-graduate training in biophysics and to foster communication between biophysicists within different departments on the UC Riverside campus. The Program is thus intended to be interdepartmental, and includes some 27 faculty from the departments of Biochemistry, Biology, Botany and Plant Sciences, Chemistry and Physics. The program’s primary objective is to train scientists able to teach and conduct research in the area of biophysics. The proposed Biophysics Program will offer both a M.S. and a Ph.D. in Biophysics.

Given the departmental distribution of the biophysics community on campus, graduate students will have the opportunity to incorporate a wide range of disciplines into their training experience. Programs of study will be tailored to the interests and goals of individual students.

Article II. Membership

1) Membership Criteria. The participating faculty recognize that involvement in a graduate program can take many forms, although the principal one is obviously training of graduate students in the field as broadly defined. Criteria for membership can include 1) maintenance of an active research program in the area of biophysics as broadly defined; 2) service on graduate student General Examination and Dissertation Committees; 3) continued participation in the Biophysics program by emeritus faculty, and 4) support of research endeavors in the field of biophysics by non-Academic Senate members. Approval of new members to the Biophysics program will be vested in the Executive Committee. Faculty requesting membership in the Biophysics Program should send a curriculum vitae to the Graduate Program Director with a cover letter describing how the candidate expects to be involved in the program. The Director will then forward the documents to the Executive Committee for consideration. With a favorable review, an e-mail vote of the participating faculty will be taken; membership will be conferred with a positive vote by a majority of the responding faculty.

2) Membership Retention. The membership status of Biophysics faculty will be reviewed every three years by the Executive Committee. Criteria used to evaluate members can include serving as a major professor or as a member of advisory, candidacy exam or supervisory committees for Biophysics graduate students; service on committees of the Biophysics Program; attendance at seminars; participation in recruitment activities and other Biophysics Program functions. Faculty whose membership is to be evaluated will be notified in Fall of the academic year and may be asked to supply a brief summary of their Biophysics-related activities to the Executive Committee by the end of the Fall quarter. The Executive Committee will complete its evaluations by the end of Winter quarter of the same academic year.

3) Termination of Membership. A participating faculty member who wishes to leave the program may request termination of their membership at any time by sending a memo to the Program Director. Program members whose participation is deemed below that sufficient for good standing will be reviewed by the Executive Committee to determine the source of any problems and to recommend solutions. Members will be given a year to improve their participation in the Biophysics Program before facing termination.

Article III. Organization and Administration

As indicated above, the administration of the program and its activities will be vested in an Executive Committee consisting of three program members in addition to the Biophysics Program Director, who will serve as chair. Each of these will chair one of the three standing committees of the Program: Recruitment and Admissions, Graduate Oversight and Curriculum, with the responsibilities described below.
1) **Program Director.** The Graduate Program Director will be responsible for the overall direction and organization of the Biophysics Program and will chair the Executive Committee. The appointment of the Program Director will be in keeping with the regulations of Graduate Council. Initially, the Dean of the Graduate Division will solicit nominations from the program faculty and make an appointment. Afterwards, the Executive Committee will solicit confidential nominations from the participating faculty and submit the names of no more than two qualified faculty to the Dean of the Graduate Division, along with a supporting statement for each nominee. The Dean of the Graduate Division will then forward his/her final nominee to the Chancellor, who will make the actual appointment of the new Program Director. The Biophysics Program Director will be the Biophysics representative at CNAS chairs meetings and other meetings on campus requiring representation of the program. The Biophysics Program Director will send nominations of faculty to serve as Graduate Advisor to the Dean of the Graduate Division as well as nominations of faculty to serve as chairs of the program’s standing committees. The Biophysics Program Director will appoint additional members to these standing committees (see below).

2) **Chair, Recruitment and Admissions.** The chair of the Recruitment and Admissions committee will be responsible for recruiting students to the Program and assessing the files of applicants to the program. The Recruitment and Admissions Chair will be nominated by the Biophysics Program Director, with final approval given by the Dean of the Graduate Division.

3) **Chair, Graduate Oversight.** The chair of the Graduate Oversight Committee will serve as Graduate Advisor and will be responsible for the overall academic advising of students in the Biophysics Program. S/he will be responsible for revisions of the Graduate Student Handbook and will be responsible for setting up faculty rotation schedules for first-year graduate students. S/he will also be responsible for advising students as to forming their Qualifying Examination and Dissertation Committees, and will have responsibility of the Program’s annual Comprehensive Examination. The Dean of the Graduate Division will give final approval of the Qualifying Examination and Dissertation Committees. As Graduate Advisor, the chair of the Graduate Oversight Committee will be nominated by the Biophysics Program Director, with final approval given by the Dean of the Graduate Division.

4) **Chair, Curriculum.** The chair of the Curriculum Committee will oversee the assessment of the Program curriculum and implementation of changes in same, as described further below. With his/her committee, s/he will also have overall responsibility for organizing the Program’s seminar series. The Recruitment and Admissions Chair will be nominated by the Biophysics Program Director, with final approval given by the Dean of the Graduate Division.

**Article IV. Committees**

1) **Executive.** The administration of the program and its activities will be vested in an Executive Committee consisting of four members: Biophysics Program Director who will serve as chair, and the chairs of the program’s three standing committees. The Executive Committee will act in an advisory capacity to the Program Director for any issues that arise concerning the Biophysics Program and will be responsible for review and approval of new faculty to the Biophysics program and for final decisions on termination of membership. The Executive Committee will also facilitate the process used to nominate new Program Directors. It will meet at least once per year, more frequently as needed.

2) **Recruitment and Admissions.** The Recruitment and Admissions Committee will be responsible for recruitment activities and review of applications of students who wish to enter the Biophysics Program. This committee will send files of qualified applicants, along with supporting documentation, to the Graduate Division Dean, who will make the final decision regarding admission and Graduate Division fellowship support. The Recruitment and Admissions Committee
will also coordinate the recruitment visits of admitted graduate students to UCR, oversee the
maintenance of the program website and prepare advertising/recruitment materials for the
program.

The Recruitment and Admissions Committee will consist of the committee Chair from the
Executive Committee plus two participating faculty members appointed by the Director, and will
meet as necessary to review files and plan recruitment activities. The term of membership on the
Admissions Committee will be three years.

3) Graduate Oversight. The Graduate Oversight Committee will be responsible for overseeing
students’ progress through the program, and will assist the Chair of the committee in forming
students’ Qualifying Examination and Dissertation Committees, and in the preparation of the
Program’s annual Comprehensive Examination.

The Graduate Oversight Committee will consist of the committee Chair from the Executive
Committee plus two participating faculty members appointed by the Director, and will meet as
necessary to undertake its responsibilities. The term of membership on the Admissions
Committee will be three years.

4) Curriculum. The Curriculum Committee will be responsible for assessment of and changes to the
curriculum of the Biophysics program, and will make recommendations for such changes to the
curriculum as are deemed appropriate, including the addition of new elective courses, to the
participating Biophysics faculty during a Biophysics faculty meeting. A subsequent e-mail vote will
be held to approve or disapprove the recommended changes. In order to be considered approved,
at least 51% of the participating program faculty must vote in favor of the changes to the program
curriculum. The Curriculum Committee will also be responsible for administering the Program’s
seminar series, selecting and hosting speakers and planning program retreats or research
symposia. The Curriculum Committee will meet at least once per year.

The Curriculum Committee will consist of the committee Chair from the Executive Committee plus
two participating faculty members appointed by the Director, and will meet as necessary to
undertake its responsibilities. The term of membership on the Admissions Committee will be three
years.

Article V. Changes to the By-Laws

Changes to the by-laws of the program will be considered at a meeting of the participating
faculty, and a subsequent e-mail vote will be held to approve or disapprove the proposed changes. In
order to be considered approved, at least 51% of the participating program faculty must vote in favor
of the changes to the program’s by-laws.

Section 9. Changes in Senate Regulations

No changes in Academic Senate Regulations are required.
Appendices

I. Faculty CV’s

II. Faculty Letters of Participation

III. Departmental Chair and Program Director Letters

IV. Letters from CNAS Dean

V. CNAS Executive Committee memo

VI. Syllabi for Core Courses

VII. Course Catalog Descriptions of Elective Courses
Graduate Council

November 21, 2017

To: Dylan Rodriguez, Chair
   Riverside Division

From: Christiane Weirauch, Chair
       Graduate Council

Re: Revised Biophysics Proposal

Graduate Council reviewed the revised Biophysics proposal at their November 16, 2017 meeting. The Council is very supportive of this new program but would like clarification on the following items:

- TAships – explicitly listing TAAC as a mechanism to secure TAships for students in this interdepartmental program is a strength, but it would be good to explore potential buy-in from departments and to mention this in the proposal.

- Please specify the number of required lab rotations in the proposal. This information is useful for students and prevents confusion.

- Section 2.3d: “Students will also be required to complete the Responsible Conduct of Research program provided by the Graduate Division”: it is unclear what this “program” entails, given there is no detail on the corresponding webpage. Please be more specific.

- Professional Development (PD): clarify the last bullet point (“Responsible Conduct of Research program”). As per current catalog copy PD training is explained as “Training typically includes elements of research and professional ethics, grant and professional writing, strategies for success in graduate school and the profession, pedagogy, public speaking, career and job market guidance, and other relevant topics to help students become successful professionals.” The currently listed requirements are integral parts of a graduate program, but PD requirements would ideally address additional training aspects and be more rigorous.
October 20, 2017

To: Dylan Rodriguez, Chair
   Riverside Division

From: Jiayu Liao
       Committee on Library and Information Technology

Re: [Campus Review] New Graduate Program Proposal: Revised Biophysics Interdepartmental Graduate Program

The Committee on Library and Information Technology reviewed the [Campus Review] New Graduate Program Proposal: Biophysics Interdepartmental Graduate Program at their October 19, 2017 meeting and voted to support the program. Although it was noted in the proposal that there will be no increase in demand for new library acquisitions and no increases in computing costs, the committee believes that if this new program brings new faculty and students to campus, this will need to be re-evaluated as more computer support and dedicated lab space will be needed.
PLANNING & BUDGET

December 21, 2017

To:            Dylan Rodriguez, Chair
               Riverside Division

From:  Christian Shelton, Chair
        Committee on Planning and Budget

RE:        Revised Biophysics Proposal

P&B discussed the revised proposal for a graduate program in Biophysics and feels that the
issues the committee raised last year have been addressed and resolved. The revised proposal
makes it clear how this program fits into UCR's plans to increase the size of graduate
programs.

Separately, P&B noted that the current difficulties of budgetary support for interdisciplinary
programs remain. This is not unique to this proposal and does not stand in the way of P&B's
support of the Biophysics proposal.

Yet, some of the issues raised in the last round of review were mitigated in the current
proposal by the reduction of the proposal to a single college.

For the first cycle of review by Graduate Council, P&B suggests that potential problems with
interdisciplinary funding be paid special attention to.
To the University Senate:

Please find attached a revised proposal to create an interdepartmental graduate program in Biophysics at UCR, the original version having been submitted December 21, 2016. In their reviews of the original proposal, both Graduate Council and the Senate Committee on Budget and Planning expressed support for the proposed graduate program, but each had concerns that warranted the present revision. These concerns, and the responses to them, are summarized below.

Graduate Council expressed concern regarding funding of the program, and asked for additional information regarding compensation for the program Director and overall support for the program. There was also a general statement made regarding faculty diversity. Regarding diversity, a second round of solicitations to participate has been circulated, and of the 27 faculty now participating in the revised proposal, seven are women and eleven are minority, a significant improvement.

Regarding support for the program, new wording in Sections 1.6, 6.1, 6.6 and the Introduction to Section 8 emphasizes that the proposed program will be administered by the CNAS Graduate Affairs Center, which presently provides administrative services for 16 departmental and interdepartmental graduate programs. The proposed program represents only a modest increase in the Center’s workload, and a member of the Center’s staff has already volunteered to serve the proposed program.

By far the most substantive change to the proposal has been the removal of ten faculty in BCOE, with all remaining 27 participants being in CNAS. This was necessitated in response to concerns expressed by Graduate Council, which specifically stated:

“Given the campus-wide nature of the program, the Council feels that funding should be defined and commitments outlined at inception. This could involve discussion and commitment among the deans of the various colleges (who have all indicated support of the proposal), or perhaps funding of these programs could be best managed at the provost level. Either way, budget support should be determined in detail, including provisions for future expansions, before the program begins.”

In attempting to address this concern, Deans Kathryn Uhrich of CNAS and Sharon Walker of BCOE met in early July to discuss a joint response. At the end of the day, Dean Walker made clear that while she fully supported the creation of the proposed program she was not prepared to make any specific financial commitment to it. Given the express concerns of Graduate Council, this decision has necessitated dropping BCOE participants so that all participating faculty are now from CNAS. I personally find this unfortunate, but Graduate Council has clearly articulated its concerns and there is simply no other way forward. I observe that with 27 participants, the revised proposal remains well above critical mass and retains broad programmatic depth.

To address the concerns expressed by Graduate Council, a second letter from the CNAS Dean and Divisional Deans of the Life Sciences and Physical Sciences and Mathematics has been provided in Appendix IV, and as indicated there and in modified wording to Sections 6.1 and 6.6, compensation for the Program Director will be provided by the CNAS Dean’s office in a manner consistent with college policy, as described in the letter. This letter also clearly articulates the Deans’ commitment to provide a level of support appropriate to ensure the success of the proposed program, including the allocation of teaching assistantships for program students through the TA Allocation Committee.
responsible for assigning TAs for all the Life Science graduate programs. This commitment represents a level of support comparable to that enjoyed by other interdepartmental graduate programs in the Life Sciences, including Cellular, Molecular and Developmental Biology, and Genetics, Genomics and Bioinformatics, which by any measure must be considered very successful. I trust this second letter of support from CNAS satisfactorily addresses the concerns raised by Graduate Council.

The Committee on Budget and Planning voted unanimously in support of the program, but commented on the need for the proposed curriculum to comply with Graduate Division requirements regarding 301/302-level coursework and requested additional information concerning the relationship of the proposed graduate program to existing ones and how teaching assistantships would be allocated for program students. Regarding the 301/302-level coursework, it is to be noted that Graduate Division has no formal requirements for these courses, which provide department-specific training for prospective teaching assistants. Section 7 has been expanded, however, to include a statement that program students seeking teaching assistantships should comply with departmental requirements for such coursework in order to be eligible.

Regarding the relationship of the proposed program to existing ones, Section 1.4 has been substantially expanded to emphasize the point made in the original proposal that the intent is to complement rather than duplicate or compete with existing graduate programs, and specifically to recruit a cadre of students seeking study and training in biophysics who would not have otherwise considered UC Riverside. The Committee specifically asked the question “how will faculty in biophysics be able to increase their total number of mentored graduate students without additional faculty lines?”, which seems to suggest that the program can only grow at the expense of others, and that the number of participating faculty and the size of their research programs is static. Suffice it to say that the research programs of the participating faculty are substantially under-staffed at present, a situation that has been a major impetus for proposing the new graduate program in the first place. It is further to be emphasized that the number of faculty working in the area of biophysics has been rapidly expanding, with 12 of the participating faculty hired in the last two years. Three additional hires have been approved in the coming year in Biochemistry, Chemistry and Physics and there is every reason to believe this expansion will continue for the foreseeable future. While these hires are not required for the success of the proposed program, they do underscore how timely the present proposal is. The demand for graduate students working in the area is only expected to increase and there is every reason to believe that the participating faculty will be able to accommodate the anticipated increase in graduate students accruing from the program’s growth, as projected in Section 1.3. Creation of the proposed graduate program is also fully consistent with the projected growth of the Graduate Division as the size of the faculty expands.

Finally, the Committee requested additional information regarding the allocation and administration of teaching assistantships for the program’s students. In response, Section 7 has been expanded considerably to address this and, as referred to above, a new letter from the CNAS Dean has been provided in Appendix IV that clearly articulates their commitment to providing teaching assistantships and other resources sufficient to ensure the success of the proposed program.

In addition to these specific responses to points raised by Graduate Council and the Committee on Budget and Planning, a number of stylistic changes have been made throughout the proposal and two egregious grammatical mistakes have been corrected. These are not enumerated.

In conclusion, I would like to thank both Graduate Council and the Committee on Budget and Planning for their thoughtful critiques of the original proposal. I look forward to learning of final disposition of the revised proposal.

Sincerely,

Russ Hille
Distinguished Professor of Biochemistry
December 21, 2016

University Senate
University of California, Riverside

Dear Colleagues:

I attach for your consideration a proposal to create an interdepartmental graduate program in Biophysics at UC Riverside. The 31 participating faculty represent seven departments in two colleges, and collectively reflect the full breadth of biophysics as presently practiced internationally.

In addition to the body of the proposal, including an executive summary, seven appendices are included containing the following:

- CV’s of participating faculty
- letters of participation form the participating faculty
- letters from the seven departmental chairs at UCR as well as letters from the directors of two existing interdepartmental graduate programs at UC Berkeley and UC Davis
- letters of support from the Deans of CNAS and BCOE
- memoranda of approval from the Executive Committees of CNAS and BCOE
- syllabi for the proposed core curriculum
- catalog descriptions of the proposed elective courses

I submit the following names as suggested internal and external examiners:

Wendy Salzman, Department of Biology, UCR  michele.salzman@ucr.edu
Mary Droser, Department of Earth Sciences, UCR  mary.droser@ucr.edu
Jay Gan, Department of Environmental Sciences, UCR  j.gan@ucr.edu
Howard Judelson, Department of Plant Pathology & Microbiology, UCR  howard.judelson@ucr.edu
Jory Yarmoff, Department of Physics, UCR  jory.yarmoff@ucr.edu
David Britt, Department of Chemistry, UC Davis  rdbritt@ucdavis.edu
Carlos Bustamante, Department of Physics, UC Berkeley  carlos@alice.berkeley.edu
Alison Butler, Department of Chemistry, UC Santa Barbara  butler@chem.ucsb.edu
Susan Miller, Department of Pharmaceutical Chemistry, UC San Francisco  Susan.MillerPhd@ucsf.edu
Tom Poulos, Department of Biochemistry, UC Irvine  poulos@uci.edu

Thank you for your consideration, and I look forward to hearing back from you in due course.

With best regards,

Russ Hille, Ph.D.
Distinguished Professor of Biochemistry
A Proposal for an Interdepartmental Program of Graduate Studies in Biophysics for the M.S. and Ph.D. Degrees

Prepared September 14, 2016; revised August 22, 2017

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Executive Summary
An interdepartmental graduate program in the field of Biophysics is proposed, justified on the basis of the intrinsic importance of the field in the life sciences and the growing number of faculty at UC Riverside who are presently working in the area as broadly defined. The intent is to provide a means to recruit and train a new cadre of graduate students to UCR that will complement existing graduate programs on campus and provide trainees for the research programs of the participating faculty. Areas of existing expertise on campus include macromolecular structure determination, spectroscopic methods of various sorts, photosynthesis, physiological ecology and ecosystem processes, computational/mathematical modeling of biological systems, biological electron transfer, neurobiophysics and protein engineering. Formal course requirements will consist of a core curriculum and electives that amount to approximately one full academic year of coursework, and will be comprised of existing classes. Training in professional integrity and the responsible conduct of research will be explicit components of the curriculum. Basic requirements for the M.S. Plan II degree will consist of successful completion of the coursework and passing a Comprehensive Examination prepared and graded by the participating faculty. For the Ph.D. degree, in addition to the requirements for the M.S. Plan II degree, students will be expected to complete a Qualifying Examination consisting of the preparation and defense of a research proposal based on their dissertation research and prepared in the format of a regular grant proposal to the National Science Foundation or National Institutes of Health. Upon successfully completing the Qualifying Examination, Ph.D. students will be expected to complete an independent research project under the direction of a three-member dissertation committee chaired by a faculty member in the Program who will serve as the student’s dissertation advisor. The dissertation advisor will be responsible for direction of the research, including providing an appropriate environment and other resources required to undertake the research. The Dissertation Committee will provide general guidance in the course of research, and be responsible for administering the final oral defense of the dissertation arising from the research, which will consist of a public presentation of the principal findings of the research followed by a private defense of the dissertation.

The Program will be administered by a Director and a three-member Executive Committee. The members of the Executive Committee will be responsible for graduate admissions, graduate oversight and curriculum, with each chairing a standing committee comprised of two additional participating faculty members from the Program. The Director, in conjunction with an administrator from the CNAS Graduate Student Affairs Center, will be responsible for the day-to-day operation of the program, including admissions, student advising and monitoring students’ progress through the Program.
Section 1. Introduction

1.1) Aims and objectives of the program. The objectives of the proposed interdepartmental graduate program are to provide graduate training leading to the M.S. and Ph.D. degrees in Biophysics, and to promote teaching and research in the field of Biophysics by students and faculty at the University of California, Riverside. Biophysics is a major area of study and research in the life sciences, and attracts a considerable number of students. Biophysicists are needed by institutions of higher learning, and by federal, state and private research organizations in order to fulfill their respective missions. UC Riverside has considerable strength in the area of Biophysics, but this strength has a relatively low level of national visibility given the broad dispersal of the faculty working in the area on campus and the absence of a cohesive training environment.

1.2) Historical development of the field. Biophysics as an academic discipline arose in the mid-19th Century out of studies by a group of German physicians and physiologists whose work focused on various aspects of electrophysiology and sensory stimulus, which in turn had grown out of the earlier work of Galvani and Volta. By the mid-20th Century, a formal Biophysical Society had been created in the US as an outgrowth of the American Physiological Society, and the Biological Physics Division of the American Physical Society had been established. At this time the discipline had grown to encompass a great many areas of research utilizing a variety of physical methods to study biological phenomena, as well as computational modeling of same. Examples include: structural biology, spectroscopy, electrophysiology, bioenergetics and biomechanics, neural networks, single-molecule dynamics, theoretical biology and a wide range of computational methods. Today the combined membership of the Biophysical Society and the APS Division of Biological Physics includes over 10,000 scientists, a large and thriving intellectual community. Here at UC Riverside, there has been significant investment in faculty hiring in the area of biophysics in several departments, and an undergraduate track in Biophysics already exists as part of the BS major in Physics. A number graduate and undergraduate courses are in place in the Physics and Astronomy Department, as well as the departments of Biochemistry and Chemistry. Significantly, substantial expertise already exists on campus in areas recognized as lying within Biophysics, including: macromolecular structure determination, spectroscopic methods of various sorts, photosynthesis, physiological ecology and ecosystem processes, biological electron transfer, computational/mathematical modeling of biological systems, neurobiophysics and protein engineering. The departments Biochemistry, Chemistry and Physics and Astronomy have all made multiple hires in the area of biophysics over the past few years, and the rapid growth of this community has provided the impetus for the creation of a graduate program in Biophysics. The proposed program will be essential to maximize the growth and vigor of the research programs of both existing and future faculty at UC Riverside working in the area.

1.3) Timetable for development of the program. Upon approval of the Program, a Director will be appointed by the Dean of the Graduate Division and the program’s standing committees established as described in Section 8 below. A website describing the new program and the research interests of its participating faculty will be created to advertise the program, and graduate admissions will commence, focusing on Ph.D. applicants. We anticipate a graduate admission rate of 5-10 students per year over the first several years of the Program, and 5-15 thereafter. Assuming an average matriculation-to-graduation time of 4.5 to 5 years, the Program will eventually grow to approximately 45 students. Given the significant amount of faculty recruitment in Biophysics that has taken and continues to take place on campus, the number of participating faculty is expected to grow, which may well lead to even more rapid growth of the Program. Table 1 provides a timetable for anticipated Ph.D. enrollment.
1.4) Relation of the proposed program to existing programs and to the Campus Academic Plan. Biophysics is inherently interdisciplinary, and the proposed program will effectively complement existing graduate programs in the Departments of Biochemistry, Chemistry and Physics and Astronomy. The majority of participating faculty also come from these academic units, and the proposed Program will provide them with a new source of trainees to participate in their individual research programs. The intent is to create a mechanism for the recruitment of a cadre of graduate students interested in studying and training in biophysics that would not otherwise have considered UC Riverside. For this reason, it is to be expected that any negative impact on existing programs will be negligible. The proposed program is also consistent with the growth of the graduate student population at UC Riverside anticipated by the Graduate Division, and former Dean Joe Childers was specifically enthusiastic about the creation of the program. A major focus of the Campus Academic Plan is growth of UC Riverside’s research portfolio (particularly the NIH-supported component), and achieving AAU accreditation. Much of the field of biophysics in fact has immediate biomedical relevance, and creation of a Biophysics Program is thus fully aligned with the Campus Academic Plan. Graduate programs are the engine of the research enterprise in the laboratory sciences, and creation of a graduate program in Biophysics can be expected to facilitate the development of new and expanded research programs by the participating faculty. Creation of the program is also justified by the significant level of faculty recruitment in the area at UC Riverside over the past several years in several departments, with a critical mass of faculty now having been achieved. Indeed, a major impetus for the creation of the program was the insufficiently large pool of graduate students available to the participating faculty, particularly junior faculty eager to establish their laboratories. Additional faculty growth in the area of biophysics is a specific component of the strategic plans for (minimally) the departments of Biochemistry, Chemistry and Physics, and the demand for graduate students will only increase in future.

1.5) Interrelationship of the program with other UC institutions. The majority of Biophysics programs at other UC campuses fall into two groups: Berkeley, Davis and San Francisco have interdepartmental graduate programs in Biophysics similar to that being proposed here, while Los Angeles, Santa Barbara, Santa Cruz and San Diego have competing tracks or sections in both their Physics and Chemistry/Biochemistry Departments. Additionally, Irvine has a Department of Physiology and Biophysics in its School of Medicine, and Merced has a Biophysics track in the Ph.D. program of its Department of Physics. Given the distribution of the participating faculty at UC Riverside, the interdepartmental graduate program model seen at Berkeley, Davis and San Francisco is considered the more appropriate for UC Riverside, and the solicited letters from the Directors of the interdepartmental graduate programs at both Berkeley and Davis are very supportive (see Appendix III); clearly, there is no perceived concern regarding competition between campuses. Indeed, given the important role of Biophysics in the biological sciences, all research universities involved in graduate training in the biological sciences would be well served by providing a degree program in biophysics. UC Riverside is no exception.
1.6) **Administration.** As described in detail in Section 8 below, the Program will be administered by a Director and a three-member Executive Committee. The members of the Executive Committee will be responsible for Graduate Admissions, Graduate Oversight and Curriculum, with each chairing a standing committee comprised of two additional participating faculty members from the Program. The Director, in conjunction with an administrator from the CNAS Graduate Student Affairs Center, will be responsible for the day-to-day operation of the program, including admissions, student advising and monitoring students’ progress through the Program. The Graduate Student Affairs Center presently oversees the administration of 16 graduate programs, and the addition of one more does not significantly increase the workload of its staff. Indeed, a staff member has already volunteered to take responsibility for the proposed program. The Chair of the Graduate Oversight Committee will serve as graduate advisor and will be responsible for administering the Cumulative Examination, which will consist of questions provided by the participating faculty.

1.7) **Plan for evaluation of the program.** In the first two years, the participating faculty will self-evaluate the graduate program prior to the normal third-year review to be conducted by Graduate Council that is required for all new graduate programs at UC Riverside. Thereafter, the program will be evaluated by an external team of experts every 6-7 years, as is the standard practice the Graduate Division at UC Riverside.

Section 2. Program Description

2.1) **Undergraduate preparation for admission.** Students admitted to the Biophysics Graduate Program will be expected to have completed a bachelor’s degree in Biochemistry, Biology, Chemistry or Physics (or related fields) at an accredited 4-year college or university, and to have attained an undergraduate academic record that meets or exceeds the standards established by the Graduate Division of UC Riverside. Students will have completed coursework in chemistry (minimally, one year each of introductory and organic, including laboratories), physics (minimally, one year introductory, including laboratory), mathematics (minimally, one year calculus, plus one upper division course), biochemistry (minimally, one year introductory, including laboratory) and biology (minimally, one year introductory, including laboratory) in addition to upper-division courses in their major. Students with strong academic records may be admitted with coursework deficiencies, provided these are remediated during the first two years of graduate study. Entry into the program will require adequate performance on the Graduate Record Examination (GRE), as well as the Subject Examination in Physics, Chemistry, Biochemistry or Biology.

2.2) **Foreign language competency.** None required.

2.3) **Program of study.**

2.3a) **Specific fields of emphasis.** The program will offer a Master’s (M.S.) Plan II and a doctoral (Ph.D.) degree in Biophysics. Students enrolled in the program are expected to complete core coursework consisting of a one-year (three quarter) series of graduate coursework. Students are also expected to participate in seminars and colloquia, and to become informed about the major technological methods and advances that provide the essential underpinnings to new discoveries in the field. Upon entry, each student will work with the program’s Graduate Oversight Committee to develop an appropriate course of study given the student’s interests, including the assignment of laboratory rotations (tentatively BPHY 297) with three different participating faculty as part of the preceptor selection process.
2.3b) Plans. M.S. Master’s students will complete core coursework in biophysics, and will take at least one graduate seminar course each quarter that they are enrolled. They must take and pass a Comprehensive Examination at the end of their coursework. Ph.D. Doctoral students will be expected to fulfill all requirements for the M.S. degree; the expectation for satisfactory performance on the Comprehensive Examination will be higher than for the M.S. degree. Doctoral students must also pass a combined written and oral Qualifying Examination consisting of: (1) the preparation of a research proposal based on the student’s dissertation work and taking the form of a grant proposal to NSF or NIH; and (2) defense of same before a faculty committee consisting of a Chair and three additional program faculty, plus one external member to ensure fairness (see Section 2.5 below). The student will also undertake a research project leading to a dissertation, with annual presentations to the dissertation committee to assess progress toward degree. Publications in peer-reviewed journals are also expected. In the course of their studies, Ph.D. students will be expected to complete a minimum of two quarters as teaching assistant to gain experience in instruction.

2.3c) Unit requirements. M.S. 36 units of 100 or 200 series courses, of which at least 18 units must be in the graduate 200 series. This coursework will include the program’s graduate core curriculum and courses from a list of approved electives (see Section 5). Ph.D. 36 units of 100 or 200 series courses, of which at least 24 units must be in the graduate 200 series. This coursework will include the program’s graduate core curriculum and courses from a list of approved electives (see Section 5). A minimum of 16 units of coursework other than courses in the 290 series must be completed in fulfillment of the 24-unit program requirement for graduate coursework.

2.3d) Required and recommended courses. All students will be required to take a three-quarter sequence of introductory biophysics (consisting of BCH 184, BIOL 203 and PHYS 246), as well as a series of research rotations in laboratories of participating faculty under the auspices of BPHY 297, as part of the thesis advisor selection process. Participation in the Biophysics Graduate Seminar (tentatively BPHY 252) is also required each quarter that the student is enrolled, and each student is expected to present a formal research seminar in this course prior to graduation. Students will also be required to complete the Responsible Conduct of Research program provided by the Graduate Division. To complete the 36 unit requirements for degree, students will select sufficient courses from a list of approved electives to meet unit requirements (see Section 5).

2.3e) Comprehensive Examination. Both Master’s and doctoral students will be required to pass a three-hour Comprehensive Examination consisting of questions provided by the participating faculty, with topics taken form the core curriculum. The Comprehensive Examination will be graded by those submitting questions, and the results presented to the participating faculty for a decision of PhD Pass, MS Pass, or Fail in each student’s case. The expectation for satisfactory performance on the Comprehensive Examination will be higher for doctoral students than for Master’s students.

2.3f) Licensing/certification requirements. None.

Professional development – The program of study described above incorporates a number of aspects that contribute to the professional development of the program’s graduate students. These include:
• The written component of the General Examination, which is intended to provide experience in the preparation of grant proposals to be submitted to federal granting agencies;
• The oral component of the General Examination, the requirement for an annual research evaluation and requirement to present in BPHY 252, which provide the opportunity to develop presentation skills that will complement those developed in research group meetings and journal clubs that the student may participate in;
• The TA requirement, which includes participation in the Teaching Assistant Development Program administered by the Graduate Division of UC Riverside, which is intended to develop pedagogical skills; and
• Involvement in the Graduate Division’s Responsible Conduct of Research program, which is intended to reinforce a strong sense of professional ethics.

2.4) Field examinations. None.

2.5) Ph.D. Qualifying Examination. Doctoral students must pass a written qualifying examination that, as indicated above, will consist of the preparation of a research proposal based on their dissertation work and taking the form of a grant application to the National Science Foundation or National Institutes of Health. The proposal will be evaluated by an Oral Qualifying Exam committee consisting of a participating faculty member selected by the Director in consultation with the student’s dissertation advisor and three additional program faculty selected by the student and his/her preceptor, and approved by the Program Director. All members of the Oral Qualifying Examination Committee must be members of the Academic Senate, and the Committee will include one external examiner whose principal is to ensure the fairness of the examination, for a total of five committee members. The Committee will not include the student’s dissertation advisor. Once the written proposal is deemed satisfactory by the Committee, the student must pass an oral examination that will consist of a defense of the written research proposal before the student’s Qualifying Examination committee. Upon successful completion of all coursework and passing of the Qualifying Examination, the student will advance to Candidacy.

2.6) Thesis and/or dissertation. Having completed laboratory rotations in BPHY 297 in their first year, students will be expected to have selected a dissertation advisor by the end of their first academic year. The student’s dissertation advisor will chair a Ph.D. Dissertation Committee that will consist of a minimum of two additional members of the Academic Senate, who will normally also be participating members of the Biophysics Graduate Program. All committee members should be able to provide guidance and judge the scholarship of the dissertation research. The student is expected to meet with his/her Dissertation Committee once a year in an Annual Research Evaluation, in which the student formally presents his/her work to date and progress is assessed and input to the research project provided by the committee. During this time, students will be enrolled in sufficient credits of directed research (tentatively BPHY 299) to ensure good standing in the Graduate Division. A written dissertation will be completed by each student in the program.

2.7) Final examination. Doctoral candidates will defend their dissertations in a public, oral presentation at a time announced to members of the University community. The public presentation will be followed by a private defense of the dissertation to the Dissertation Committee, which will make a recommendation to the Graduate Division as to whether the degree of Ph.D. should be conferred.

2.8) Explanation of special requirements. None.
2.9) **Relationship of M.S. and Ph.D. programs.** Students will normally be admitted to the Ph.D. program. Upon passing the Qualifying Examination and advancement to Candidacy, the student may petition the Graduate Division for conferral of the M.S. degree.

2.10) **Special preparation for careers in teaching.** Not applicable.

2.11) **Sample Ph.D. program.** Students enrolled in the proposed program will be expected to complete an individualized curriculum that will include the core coursework described in Section 2.3d above, with additional coursework tailored to the student’s research interests and background (including remediation of deficiencies identified upon admission to the program). Table 2 provides a sample program designed to meet the needs of a student wishing to work in the area of structural biology, with an emphasis in protein structure determination as elucidated by NMR.

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<th>Fall</th>
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<tr>
<td><strong>Year 1</strong></td>
<td><strong>BIOL 203 (Intro)</strong></td>
<td><strong>BCH 184 (Intro)</strong></td>
<td><strong>PHYS 246 (Intro)</strong></td>
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<td><strong>BPHY 290 (Lab Rotation)</strong></td>
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<td><strong>Elective</strong></td>
<td><strong>Elective</strong></td>
<td><strong>Elective</strong></td>
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<tr>
<td><strong>Year 2</strong></td>
<td><strong>CHEM 209M (Introduction to NMR)</strong></td>
<td><strong>CHEM 229Q (Advanced NMR)</strong></td>
<td><strong>BPHY 252 (Seminar)</strong></td>
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<td><strong>BPHY 297 (Research)</strong></td>
<td><strong>BPHY 297 (Research)</strong></td>
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<tr>
<td><strong>Years 3-5</strong></td>
<td><strong>BPHY 252 (Seminar)</strong></td>
<td><strong>BPHY 299 (Dissertation Research)</strong></td>
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<td><strong>BPHY 299 (Dissertation Research)</strong></td>
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2.12) **Normative time from matriculation to degree.** A typical doctoral student will be expected to complete all degree requirements in approximately five years.

**Section 3. Projected Need**

3.1) **Student demand for the program.** The National Research Council recognizes Biochemistry, Biophysics and Structural Biology as major disciplines in the Life Sciences, and specifically ranks Ph.D. programs in these areas. Biophysics and Computational Biology is also a major section of Proc. Natl. Acad. Sci. (USA), emphasizing its importance as a discipline. Significant breakthroughs over the past decade in protein structure determination and a variety of imaging methodologies, new insights into the dynamic behavior of individual protein molecules and advances in understanding the relationship of structure to function (in systems ranging from nitrogen fixation and photosynthesis to the replisome and signal transduction) have brought great attention to Biophysics. These advances in turn have attracted students eager to participate in such discoveries. At the same time, a wide range of career opportunities await individuals trained in biophysics, including positions in the pharmaceutical and chemical industries, academia and both public and private research institutions. The proposed graduate program will provide a coherent, campus-wide umbrella organization under which faculty efforts and resources can be marshaled, faculty and student interactions and research/grant productivity facilitated, and the overall reputation of the campus in the field enhanced. This will then generate even greater interest among potential students who will be attracted to the program. While
students interested in the research programs of the participating faculty are already entering one or another existing departmental graduate program, a formal interdepartmental program will provide prospective students with greater educational and training opportunities and be of greater interest to students specifically seeking a degree in Biophysics. Again, the expectation is that the proposed program will attract a cadre of students who would not otherwise consider coming to UC Riverside and is not expected to have a negative impact on existing graduate programs. It will also address a significant manpower need on the part of the research programs of present and future faculty working in the area.

3.2) *Opportunities for placement of graduates.* There is high demand for biophysicists in a broad range of areas. The development of new drugs in the pharmaceutical industry is increasingly guided by the detailed three-dimensional structures of therapeutic targets (*e.g.*, reverse transcriptases, viral coat protein maturases, membrane channel proteins) and by the modeling of their dynamic behavior and interaction with potential drugs. Similarly, the chemical industry has become increasingly invested in the use of individual enzymes and even entire metabolic pathways in the development of more efficient methods to produce a wide range of commodity and fine chemicals. The US National Laboratories have had a long-standing and strategic interest in the application of sophisticated physical methods to understand biological systems and processes, as have private research institutions such as the Scripps Research Institute and Howard Hughes Medical Institute. Finally, recruitment of biophysicists has become a priority in academia nationwide, and particularly in biomedically relevant areas. This national trend is reflected in recent faculty recruitment at UC Riverside in the Departments of Biochemistry, Bioengineering and Chemistry, and to a lesser extent the Department of Physics. There is every reason to believe that students receiving a Ph.D. in Biophysics from UC Riverside will have excellent job prospects.

3.3) *Importance to the discipline.* Biophysics is an inherently interdisciplinary enterprise, with strong components drawn from Physics, Biochemistry, Mathematics and Chemistry, as well as other life sciences. Having a Ph.D. program that will provide a coherent training program to students across disciplinary lines will provide students with an exceptionally broad perspective that will make them extremely well-qualified to contribute at the cutting edge of modern research in the area. The broad disciplinary distribution of participating faculty in the proposed program will greatly contribute to the breadth of training provided at UC Riverside.

3.4) *Ways in which the Program will meet societal needs.* Over the past 50 years, many of the most important advances in our understanding of the processes of life have been made by biophysicists. Signal contributions include: discovery of the atomic-resolution structure of DNA; elucidation of the genetic code and mechanism of information transfer in biological systems; structure of the ribosome, photosynthetic and nitrogen-fixation systems; behavior of individual molecules of the replisome, topoisomerase, helicase and other complex enzymatic systems working on DNA; the physical basis of transmembrane ion transport, particularly as relates to neuronal function; and visualization/analysis of neural networks. These and other advances have contributed enormously to our understanding of various disease states, including cancer and heart disease, and to the improvement of human health. Students in the proposed Biophysics Program will be able to participate in either basic or applied research in these and other emerging areas and thus contribute to a deeper understanding biological processes and to improved human health.

3.5) *Relationship of the Program to research interests of the faculty.* Many faculty members at UC Riverside are engaged in biophysics-related research, including a significant number of new hires
in the Departments of Biochemistry and Chemistry. The participating faculty are spread across five different departments, and an interdepartmental graduate program such as proposed will provide an effective and much-needed mechanism for facilitating productive interactions among the participating faculty and for generating an enriched training environment for its students.

3.6) **Program differentiation.** Most UC campuses have graduate programs in biophysics (UC Irvine has a Department of Physiology and Biophysics in its School of Medicine), and a biophysics program on each campus is easily justified in light of the information provided in Sections 3.1 - 3.5 above. The strongly supportive letters from the Directors of the interdepartmental graduate programs in Biophysics at Berkeley and Davis (Appendix III) attest to the lack of perceived competition with existing programs at other UC campuses. The proposed program is distinctive in the range of specific physical methods employed by its participating faculty as well as the breadth of the particular biological systems and processes under investigation, factors which combine to provide a unique training environment.

**Section 4. Faculty**

The 27 participating faculty in the proposed Biophysics Graduate Program are self-identified from among five departments in the College of Natural and Agricultural Sciences; of these eight are women and eleven are minority. Each has a significant component of biophysics in his or her research program. Detailed *curricula vitae* are provided in Appendix I, and individual letters of participation in Appendix II. Letters from the Chairs of the Departments of Biochemistry, Biology, Botany and Plant Sciences, Chemistry and Physics and Astronomy are provided in Appendix III, along with letters from the Directors of interdepartmental graduate programs at UC Berkeley, UC Davis and UC San Francisco. Letters of support from the Dean of CNAS can be found in Appendix IV, and a memorandum from the Executive Committee of CNAS in Appendix V.

**Biochemistry**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Doctorate</th>
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<tbody>
<tr>
<td>Gregor Blaha</td>
<td>Assistant Professor, Ph.D.</td>
</tr>
<tr>
<td>Richard Debus</td>
<td>Professor, Ph.D.</td>
</tr>
<tr>
<td>Li Fan</td>
<td>Associate Professor, Ph.D.</td>
</tr>
<tr>
<td>Russ Hille</td>
<td>Distinguished Professor, Ph.D.</td>
</tr>
<tr>
<td>Seán O’Leary</td>
<td>Assistant Professor, Ph.D.</td>
</tr>
<tr>
<td>Jeff Perry</td>
<td>Assistant Professor, Ph.D.</td>
</tr>
<tr>
<td>Jikui Song</td>
<td>Assistant Professor, Ph.D.</td>
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**Biology**

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<tr>
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<tbody>
<tr>
<td>Richard Cardullo</td>
<td>Professor, Ph.D.</td>
</tr>
<tr>
<td>Theodore Garland</td>
<td>Distinguished Professor, Ph.D.</td>
</tr>
<tr>
<td>Nicole Rafferty</td>
<td>Assistant Professor, Ph.D.</td>
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**Botany and Plant Sciences**

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Darrel Jenerette</td>
<td>Associate Professor, Ph.D.</td>
</tr>
<tr>
<td>Dawn Nagel</td>
<td>Assistant Professor, Ph.D.</td>
</tr>
<tr>
<td>Carolyn Rasmussen</td>
<td>Assistant Professor, Ph.D.</td>
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<tr>
<td>Louis Santiago</td>
<td>Associate Professor, Ph.D.</td>
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**Chemistry**

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<tr>
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<tbody>
<tr>
<td>Huiwang Ai</td>
<td>Assistant Professor, Ph.D.</td>
</tr>
<tr>
<td>Chia-en Chang</td>
<td>Associate Professor, Ph.D.</td>
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<tr>
<td>Joseph Genereux</td>
<td>Assistant Professor, Ph.D.</td>
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<tr>
<td>Richard Hooley</td>
<td>Associate Professor, Ph.D.</td>
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<tr>
<td>Ryan Julian</td>
<td>Professor, Ph.D.</td>
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<tr>
<td>Len Mueller</td>
<td>Professor, Ph.D.</td>
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<tr>
<td>Yinsheng Wang</td>
<td>Professor, Ph.D.</td>
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</table>
Physics

Mark Alber (Distinguished Professor, Ph.D.)
John Barton (Assistant Professor, Ph.D., arriving 1/1/18)
Umar Mohideen (Professor, Ph.D.)
Roya Zandi (Professor, Ph.D.)

Section 5. Courses

No new didactic courses are required to implement the proposed program, although new Biophysics Seminar (tentatively BPHY 252), Research Rotation (tentatively BPHY 297) and Dissertation Research (tentatively BPHY 299) courses will need to be established. Three existing courses, BCH 184 (Physical Biochemistry, 4 units), BIOL 203 (Cellular Biophysics, 3 units) and PHYS 246 (Biophysics, 4 units each) will constitute the core curriculum for the proposed program. Syllabi for these three courses along with their catalog descriptions are provided in Appendix VI.

Additional elective courses appropriate for the program include:

- BCH 186 (Topics in Molecular Bioenergetics, 3 units)
- BCH 187 (Fundamentals of Enzymology, 3 units)
- BCH 210 (Biochemistry of Macromolecules, 4 units)
- BCH 230 (Advanced Topics in Biochemistry: Enzymology)
- CHEM 201A (Advanced Physical Chemistry: Quantum Mechanics, 3 units)
- CHEM 201B (Advanced Physical Chemistry: Quantum Mechanics and Spectroscopy, 3 units)
- CHEM 201C (Advanced Physical Chemistry: Elementary Statistical Mechanics, 3 units)
- CHEM 201D (Advanced Physical Chemistry: Thermodynamics, 3 units)
- CHEM 201E (Advanced Physical Chemistry: Kinetics, 3 units)
- CHEM 206A (Introduction to Computational Quantum Chemistry, 3 units)
- CHEM 206B (Modeling Chemical and Biochemical Molecules, 3 units)
- CHEM 209M (Introduction to NMR, 3 units)
- CHEM 211D (Spectrometry in Organic Structure Analysis, 3 units)
- CHEM 229Q (Advanced NMR, 3 units)
- PHYS 145ABC (Biophysics, 4 units each)
- PHYS 212A (Thermodynamics and Statistical Mechanics I, 4 units)
- PHYS 212B (Thermodynamics and Statistical Mechanics II, 4 units)

Catalog descriptions of the above courses are provided in Appendix VII. All courses are currently offered, (some in alternate years), and all are currently staffed. New elective courses can be added upon approval as described in Section 8.

Section 6. Resource Requirements

6.1) **FTE faculty.** No additional faculty positions are sought, although new or replacement positions awarded to departments with participating faculty in the proposed program can reasonably be expected to expand the program over time. The process for admitting new faculty to the program is described in Section 8, in Article II.1 of the by-laws. Administrative support will be provided by the Graduate Student Affairs Center of CNAS, which presently administers 16 graduate programs; as indicated above one staff member has already volunteered to work with the proposed program. Support for the Director will be provided by CNAS commensurate with that provided other Directors of interdepartmental graduate programs (e.g., Cell, Molecular and Developmental Biology; Genetics, Genomics and Bioinformatics; Environmental Toxicology), as described in the letters provided by
6.2) **Library acquisition.** The UCR library system, in particular the Science Library, currently subscribes to all the major journals relevant to Biophysics, and also purchases the important books, monographs and the like in the field. No increase in demand for new acquisitions is anticipated.

6.3) **Computing costs.** No increases in computing costs are anticipated. Personal computer facilities are available in the laboratories of all the participating faculty, providing access to the Internet. The computer facilities of the Science Library are also available to student and participating faculty of the program. More advanced computing capabilities are available in the laboratories of several of the participating faculty, who also have access to off-campus supercomputing facilities as needed.

6.4) **Equipment.** No new equipment is required to implement the proposed program, although one of the expected benefits accruing from its creation is that greater interaction among laboratories will identify common equipment needs for which extramural funds will be sought. While institutional matching funds are typically required of granting agencies in making such awards, these are usually modest relative to the total cost of the instrumentation. As a particular example, plans are being made for the submission of a proposal for a 900 MHz NMR instrument that will be used by several of the participating faculty of the proposed program, to be housed in space already available in the Chemical Sciences Building.

6.5) **Space and other capital facilities.** None, although again plans are being made for the submission of a proposal for a 900 MHz NMR instrument that will be used by several of the participating faculty of the proposed program, to be housed in specifically designed space already available in the Chemical Sciences Building. Additional space may be made available in the MRB1 building that is presently under construction, scheduled for completion at the end of 2018.

6.6) **Other operating costs.** As indicated above, support for the Director of the proposed program will be provided by CNAS, consistent with its policies as outlined in the Deans’ letters (Appendix IV). Additionally, administrative services will be provided by the CNAS Graduate Student Affairs Center as discussed above. Again, this Center already provides administrative support for 16 graduate programs, and the proposed program does not substantively increase its workload. A staff member of the Center has already volunteered to serve the proposed program.

**Section 7. Graduate Student Support**

Graduate students in the proposed program will be supported by a combination of sources. Support in the first year will be provided by fellowships through the Graduate Division, and creation of the program is consistent with the Graduate Division’s projected growth of graduate fellowships as the number of faculty increases. In consultation with the Graduate Division, former Dean Childers was enthusiastic about creation of the program. At the end of the first year students will have selected a dissertation advisor and will typically be supported thereafter as research assistants on grants awarded to their dissertation advisors, individual pre-doctoral fellowships from federal granting agencies and private foundations, and/or teaching assistantships provided either by the home department of the student’s dissertation advisor or through the Teaching Assistantship Allocation Committee (TAAC), which makes assignments for all graduate programs in the Life Sciences. The TAAC has a strong track record of providing support for graduate students in 16 different graduate programs, specifically including successful interdepartmental graduate programs such as Cell, Molecular and Developmental Biology and Genetics, Genomics and Genomics. While the Graduate
Division has no formal requirement for 301/302-level coursework to provide training in becoming a teaching assistant, biophysics students holding teaching assistantships in departments that require 301/302 coursework will take them. The departments with participating faculty in the program will work in partnership with the Graduate Division and CNAS to ensure continuous funding for all the program’s students in good academic standing throughout their time in the proposed program as described in Deans' letters provided in Appendix IV. It is to be emphasized that there are a number of very successful interdepartmental graduate programs on campus and that there has never been a case where a graduate student in good academic standing in CNAS ever had to leave a graduate program, departmental or interdepartmental, for lack of funding. CNAS has demonstrated an outstanding track record to support for graduate students that is clearly articulated in the Deans' letters in Appendix IV and is far more specific than letters of support for past proposals for the creation on interdepartmental graduate programs (e.g., GGB, CMDB and Materials Science). Students in the proposed program can thus expect to have the benefit of appropriate support from the college.

Section 8. Governance

The Program will be administered by a Director and a three-member Executive Committee. The Director, in conjunction with an administrator from the CNAS Graduate Affairs Center, will be responsible for the day-to-day operation of the program, including admissions, student advising and monitoring students' progress through the Program. The members of the Executive Committee will chair subcommittees for Graduate Admissions, Graduate Oversight and Curriculum, with each subcommittee comprised of two additional participating faculty members from the Program. The proposed graduate program will be governed by the following by-laws:

Article I. Objective

The proposed Biophysics Graduate Program is intended to encourage broad-based study of biophysics and to foster communication between biophysicists within different departments on the UC Riverside campus. The Program is thus intended to be interdepartmental, and includes some 39 faculty from the departments of Biochemistry, Bioengineering, Biology, Botany and Plant Sciences, Chemical and Environmental Engineering, Chemistry and Physics. The program’s primary objective is to train scientists able to teach and conduct research in the area of biophysics. The proposed Biophysics Program will offer both a M.S. and a Ph.D. in Biophysics.

Given the diversity in the biophysics community on campus, graduate students will have the opportunity to incorporate a wide range of disciplines into their training experience. Programs of study will be tailored to the interests and goals of individual students.

Article II. Membership

1) Membership Criteria. The participating faculty recognize that involvement in a graduate program can take many forms, although the principal one is obviously training of graduate students in the field as broadly defined. Criteria for membership can include 1) maintenance of an active research program in the area of biophysics as broadly defined; 2) service on graduate student General Examination and Dissertation Committees; 3) continued participation in the Biophysics program by emeritus faculty, and 4) support of research endeavors in the field of biophysics by non-academic senate members. Approval of new members to the Biophysics program will be vested in the Executive Committee. Faculty requesting membership in the Biophysics Program should send a curriculum vitae to the Graduate Program Director along by a letter describing how the candidate expects to be involved in the program. The Director will then forward the documents to the rest of the Executive Committee for consideration.
2) **Membership Retention.** The membership status of Biophysics faculty will be reviewed every three years by the Executive Committee. Criteria used to evaluate members can include serving as a major professor or as a member of advisory, candidacy exam or supervisory committees for Biophysics graduate students; service on committees of the Biophysics Program; attendance at seminars; participation in recruitment activities and other Biophysics Program functions. Faculty whose membership is to be evaluated will be notified in Fall of the academic year and may be asked to supply a brief summary of their Biophysics-related activities to the Executive Committee by the end of the Fall quarter. The Executive Committee will complete its evaluations by the end of Winter quarter of the same academic year.

3) **Termination of Membership.** A participating faculty member who wishes to leave the program may request termination of their membership at any time by sending a memo to the Program Director. Program members whose participation is deemed below that sufficient for good standing will be reviewed by the Executive Committee to determine the source of any problems and to recommend solutions. Members will be given a year to improve their participation in the Biophysics Program before facing termination.

**Article III. Organization and Administration**

The administration of the program and its activities will be vested in an Executive Committee consisting of three program members in addition to the Biophysics Program Director, who will serve as chair. Each of these will chair one of the three standing committees of the Program: Recruitment and Admissions, Graduate Oversight and Curriculum.

1) **Program Director.** The Graduate Program Director will be responsible for the overall direction and organization of the Biophysics Program and will chair the Executive Committee. The appointment of the Program Director will be in keeping with the regulations of Graduate Council. Initially, the Dean of the Graduate Division will solicit nominations from the program faculty and make an appointment. Afterwards, the Executive Committee will solicit confidential nominations from the participating faculty and submit the names of no more than two qualified faculty to the Dean of the Graduate Division, along with a supporting statement for each nominee. The Dean of the Graduate Division will then forward his/her final nominee to the Chancellor, who will make the actual appointment of the new Program Director. The Biophysics Program Director will be the Biophysics representative at CNAS chairs meetings and other meetings on campus requiring representation of the program. The Biophysics Program Director will send nominations of faculty to serve as Graduate Advisor to the Dean of the Graduate Division as well as nominations of faculty to serve as chairs of the program’s standing committees. The Biophysics Program Director will appoint additional members to these standing committees (see below).

2) **Chair, Recruitment and Admissions.** The chair of the Recruitment and Admissions committee will be responsible for recruiting students to the Program and assessing the files of applicants to the program. The Recruitment and Admissions Chair will be nominated by the Biophysics Program Director, with final approval given by the Dean of the Graduate Division.

3) **Chair, Graduate Oversight.** The chair of the Graduate Oversight Committee will serve as Graduate Advisor and will be responsible for the overall academic advising of students in the Biophysics Program. S/he will be responsible for revisions of the Graduate Student Handbook and will be responsible for setting up faculty rotation schedules for first-year graduate students. S/he will also be responsible for advising students as to forming their Qualifying Examination and Dissertation Committees, and will have responsibility of the Program’s annual Comprehensive Examination. The Dean of the Graduate Division will give final approval of the Qualifying Examination and Dissertation Committees. As Graduate Advisor, the chair of the Graduate Oversight Committee
will be nominated by the Biophysics Program Director, with final approval given by the Dean of the Graduate Division.

4) **Chair, Curriculum.** The chair of the Curriculum Committee will oversee the assessment of the Program curriculum and implementation of changes in same, as described further below. With his/her committee, s/he will also have overall responsibility for organizing the Program’s seminar series. The Recruitment and Admissions Chair will be nominated by the Biophysics Program Director, with final approval given by the Dean of the Graduate Division.

**Article IV. Committees**

1) **Executive.** The administration of the program and its activities will be vested in an Executive Committee consisting of four members: Biophysics Program Director who will serve as chair, and the chairs of the program’s three standing committees. The Executive Committee will act in an advisory capacity to the Program Director for any issues that arise concerning the Biophysics Program and will be responsible for review and approval of new faculty to the Biophysics program and for final decisions on termination of membership. The Executive Committee will also facilitate the process used to nominate new Program Directors. It will meet at least once per year, more frequently as needed.

2) **Recruitment and Admissions.** The Recruitment and Admissions Committee will be responsible for recruitment activities and review of applications of students who wish to enter the Biophysics Program. This committee will send files of qualified applicants, along with supporting documentation, to the Graduate Division Dean, who will make the final decision regarding admission and Graduate Division fellowship support. The Recruitment and Admissions Committee will also coordinate the recruitment visits of admitted graduate students to UCR, oversee the maintenance of the program website and prepare advertising/recruitment materials for the program.

The Recruitment and Admissions Committee will consist of the committee Chair from the Executive Committee plus two participating faculty members appointed by the Director, and will meet as necessary to review files and plan recruitment activities. The term of membership on the Admissions Committee will be three years.

3) **Graduate Oversight.** The Graduate Oversight Committee will be responsible for overseeing students’ progress through the program, and will assist the Chair of the committee in forming students’ Qualifying Examination and Dissertation Committees, and in the preparation of the Program’s annual Comprehensive Examination.

The Graduate Oversight Committee will consist of the committee Chair from the Executive Committee plus two participating faculty members appointed by the Director, and will meet as necessary to undertake its responsibilities. The term of membership on the Admissions Committee will be three years.

4) **Curriculum.** The Curriculum Committee will be responsible for assessment of and changes to the curriculum of the Biophysics program, and will make recommendations for such changes to the curriculum as are deemed appropriate, including the addition of new elective courses, to the participating Biophysics faculty during a Biophysics faculty meeting. A subsequent e-mail vote will be held to approve or disapprove the recommended changes. In order to be considered approved, at least 51% of the participating program faculty must vote in favor of the changes to the program curriculum. The Curriculum Committee will also be responsible for administering the Program’s seminar series, selecting and hosting speakers and planning program retreats or research symposia. The Curriculum Committee will meet at least once per year.
The Curriculum Committee will consist of the committee Chair from the Executive Committee plus two participating faculty members appointed by the Director, and will meet as necessary to undertake its responsibilities. The term of membership on the Admissions Committee will be three years.

Article V. Changes to the By-Laws

Changes to the by-laws of the program will be considered at a meeting of the participating faculty, and a subsequent e-mail vote will be held to approve or disapprove the proposed changes. In order to be considered approved, at least 51% of the participating program faculty must vote in favor of the changes to the program's by-laws.

Section 9. Changes in Senate Regulations

No changes in Academic Senate Regulations are required.

Appendices

I. Faculty CV’s

II. Faculty Letters of Participation

III. Departmental Chair and Program Director Letters

IV. Letters from CNAS Dean

V. CNAS Executive Committee memo

VI. Syllabi for Core Courses

VII. Course Catalog Descriptions of Elective Courses
Appendix I. CV's of participating faculty

Huiwang Ai (Assistant Professor, Chemistry, Ph.D.)
Mark Alber (Distinguished Professor, Physics, Ph.D.)
John Barton (Assistant Professor, Ph.D., Physics, arriving 1/1/18)
Gregor Blaha (Assistant Professor, Biochemistry, Ph.D.)
Chia-en Chang (Associate Professor, Chemistry, Ph.D.)
Richard Cardullo (Professor, Biology, Ph.D.)
Richard Debus (Professor, Biochemistry, Ph.D.)
Li Fan (Associate Professor, Ph.D.)
Theodore Garland (Distinguished Professor, Biology, Ph.D.)
Joseph Genereux (Assistant Professor, Chemistry, Ph.D.)
Russ Hille (Distinguished Professor, Biochemistry, Ph.D.)
Richard Hooley (Associate Professor, Chemistry, Ph.D.)
Darrel Jenerette (Associate Professor, Botany and Plant Sciences, Ph.D.)
Ryan Julian (Professor, Chemistry, Ph.D.)
Umar Mohideen (Professor, Physics, Ph.D.)
Len Mueller (Professor, Chemistry, Ph.D.)
Dawn Nagel (Assistant Professor, Botany and Plant Sciences, Ph.D.)
Seán O'Leary (Assistant Professor, Biochemistry, Ph.D.)
Jeff Perry (Assistant Professor, Biochemistry, Ph.D.)
Nicole Rafferty (assistant Professor, Biology, Ph.D)
Carolyn Rasmussen (Assistant Professor, Botany and Plant Sciences, Ph.D.)
Louis Santiago (Associate Professor, Botany and Plant Sciences, Ph.D.)
Jikui Song (Assistant Professor, Biochemistry, Ph.D.)
Yinsheng Wang (Professor, Chemistry, Ph.D.)
Min Xue (Assistant Professor, Chemistry, Ph.D.)
Wenwang Zhong (Professor, Chemistry, Ph.D.)
Roya Zandi (Professor, Physics, Ph.D.)
DR. HUIWANG AI  
CURRICULUM VITAE

Assistant Professor of Chemistry (07/2011-present)  
Cooperating faculty member of Biochemistry, Environmental Toxicology (ETOX), and Cell,  
Molecular & Developmental Biology (CMDB) graduate programs  
University of California, Riverside  
501 Big Springs Road, Riverside, CA 92521, USA  
Tel: (951) 827-3710; E-mail: huiwang.ai@ucr.edu  
Web Page: http://ailab.ucr.edu

Research statement

Biological signaling occurs at different levels, but basic processes are largely chemically based. Our research program in the fields of Bioanalytical Chemistry and Chemical Biology has a focus on the engineering of novel molecular probes to peer into cells and brains to understand their communications. We use a collection of innovative techniques, such as protein engineering and fluorescence and bioluminescence imaging, to dissect signaling pathways involving redox-active molecules, neurotransmitters, and protein post-translational modifications (PTMs). Our immediate goal is to monitor biological signaling in real time with excellent spatial resolution and molecular precision in physiologically relevant environments. Our long-term goal is to apply these new probes to live cells and animals to understand communications relevant to toxicity of chemicals, cancer development and progression, cognition and behavior, and neurological disorders.

Education and training

07/2008-06/2011  
Postdoctoral Fellow, The Scripps Research Institute, La Jolla, USA  
Advisor: Peter G. Schultz

09/2003-06/2008  
Ph.D. in Chemical Biology from Department of Chemistry, University of Alberta, Edmonton, Canada  
Advisor: Robert E. Campbell; Thesis titled “New Fluorescent Proteins and Genetically Encoded Biosensors”

09/1999-07/2003  
B.Sc. from Department of Chemistry, Tsinghua University, Beijing, China

Publications

Publications at UCR


22. Z. Chen, W. Ren, Q.E. Wright and H-w. Ai*, “Genetically Encoded Fluorescent Probe for


**Before coming to UCR**


**Patent and technology transfer**


2. pnGFP (publication #21), hsGFP (publication #25), pMAH2-CageCys (publications #30 and #36), rxFRPs (publications #29 and #35) and several other inventions are distributed through Addgene (Cambridge, MA; [http://www.addgene.org/Huiwang_Ai/](http://www.addgene.org/Huiwang_Ai/)).


4. Anaptys Biosciences (La Jolla, CA) has licensed the right to use the gene encoding mTFP1 (publication #4) for private research; Genentech (Oceanside, CA) has been approved for the usage of EBFP2 (publication #6) for research purpose; mKalama1 and EBFP2 (publication #6), mAmetrine (publication #11), and mNectarine (publication #12) are distributed through Addgene (Cambridge, MA).
Awards and honors

- UCR Academic Senate Regents’ Faculty Development Award, July 2016.
- The Chinese-American Chemistry & Chemical Biology Professors Association (CAPA) Distinguished Junior Faculty Award, 2016
- Young Investigator in Analytical and Bioanalytical Science, Analytical and Bioanalytical Chemistry Themed Issue, 2016
- National Science Foundation CAREER award, May 2014
- Hellman Fellows Award, The Hellman Fellows Fund, July 2013
- Young Investigator in Analytical and Bioanalytical Science, Analytical and Bioanalytical Chemistry Themed Issue, 2012
- UCR Academic Senate Regents’ Faculty Fellowship (RFF), June 2012.
- The Chinese American Faculty Association (CAFA) Robert T. Poe Faculty Development Award, February 2012.
- Andrew Stewart Memorial Graduate Prize, Faculty of Graduate Studies and Research, University of Alberta, May 2008.
- Professional Development Grant, University of Alberta, May 2007
- Mary Louise Imrie Graduate Student Award, University of Alberta, March 2007

Oral presentations

38. H-w. Ai, “Imaging redox and Zn\textsuperscript{2+} signaling with genetically encoded fluorescent probes”, Department of Chemistry, Texas A&M, College Station, TX, April 29, 2016.
37. H-w. Ai, “Imaging redox and Zn\textsuperscript{2+} signaling with genetically encoded fluorescent probes”, Department of Pharmacology, Baylor College of Medicine, Houston, TX, April 27, 2016.
36. H-w. Ai, “Fluorescent probes to probe redox and Zn\textsuperscript{2+} signaling”, Department of Chemistry and Biochemistry, California State University Long Beach, Long Beach, CA, April 6, 2016.
35. H-w. Ai, “Fluorescent probes to probe redox and Zn\textsuperscript{2+} signaling”, Department of Chemistry and Biochemistry, University of Missouri, Columbia, MO, April 4, 2016.
34. H-w. Ai, “Fluorescent probes to probe redox and Zn\textsuperscript{2+} signaling”, Department of Chemistry, University of Kansas, Lawrence, KS, April 1, 2016.
13. H-w. Ai, “Fluorescent Tools for Cell Redox Signaling and a Click-Type Bioconjugation


**Before coming to UCR**


3. H-w. Ai, “Expanding the fluorescent protein ‘toolkit’: new FRET pairs for live cell imaging”. Invited oral presentation in *Division of Analytical and Environmental Toxicology, Faculty of Medicine and Dentistry, University of Alberta*, Edmonton, Alberta, June 20, 2008.


**Poster presentations**


Andover, NH.


**Meetings**

- Howard Hughes Medical Institute Janelia Conference, “Fluorescent Proteins and Biological Sensors V”, Janelia Research Campus, Ashburn, VA, Nov. 6-9, 2016.
- The 251th ACS National Meeting and Exposition, San Diego, California, March 13-17, 2016.
- Society of Western Analytical Professors 2016 Meeting, Riverside, CA, Jan. 29-30, 2016.
- City of Hope-UC Riverside Biomedical Research Initiative Workshop, City of Hope, Duarte, CA, Oct. 17, 2015.
- The 2015 Bioorganic Chemistry Gordon Research Conference, Proctor Academy, Andover, NH, June 7-12, 2015.
- The 248th ACS National Meeting and Exposition, San Francisco, California, Aug. 10-14, 2014
- The 97th Canadian Chemistry Conference and Exhibition, Vancouver, British Columbia, June 1-5, 2014.
- Society of Western Analytical Professors 2014 Meeting, Arizona State University, Tempe, Arizona, Jan 9-10, 2014.
• The Canadian Proteomics Initiative, Edmonton, Alberta, May 10-12, 2006.
• The 48th CSBMCB Annual Meeting, Banff, Alberta, March 16-20, 2005
• CIHR group in protein structure and function special symposium on Frontiers in Structural Biology, Faculte St. Jean, University of Alberta, May 6-7, 2004

Additional trainings
• HHMI/National Academies Scientific Teaching Summer Institute, Riverside, CA, June 22-27, 2014
• NIH (NIGMS) Mentoring Workshop for New Faculty in Organic and Biological Chemistry, Dallas, TX, June 25-27, 2012
• Teaching Workshop by the UCR Academy of Distinguished Teachers, April 20, 2012.

Teaching experience
• Winter 2016, Chemical Biology (CHEM 143)
• Winter 2015, Bioorganic Chemistry (CHEM 143)
• Fall 2013, Fall 2014, and Spring 2016 Optical Spectroscopy (CHEM 221B)
• Fall 2012, Fall 2013, Fall 2014 and Fall 2015, Instrumental Methods of Analysis- Laboratory (CHEM 125L)
• Winter 2012 and Winter 2013, General Chemistry (CHEM 1B)
• Fall 2011 and Fall 2012, Introduction to Bioanalytical Chemistry (CHEM 221E)

Experience to review grants
• NSF Peer Review Panel “Chemical Probes of Biological Processes-P151195”, Feb 2015
• Ad hoc Reviewer for Canada Foundation for Innovation, September 2012
• Ad hoc Reviewer for Czech Science Foundation, September, 2012

Other experience and professional memberships
• 2007-present Member, American Chemical Society (ACS)
• 2012-present Member, American Association for the Advancement of Science (AAAS)
• 2013-present Referee Editor for Frontiers in Chemistry (Chemical Biology section)
• 2014-present Member of the AB SCIEX Innovation Advisory board
• 03/2016 Symposium Chair, the 251st ACS National Meeting. Symposium titled: “Luminescent proteins, dyes, and sensors”
• 01/2016 Co-organizer, the 47th annual meeting for the Society of Western
Analytical Professors (SWAP)

- 08/2014  Associate Symposium Chair, the 248th ACS National Meeting. Session titled: “Pro-fluorogenic probe-based methods for disease detection”
- 03/2013  Guest Editor for the journal Sensors (ISSN 1424-8220) for a special issue on “fluorescent biosensors”
- 03/2012  Symposium Chair, the 243rd ACS National Meeting. Symposium titled: “Fluorescent imaging of cellular structures and dynamics”

Additional activities

- Consultant for SafeWhite, Inc (2015)
- Graduate Student Admission Committee Member of UCR ETOX (2011-2014), CMDB (2012) and Chemistry (2014)
- UCR Department of Chemistry Kohler Lecturer Committee Member (2012)
- UCR Committee on International Education Member (since 2014)
- Qualifying/Oral Exam Committee member, Thesis Committee member, and 2nd Year Oral Exam Committee member for more than 20 UCR graduate students in various graduate programs.

Research Support (Ongoing):

National Institute of Health R01GM118675  Ai (PI)  05/10/2016-03/31/2020
A Fluorescent Toolkit for Imaging Reactive Oxygen Species (ROS)
Role: PI  $1,225,869

National Institute of Health R21EB021651  Ai (PI)  08/01/2016-06/30/2018
Expansion of Unnatural Fluorescent Protein Probes
Role: PI  $387,500

National Science Foundation CHE-1351933  Ai (PI)  05/01/2014-04/30/2019
CAREER: Expanding the Toolbox of Encodable Fluorescent Probes to Image Macrophage Redox Dynamics
Role: PI  $600,000

National Science Foundation REU supplement  Ai (PI)  07/01/2016-04/30/2019
Role: PI  $12,000

National Institute of Health R03EB20211  Ai (PI)  03/01/2015-12/31/2016
Lentiviral Systems for Controlled Mammalian Expression of Unnatural Fluorescent Protein Probes
Role: PI  $152,000
UCR Academic Senate Faculty Development Award  Ai (PI)  07/01/2016-06/30/2018
Genetically Encoded Fluorescent Biosensors for Serotonin
Role: PI $7,500

Yetongren Medical Group  Ai (PI)  07/01/2013-06/30/2016
Unlimited Research Gift
Role: PI $145,000

Research/Education Support (Completed):

Collaborative Seed Grant, UCR  Ai (PI)  07/01/2015-12/31/2015
Redox Reporter-Modified Human Stem Cells for Assessing Environmentally Induced Oxidative Stress
Role: PI $10,000 (1/2 to Ai)

Collaborative Seed Grant, UCR  Pirrung (PI)  07/01/2015-12/31/2015
Luciferin Engineering for Bioassays
Role: Co-PI $10,000 (1/2 to Ai)

Collaborative Seed Grant, UCR  Ge (PI)  07/01/2014-12/31/2014
Convert Electricity to Chemicals by Novel Biocatalysts
Role: Co-PI $12,000 (1/3 to Ai)

Robert T. Poe Faculty Development Grant  Ai (PI)  02/01/2012-01/31/2013
Genetically Encoded Biosensors for Hydrogen Sulfide
Role: PI $1,500

UCR Academic Senate Regents’ Faculty Fellowship  Ai (PI)  07/01/2012-06/30/2014
Novel Encodable Fluorescent Biosensors for Imaging Cell Redox Homeostasis
Role: PI $3,500

Hellman Fellowship  Ai (PI)  07/01/2013-06/30/2014
Spatiotemporal Control of Metal Ion Signaling with Engineered Fluorescent Proteins
Role: PI $30,000

Beckman Coulter Life Sciences  Zhong/Ai (PI)  11/2012
A "Biopharma to Education" grant to acquire a capillary electrophoresis (CE) instrument for teaching
Role: co-PI A CE Instrument

Training of students and postdoctoral researchers

Current Graduate Students:
- Yichong Fan (Graduate Student in ETOX Ph.D. Program, since 09/2012; Awards: 2016 UCR Dissertation Year Fellowship, and Presentation award in 2016 UCR ETOX symposium)
- Shen Zhang (Graduate Student in CHEM Ph.D. Program, since 09/2013)
Tan Truong (Graduate Student in CMDB Ph.D. Program, since 04/2014)
Andy Yeh (Graduate Student in CHEM Ph.D. Program, since 09/2014; Award: Graduate scholarship from Yin Chin Foundation of USA)

Current Postdoctoral Researcher:
- Dr. Ao Ji (since 01/2013)
- Dr. Qi Qian (since 01/2016)

Current Undergraduate Students:
- Merna Makar (Award: 2015 Kuwana-Sawyer Award for Undergraduate Researchers)
- Maria Erika Gonzales
- Ramsey Batarseh
- Cebrina Nolan

Former Group Members:
- Dr. Zhijie Chen: Graduate Student in CHEM Ph.D. Program, 09/2011-06/2016; Awards: Chinese Government Award for Outstanding Self-Financed Students Abroad; Sawyer Award for Analytical Chemistry Graduate Students; James Merrill and Adeline Wallace Annual Prize; Currently appointed as a postdoc fellow by Prof. Carlos Bustamante at UC Berkeley
- Dr. Suzan Youssef: Graduate Student in CHEM Ph.D. Program, 09/2011-06/2016; Currently appointed as a Lecturer at Crafton Hills Community College
- Dr. Wei Ren: Graduate Student in CHEM Ph.D. Program, 09/2012-06/2016; Award: Sawyer Award for Analytical Chemistry Graduate Students; Currently at UCLA Anderson School of Management
- Dr. Si Chen: Postdoctoral Researcher from 09/2011 to 11/2012; currently at Humanwell Pharmaceutical Co., Ltd
- Dr. Yunhua Liu: Staff Research Assistant, 2013-2014; currently at Shanghai Agrobiological Gene Center
- Kansas Morgan: 2012 Summer Undergraduate RISE Program Researcher
- Kevin Micko Cheang: Undergraduate Student Researcher from 09/2011 to 06/2012
- Philip Lee: Undergraduate Student Researcher from 09/2012 to 08/2014; received 2014 Kuwana-Sawyer Award for Undergraduate Researchers; currently at UCI
- Quintin Wright: Undergraduate Student Researcher from 09/2011 to 06/2014; currently at the UCSF PharmD program
- Uyen Truong, Undergraduate Student Researcher from 01/2012 to 04/2015
- Jared Yasutake, Undergraduate Student Researcher from 04/2013 to 04/2015
- Gabriela Mamani, Undergraduate Student Researcher from 01/2015 to 07/2015; currently at Kaiser Permanente

High School Students:
Liana Amaro-Diaz (summer 2014); Jolie Carreon (summers 2014, 2015); Tyler Reagn (summers 2014, 2015); Michael Wang (summers 2014, 2015, 2016); Aislin Liu (summer 2016); Vaibhavi Shah (summer 2016); Jeanessa Mendoza (summer 2016)
NAME: Mark Alber

POSITION TITLE: Distinguished Professor of Mathematics, University of California at Riverside (UCR)

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>Completion Date MM/YYYY</th>
<th>FIELD OF STUDY</th>
</tr>
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<tbody>
<tr>
<td>Moscow Institute of Technology, Moscow, Russia</td>
<td>Honors M.S.</td>
<td>1983</td>
<td>Applied Mathematics</td>
</tr>
<tr>
<td>University of Pennsylvania, Philadelphia, PA</td>
<td>Ph.D.</td>
<td>1990</td>
<td>Mathematics</td>
</tr>
</tbody>
</table>

A. Personal Statement

My research focuses on coupling multi-scale modeling and experiments to generate new hypotheses about biological mechanisms. I have been PI on several NIH and NSF funded collaborative projects on coupling novel multi-scale modeling of biological problems with biophysical experiments. In particular, my interdisciplinary group has developed and calibrated several multi-scale models of blood clot formation, epithelial tissue growth, chicken limb development, cell culture aggregation, bacterial swarming and microtubule dynamics. Many approaches developed by the group involve methods from biophysics, statistical physics and nonlinear dynamics. The information and articles below indicate my expertise in the areas of research relevant to the Biophysical Ph.D. proposal.

2009 – 2016  Vincent J. Duncan Family Professor of Applied Mathematics, University of Notre Dame
2003 – 2016  Concurrent Professor of Physics, University of Notre Dame
2011 – current, Elected Fellow, American Association for the Advancement of Science (AAAS)
2015 – current Deputy Editor, PLoS Computational Biology
2008 - 2012 Member of the Editorial Board, Journal of Statistical Physics

Selected Publications related to Biophysics:


Chunlei Li, Jun Li, Holly V. Goodson and Mark S Alber [2014], Microtubule Dynamics Instability: the Role of Cracks between Proto_laments, Soft Matter 10, 2069-2080.

Oleg V. Kim, Zhiliang Xu, Elliot D. Rosen and Mark S. Alber [2013], Fibrin Networks Regulate Protein Transport during Thrombus Development, PLoS Computational Biology 9 (6), e1003095.

Cameron Harvey, Mark Alber, Lev Tsimring, Igor Aronson [2013], Continuum modeling of clustering of myxobacteria, New Journal of Physics 15, 035029.

Huijing Du, Zhiliang Xu, Morgen Anyan, Oleg Kim, W. Matthew Leevy, Joshua D. Shrout and Mark Alber [2012], High density waves of the bacterium Pseudomonas aeruginosa in propagating swarms result in e cient colonization of surfaces, Biophysical Journal 103(3), 601-609.

Richard Gejji, Pavel Lushnikov and Mark Alber [2012], Macroscopic model of self- propelled bacteria swarming with regular reversals, Physical Review E 85, 021903 (highlighted in Faculty of 1000).


Cameron W. Harvey, Faruck Morcos, Christopher R. Sweet, Dale Kaiser, Santanu Chatterjee, Xiaomin Lu, Danny Chen and Mark Alber [2011], Study of elastic collisions of M. xanthus in swarms, Physical Biology 8, 026016.


Lushnikov, P.P., Chen, N., and M.S. Alber [2008], Macroscopic dynamics of biological cells interacting via chemotaxis and direct contact, Phys. Rev. E. 78, 061904 (highlighted in the Faculty of 1000 Biology).


**B. Positions and Honors**

**Positions and Employment**

<table>
<thead>
<tr>
<th>Year</th>
<th>Position</th>
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</thead>
<tbody>
<tr>
<td>Summer 1990</td>
<td>Instructor, University of Pennsylvania</td>
</tr>
<tr>
<td>1990 – 1996</td>
<td>Assistant Professor, Department of Mathematics, University of Notre Dame (UND)</td>
</tr>
<tr>
<td>1993–1994</td>
<td>On Sabbatical leave at UC Berkeley and Mathematical Sciences Research Institute (MSRI) and Institute for Advanced Study, Princeton, NJ</td>
</tr>
<tr>
<td>Summer 1993</td>
<td>Visiting Fellow, Fields Institute for Research in Mathematical Sciences, Canada</td>
</tr>
<tr>
<td>June 1994</td>
<td>Visiting Scientist, CNLS, Los Alamos National Lab., NM</td>
</tr>
<tr>
<td>1995, 1996</td>
<td>Visiting Fellow, Hewlett-Packard Research Lab., Bristol, UK</td>
</tr>
<tr>
<td>1996 – 2001</td>
<td>Tenured Associate Professor, Department of Mathematics, UND</td>
</tr>
<tr>
<td>1997 – 2012</td>
<td>Member of the Executive Committee of the Notre Dame Center for Applied Mathematics</td>
</tr>
<tr>
<td>2000 – 2001</td>
<td>Sabbatical leave at Stanford University, Palo Alto, CA</td>
</tr>
<tr>
<td>2001</td>
<td>Senior Fellow, Institute for Pure and Applied Mathematics (IPAM), UCLA</td>
</tr>
<tr>
<td>2001 – 2006</td>
<td>Professor, Department of Mathematics, UND</td>
</tr>
<tr>
<td>2001-2002</td>
<td>Associate Director, Interdisciplinary Center for the Study of Biocomplexity (ICSB), UND</td>
</tr>
<tr>
<td>2002 –</td>
<td>Director, ICSB, UND</td>
</tr>
<tr>
<td>2003 –</td>
<td>Concurrent Professor, Department of Physics, UND</td>
</tr>
<tr>
<td>2006 – 2007</td>
<td>Member of the University of Notre Dame Graduate Council, UND</td>
</tr>
<tr>
<td>2006 – 2009</td>
<td>Notre Dame University Professor of Applied Mathematics, UND</td>
</tr>
<tr>
<td>2009 –</td>
<td>Vincent J. Duncan Family Professor of Applied Mathematics, UND</td>
</tr>
<tr>
<td>2012 –</td>
<td>Concurrent professor of Computer Science and Engineering, UND</td>
</tr>
<tr>
<td>2013 – 2015</td>
<td>Director of graduated studies, Department of Applied and Computational Mathematics and Statistics, UND</td>
</tr>
<tr>
<td>2016 –</td>
<td>Distinguished Professor of Mathematics, University of California, Riverside (UCR)</td>
</tr>
</tbody>
</table>

**Other Experience and Professional Memberships**

<table>
<thead>
<tr>
<th>Year</th>
<th>Experience</th>
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</thead>
<tbody>
<tr>
<td>2008 – 2012</td>
<td>Member of the Editorial Board, Journal of Statistical Physics</td>
</tr>
<tr>
<td>2010 –</td>
<td>Review Editor of Frontiers in Computational Physiology and Medicine</td>
</tr>
<tr>
<td>2010 –</td>
<td>Member of the Committee of the American Mathematical Society (AMS) on Human Rights of Mathematicians</td>
</tr>
<tr>
<td>2013 – 2016</td>
<td>Representative of the AMS to the AAAS Human Rights Coalition (HRC) and member of the Council of the HRC</td>
</tr>
<tr>
<td>2011 – 2013</td>
<td>Member of the Editorial Board, PLoS Computational Biology</td>
</tr>
<tr>
<td>2009 – 2016</td>
<td>Member of 9 NIH Panels and 3 NSF Panels</td>
</tr>
<tr>
<td>2010 –</td>
<td>Member of the Editorial Board, Bulletin of Mathematical Biology</td>
</tr>
<tr>
<td>2013 –</td>
<td>Deputy Editor, PLoS Computational Biology</td>
</tr>
</tbody>
</table>

**Honors**

<table>
<thead>
<tr>
<th>Year</th>
<th>Honor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 – 2009</td>
<td>Notre Dame University Professor of Applied Mathematics, UND</td>
</tr>
<tr>
<td>2011 –</td>
<td>Elected Fellow, American Association for the Advancement of Science (AAAS)</td>
</tr>
<tr>
<td>2009 – 2016</td>
<td>Vincent J. Duncan Family Professor of Applied Mathematics, UND</td>
</tr>
<tr>
<td>2013</td>
<td>Distinguished Lecture in Applied Mathematics, U of Massachusetts, Amherst, MA</td>
</tr>
<tr>
<td>2016</td>
<td>Keynote Speaker, 8th International Bio-fluid Mechanics Symposium, Caltech, Pasadena, CA</td>
</tr>
<tr>
<td>2016 –</td>
<td>Distinguished Professor of Mathematics, University of California, Riverside (UCR)</td>
</tr>
</tbody>
</table>
C. Contribution to Science

My research focused on coupling multi-scale modeling and experiments to generate new biologically relevant hypotheses for the following main projects.

Combined multi-scale modeling and experimental study of blood clot formation
Unlike current experimental approaches that can only explore the effects of one or two components, an interplay between experiment and a validated simulation of thrombogenesis could provide a framework to study the complex network of factors and processes involved in thrombus development. We developed in Sweet et al. [2011] and Wu et al. [2014] two and three-dimensional multi-scale models coupling detailed submodels for cells and blood and used them to simulate receptor-mediated adhesion of deformable platelets at the site of vascular injury under different shear rates of blood flow. Fibrin is a protein polymer that forms a 3D filamentous network, a major structural component of protective physiological blood clots as well as life threatening pathological thrombi. It plays an important role in wound healing, tissue regeneration and is widely employed in surgery as a sealant and in tissue engineering as a scaffold. The network permeability and the protein diffusivity were shown in Kim et al. [2013] to be important factors determining the transport of proteins through the fibrin network. Rheological measurements described in Kim et al. [2014] revealed nonlinear changes of fibrin network viscoelastic properties under dynamic compression, resulting in network softening followed by its dramatic hardening.

1. Oleg V. Kim, Rustem I. Litvinov, John W. Weisel and Mark S. Alber [2014], Structural basis for the nonlinear mechanics of fibrin networks under compression, Biomaterials 35, 6739-6749.
1. Oleg V. Kim, Zhiliang Xu, Elliot D. Rosen and Mark S. Alber [2013], Fibrin Networks Regulate Protein Transport during Thrombus Development, PLoS Computational Biology 9 (6), e1003095.

Multi-scale modeling of early chicken limb development
Developing organs have both discrete and continuous aspects; they may undergo changes according to deterministic or stochastic rules. Some embryonic tissues are planar and can be approximated as 2D sheets, whereas other tissues are space-filling and inherently 3D. Some developmental processes are synchronized over a spatial domain whereas others sweep across a region over time. In some cases, one developmental process will relax much faster or much slower than another, so that the two can be treated essentially independently of one another. In other cases, the only accurate representation is to treat the processes as mutually determinative and conditioning. Each of these possibilities presents a distinct problem for the modeler, and it is becoming increasingly clear that a fully satisfactory model for the development of any living organ must embody all of them. That is, it will be inescapably hybrid, mathematically and computationally. We developed a multi-scale simulation environment [Cickovski et al. 2005, 2007, Zhu et al. 2010 and Zhang et al. 2013] of a chicken limb and used it to simulate cell rearrangement as an individual based module in the presence of morphogen fields and cell-state transition rules based on simplifications of system of equations described above. This strategy permitted us to generate 3D simulations with authentic developmental properties.

Combined multi-scale modeling and experimental study of spread of infection

*Pseudomonas aeruginosa* is an opportunistic pathogen responsible for both acute and persistent infections in susceptible individuals, as exampled by those for burn victims and people with cystic fibrosis. A key aspect of these infections is the formation of bacterial swarms, which are surface-associated, socially organized communities of cells. We developed biologically justified cell-based multi-scale models to generate and test hypothesized mechanisms leading to pathogen *P. aeruginosa* swarming observed in experiments. In the recent paper [Anyan et al. 2014, PNAS] we combined laboratory and computational methods to probe the physical interactions of Type IV pili (TFP) during flagellar-mediated swarming and found that TFP of one cell strongly interact with TFP of other cells, which limits swarming expansion rate. Hence, wild-type *P. aeruginosa* use cell–cell physical interactions via their TFP to control self-organization within motile swarms. This collective mechanism of cell–cell coordination using TFP allows for moderation of swarming direction of individual cells and avoidance of a toxic environment.


Study of the interplay of motility mechanisms during swarming of *Myxococcus xanthus*

The main goal of this interdisciplinary project is to combine simulations using new three-dimensional multi-scale modeling environment and specifically designed experiments to study basic coordination events of *M. xanthus* swarming, which is essential to understanding how millions of bacteria function in real environments. Research program focuses on the role of flexibility of cells, viscosity of extracellular polysaccharide, slime adhesivity and directional reversals in resolving collisions, increasing alignment and optimizing swarming rate for *M. xanthus*. In particular, we demonstrated in Harvey et al. [2014] (J. Bacteriol.) interconnection of division, motility, and polarity for the bacterium *Myxococcus xanthus*.


Experimental and computational studies of MT dynamics and regulation by binding proteins

The long-term goal of this collaborative project is to develop a comprehensive understanding of MT dynamics and its regulation by MT binding proteins though a coordinated program of multiscale computational modeling and experiment. The specific goals of this project are to 1) use combined experiment and modeling to establish fundamental principles for how groups of MTBinding Proteins (MTBPs) work together; 2) define the relationship between the behavior of the bulk polymer and that of the individual MTs, and 3) develop freely available software packages to allow students and researchers at remote sites to use our models. In particular, in the papers Gupta
et al. [2013] (PNAS) and Li et al. [2014] (Soft Matter) we introduced two models for studying the catastrophe-promoting activity of the microtubule destabilizer Op18/stathmin and to study in detail to investigate the connection between cracks and MT dynamic instability.


Complete List of Published Work in MyBibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/1Xi9sryY5mXkT/bibliography/50131426/public/?sort=date&direction=ascending

D. Research Support

**Ongoing Research Support**

**U01 HL116330** Alber (PI) 07/26/2014 - 07/30/2019

Multiscale modeling and empirical study of a mechanism limiting blood clot growth. This interdisciplinary collaborative project integrates multiscale modeling and experiments to examine novel hypothesis related to the role of fibrin networks in processes halting thrombus growth. This will help physicians to estimate risk of thrombotic disease for an individual patient by identifying critical values of parameters of processes regulating thrombogenesis.

**R01GM095959** Alber (PI) 04/01/2012 - 12/31/2016

Combined multiscale modeling and experimental study of bacterial swarming. A key aspect of bacterial infections is the formation of bacterial swarms, which are surface-associated, socially organized communities of cells. This combined multiscale modeling and laboratory study of bacterial behavior on surfaces will provide new critical information needed for the eradication, prevention and treatment of the *P. aeruginosa* infections.

**NSF Grant CBET-1403887** Zartman (PI), Alber and Hoelzle (Co-PIs) 05/01/14 - 04/30/17

Decoding organ-level intercellular signaling in an active, regulated microenvironment. The team develops novel biophysical methods combined with computer simulations for testing novel hypothesis that intercellular calcium waves encode information on the size, differentiation state and overall physiology of epithelia.

**NSF grant MCB-1244593** Goodson (PI), Alber (Co-PI) 2017 07/01/13 - 06/30/17

BioMaPS: Experimental and Computational Studies of Microtubule Dynamics and Regulation by Binding Proteins. The long-term goal of this collaborative project is to develop a comprehensive understanding of MT dynamics and its regulation by MT binding proteins though a coordinated program of multiscale computational modeling and experiment.

**Recently Completed Research Support**

**R01GM100470** Alber (PI) 06/01/11 - 06/01/14

Study of the interplay of motility mechanisms during swarming of *Myxococcus xanthus*. The main goal of this interdisciplinary project was to combine simulations using new three-dimensional multiscale modeling...
environment and specifically designed experiments to study basic coordination events of *M. xanthus* swarming, which is essential to understanding how millions of bacteria function in real environments.

**NSF grant MCB-0951264**
**Goodson (PI), Alber (Co-PI)**
03/15/10 - 03/15/13
Cellular Organization, Computational and Experimental Studies of Microtubule Dynamics and Regulation by Binding proteins. The project resulted in development of a multi-scale MT model and getting predictive and quantitative understanding of the MT cytoskeleton and its regulation by MTBPs.

**NSF Grant DMS-0800612**
**Alber (PI)**
09/01/08-09/01/11
Integrating Multiscale Modeling and in vivo Experiments for Studying Blood Clot Development, The focus of this project was on studying interplay and impact of viscous, incompressible blood plasma, activated and non-activated platelets, as well as other blood cells, activating chemicals, fibrinogen and vessel walls on the internal structure of the developing blood clot.
John P Barton

Postdoctoral Researcher
2012 - 2016
Massachusetts Institute of Technology
Ragon Institute of MGH, MIT & Harvard
Adviser: Arup K Chakraborty

PhD, Physics
2006 - 2012
Rutgers, The State University of New Jersey
Adviser: Joel L Lebowitz

BS, Physics & Mathematics
2002 - 2006
Duke University
Magna cum laude
Honors thesis adviser: M Ronen Plesser

Research Interests
I use methods from statistical mechanics and machine learning to study pathogen evolution and human immunity. I am particularly interested in highly mutable pathogens such as HIV, and the dynamical interactions between microbes and the immune system.

Publications


  • Part of the special issue “Information Processing in Living Systems”

2015

  • Awarded MIT Postdoctoral Association Travel Grant, APS March Meeting
  • Highlighted on the MIT Postdoctoral Association website

2014


* Equal contributions † Co-corresponding authors

jpbarton@mit.edu
johnbarton.github.io


- Part of the special issue "Statistical Physics and Neuroscience"


- Included in the Journal of Physics A Highlights of 2011 collection


Chakraborty AK, Barton JP. Rational design of effective vaccine targets and strategies for HIV: a crossroad of statistical physics, biology, and medicine. Submitted.


Invited talks

2016

116th Statistical Mechanics Conference, Rutgers University

Initiative for the Theoretical Sciences, CUNY (declined for family reasons)

Department of Microbiology, University of Pennsylvania School of Medicine

Coevolution in Proteins and RNA, Theory and Experiments Workshop

Keystone Systems Immunology Meeting (short talk selected from abstracts)

2015

Systems Immunology Workshop, Cincinnati Children’s Hospital Medical Center

Mathematical Physics Seminar, Rutgers University

Center for Biophysics and Computational Biology, Temple University

Keystone HIV Vaccines Meeting (short talk selected from abstracts)

Monday Meeting, Ragon Institute of MGH, MIT and Harvard

2014

Institute for Advanced Study Focused Program on Computational and Experimental Immunology, Hong Kong University of Science and Technology

Monday Meeting, Ragon Institute of MGH, MIT and Harvard

2013

Harvard Microbial Evolution Group, Harvard University
Contributed presentations

2016
IMES Research Progress Meeting
Koch Institute Immune Engineering Symposium, MIT
APS March Meeting

2015
Forecasting Evolution Conference (short talk invitation declined)
Third Annual Winter Q-Bio Meeting

2014
112th Statistical Mechanics Conference, Rutgers University
MIT Biophysics Retreat
MIT-MGH Meeting on IBD, Microbiome and Autoimmune Disease

2013
First Annual Winter Q-Bio Meeting

2012
108th Statistical Mechanics Conference, Rutgers University
107th Statistical Mechanics Conference, Rutgers University

2011
106th Statistical Mechanics Conference, Rutgers University

Honors & Awards

eLife Early-Career Reviewer (2016)
Lindau Nobel Laureate Meeting Attendee, Siemens AG Fellow (2015)
MIT Postdoctoral Association Travel Grant (2014)
Rutgers University Departmental Graduate Assistantship (2010, 2012)
GAANN Fellowship, Rutgers University (declined)
Phi Beta Kappa, National honor society
Sigma Pi Sigma, National physics honor society
Phi Eta Sigma, National honor society

Teaching Experience

Teaching assistant, Honors Physics III (Physics 273), Rutgers University (2011)
Senior teaching assistant, Extended General Physics (Physics 201), Rutgers University (2010)
Teaching assistant, Extended General Physics (Physics 201/202), Rutgers University (2006 - 2009)
Teaching assistant, General Physics I-II (Physics 52L-54L), Duke University (2003 - 2004)
References
Arup K Chakraborty
Departments of Chemical Engineering, Physics, Chemistry,
& Biological Engineering, Institute for Medical Engineering & Science,
Massachusetts Institute of Technology
arupc@mit.edu
(617) 253 – 3890

Mehran Kardar
Department of Physics
Massachusetts Institute of Technology
kardar@mit.edu
(617) 253 – 3259

Joel L Lebowitz
Departments of Physics & Mathematics
Rutgers, The State University of New Jersey
lebowitz@math.rutgers.edu
(732) 445 – 2411 x 6025

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Nuffield Department of Medicine
University of Oxford
andrew.mcmichael@ndm.ox.ac.uk
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École Normale Supérieure
cocco@lps.ens.fr
(+33) 1 44323371
Gegor M. Blaha  
Assistant Professor of Biochemistry  
5489 Boyce Hall, University of California, Riverside, CA 92521  
Phone: (951) 827-3832, Fax: (951) 827-4294, email: gregor.blaha@ucr.edu

Professional Preparation
University of Vienna, Austria Chemistry/Chemistry Mag.rer.nat., 1997  
Vienna University of Technology, Austria Technical Sciences Dr. techn., 2001  
Yale University, New Haven, CT Macromolecular Crystallography 2001 – 2008

Appointments
2012- Present University of California, Riverside, Assistant Professor, Department of Biochemistry  
2008-2011 Yale University, New Haven, CT, Research Associate  
2001-2008 Yale University, New Haven, CT, Postdoctoral Fellow  
2001 Max Planck Institute for Molecular Genetics, Berlin, Germany, Postdoctoral Fellow

Five Relevant Publications


Other Significant Publications


**Synergistic Activities**

Faculty mentor for the Minority Access to Research Careers - Undergraduate Student Training in Academic Research (Marc U*), the Louis Stokes California Alliance for Minority Participation in Science, Engineering and Mathematics (CAMP), and Summer Research in Science and Engineering program at UCR (RISE).

Faculty advisor for high school students (UCR discovery day, 2011-present), graduate students (microbiology graduate program, 2013), and post-doctoral researchers (UCR Career Day, 2012).

Co-organizer of the 2014 and organizer of the 2016 Biochemistry Summer Academy High School Teachers Science Fair Judge for Riverside Unified School District and for the Riverside, Inyo, Mono, and San Bernardino counties competitions.

Advised and consulted in the development of an alignment tool for high throughput capillary mounting of protein crystals (MiTeGen LLC, Ithaca, NY; 2010-2011 URL: http://www.mitegen.com/products/micrort/micrort.shtml.)
CURRICULUM VITAE

Richard A. Cardullo, Ph.D.
Department of Biology
The University of California
Riverside, California 92521
Ph: (951)-827-6457
FAX: (951)-827-4286
e-mail: cardullo@ucr.edu

ACADEMIC POSITIONS

2014 – present  Associate Vice Provost, Undergraduate Education, University of California, Riverside
2014 – present  Howard H Hays Jr Chair, University Honors, University of California, Riverside
2012 – 2014  Honors Faculty Member, University of California, Riverside
2009 – 2012  Divisional Dean of Life Sciences, College of Natural and Agricultural Sciences, University of California, Riverside
2004 – 2009  Chair, Department of Biology, University of California, Riverside
2006 - present  Distinguished Teaching Professor of Biology, University of California, Riverside
2002 – present  Professor of Biology, University of California, Riverside
1996 – 2002  Associate Professor of Biology, University of California, Riverside
1991 - 1996  Assistant Professor of Biology, University of California, Riverside
1987 - 1991  Senior Research Associate
The Worcester Foundation for Experimental Biology, Shrewsbury, MA
1985 - 1987  Postdoctoral Fellow
Department of Anatomy and Cellular Biology, Harvard Medical School

EDUCATION

Department of Biophysics, The Johns Hopkins University, Baltimore, Md.
Advisor: Dr. Richard Cone

1979 - 1981  M.S. Physics, May 1981
Department of Physics, University of Massachusetts, Amherst

1976 - 1979  B.S. Physics (concentration in Biophysics), April 1979
Department of Biophysics, University of Michigan, Ann Arbor
CURRICULUM VITAE

Richard A. Cardullo, Ph.D.

AWARDS, FELLOWSHIPS, AND HONORS

1981 - 1985 NIH predoctoral fellowship at Johns Hopkins
1984 - 1985 Dean’s fellowship at Johns Hopkins
1987 NIH training grant at Harvard in Reproductive Biology
1987 - 1988 NIH training grant at the Worcester Foundation in Cell Biology
1988 - 1990 NIH National Research Service Award recipient
1991 Recipient, James Shannon Award (NIH)
1998 Organizer and International Advisor for VIII International Congress of Spermatology
1999 UCR Distinguished Teaching Award
1999-2001 President, UCR Chapter of Sigma Xi
2000 Visiting Professor, Scripps Oceanographic Research Institute
2003 Vice Chair, Gordon Conference on Fertilization and Activation of Development
2005 Chair, Gordon Conference on Fertilization and Activation of Development
2006 HHMI/National Academy of Sciences Teaching Fellow in the Life Sciences
2006 Awarded title of Distinguished Teaching Professor at UC-Riverside
2007 HHMI/National Academy of Sciences Teaching Mentor in the Life Sciences
2009-present Chair, Board of Directors, Biological Sciences Curriculum Study
2012-present HHMI/NIH/NSF Vision & Change Fellow
2012-present Executive Committee and Council, AAAS - Pacific Division
2013-2015 President, American Association for the Advancement of Science - Pacific Division
2014 Visiting Professor, Department of Molecular Biology and Genetics, Cornell University
2014-present Howard H Hays Jr. Endowed Chair, University Honors, UC-Riverside

EXTRAMURAL GRANT AND AWARD HISTORY

Glycoslylation events during spermatogenesis in the mouse, R.A. Cardullo, Principal Investigator
National Institutes of Health, National Research Service Award, April, 1988 - May 1990

James Shannon Award, R.A. Cardullo, Principal Investigator
National Institutes of Health (NICHD), R55 HD27244, $100,000, October, 1991 - July, 1992

Receptor dynamics during fertilization in the mouse, R.A. Cardullo, Principal Investigator
National Institutes of Health (NICHD), RO1 HD27244, $527,834, August, 1992 - present

Development of an optical microscope for the simultaneous measurement of ligand-receptor dynamics and
signal transduction pathway in living cells, R.A. Cardullo, Principal Investigator
The Whitaker Foundation, Biomedical Research Grant, $234,388, June, 1992 - May 1995

Biophysical and biochemical characterization of sperm-egg binding, R.A. Cardullo, Sponsor for Dr.

Carbohydrate determinants during fertilization, R.A. Cardullo, Principal Investigator

Graduate Assistance in Areas of National Need, R.A. Cardullo, Program Director

Mathematical Achievement through Collaboration with Teachers and Students, R.A. Cardullo, Principal
Graduate Assistance in Areas of National Need, R.A. Cardullo, Program Director
The Department of Education, Biology Training Grant, $809,000, October, 2003 - September, 2008.

Mathematical Achievement through Collaboration with Teachers and Students, R.A. Cardullo, Principal Investigator, National Science Foundation, $199,000, November 2007 – October 2009.


California Alliance for Minority Participation in STEM Fields, R.A. Cardullo, Principal Investigator, National Science Foundation, $450,000, July 2011 – June 2016.

LSAMP Bridge to the Doctorate Training Grant, R.A. Cardullo, Principal Investigator, National Science Foundation, $987,000, July 2011 – June 2014.


Phenotypic Responses of the Lung to Hypoxia in Deer Mice Living at High Altitude, R.A. Cardullo, Principal Investigator, National Science Foundation, $480,082, January 2015 – December 2017.

Molecular Dissection of Sperm Motility: MAPK Targets and Control of Waveform, R.A. Cardullo, co-Principal Investigator, National Institutes of Health, $1,480,949, January 2017 – December 2020, Pending.

PUBLICATIONS


Thaler, C.D., Miyata, H., Haimo, L.T., and Cardullo, R.A. 2013. Waveform generation is controlled by


**PATENTS**


**TEACHING**

**Undergraduate**

- Biochemistry 100 (Introductory Biochemistry), 2015
- Biology 2 (Cellular Biology for non-majors), 2005, 2008-2010
- Biology 5B (Introduction to Organismal Biology), 2003-2007, 2010-2013
- Biology 111 (Cell Biology), 1997-1999
- HNPG 1A (Transition of an Honors Student), 2014
- HNPG 15 (Honors Ignition Seminar on the Nature of Discovery and Creativity), 2012, 2013
- HNPG 15 (Honors Ignition Seminar on Drivers of Change), 2014
- HNPG 15 (Honors Ignition Seminar on the Anthropocene)
- HNPG 151 (Honors Research Seminar), 2013, 2015
- NASC 93 (Freshman Advising Seminar), 2010, 2011
**Graduate**
Biology 200A (Graduate Course in Cellular Biology), 1995
Biology 303 – (Philosophy and Pedagogy of Teaching Undergraduate Life Science) 2010, 2012
Various topical graduate seminars, approximately 1 per year

**Postgraduate**
Analytical and Quantitative Light Microscopy at MBL (Woods Hole), 1990 to 2010.
HHMI/National Academy of Life Sciences Summer Institute (Madison, WI), 2007

**CURRENT GRADUATE STUDENTS**
Carla del los Santos, Ph.D. Candidate (Bioengineering)
Kimberly Stephens, Ph.D. Candidate (Entomology)
Nathan Robinett, Ph.D. Candidate (Evolutionary Biology, joint doctoral program San Diego State University)
Nhi Tran, M.S. Candidate (Biochemistry)

**COMPLETED GRADUATE AND POSTGRADUATE STUDENT TRAINING**
**Graduate Students:**
Eric Alm, M.S (Biology)
Cathrine Castillo, M.S. (Cell, Molecular, and Developmental Biology)
Qin Chen, M.S. (Biology)
Alejandro Cortez, M.S. (Biology)
Juan Fraire-Zamora, Ph.D. (Evolution, Ecology, and Organismal Biology)
Scott Herrick, Ph.D. (Biology)
Ruei-Shuiian Lin, Ph.D. (Biology)
Haruhiko Miyata, Ph.D. (Evolution, Ecology, and Organismal Biology)
Joya Paul, M.S. (Biology)

In addition I have served on 63 Ph.D. qualifying examination committees, 36 Ph.D. student advisory committees, 19 Ph.D. dissertation committees, and 14 M.S. thesis committees in various graduate programs.

**Postdoctoral Fellows:**
Lisa A. Fast, Ph.D.
Juan Fraire-Zamora, Ph.D.
Catherine D. Thaler, Ph.D.

**PROFESSIONAL SERVICE**
Member, Organizing Committee for International Congress on Spermatology, 1998
Vice Chair, Gordon Research Conference on Fertilization and the Activation of Development, 2003
Chair, Gordon Research Conference on Fertilization and the Activation of Development, 2005
Associate Editor, Molecular Reproduction and Development, 2009 – present
Editor, International Journal of Biochemistry and Molecular Biology, 2010 – present
Editor, American Journal of Molecular Biology, 2011-present

**Scientific Society Membership**
American Association for the Advancement of Science, American Society for Cell Biology, Biophysical Society, Sigma Xi, Society of General Physiologists, Society for the Study of Reproduction.

**Manuscript Reviews**

**Grant Reviews**
Reviewer, Jeffress Research Grant (1993)
Outside Reviewer, NSF (1994 - 2011)
Reviewer, South Plains Foundation (1996)
Panel Member, Shared Instrumentation Grants for Confocal Microscopy, NIH (1996)
Site Visit Member, Program Project Grant in Reproductive Biology at Stanford, NIH (1996)
Panel Member, Cellular and Molecular Imaging Study Section, NIH (2003)
Panel Member, Novel Contraceptive Methods, NIH (2003)
Site Visit Member, Comprehensive Math Science Partnerships, NSF (2003)
Panel Member, Cellular, Molecular and Integrative Reproduction Study Section, NIH (2011, 2013, 2016)
Panel Member, Louis Stokes Alliance for Minority Participation Centers, NSF (2011)
Panel Member, R15 Special Emphasis Panel, NIH (2013)
Panel Member, IUSE, NSF (2014)

**Invited Talks**
1985 Department of Anatomy and Cellular Biology, Harvard Medical School
1986 Department of Biophysics, Johns Hopkins University
Boston Area Cell Motility Club, Harvard University
1987 Department of Biology, Boston University
Laboratory of Human Reproduction and Reproductive Biology, Harvard Medical School
Beth Israel Hospital, Boston
Department of Anatomy and Cell Biology, Duke University
Department of Anatomy, Yale University
1989 American Society of Cell Biology, Subgroup meeting on *Ligand-induced exocytosis*
1990 Department of Physiology, The University of Texas Southwestern at Dallas
VI International Congress on Spermatology, Siena, Italy
1991 Department of Biochemistry, Georgetown University
Department of Cell and Developmental Biology, Harvard University
Department of Biology, The University of California - Riverside
Division of Reproductive Biology, The University of Pennsylvania Medical School
Gordon Conference on *Fertilization and the Activation of Development*
1992 Loeb Biomedical Research Institute, Ottawa, Canada
Boston Biomedical Research Institute
1993 Department of Biophysics and the Beckman Laser Institute, Univ. of California - Irvine
Symposium, annual meeting of the Society for the Study of Reproduction, Fort Collins
Genetics Program, University of California - Riverside

1994 Department of Biology, Pomona College
Department of Chemistry, University of California - Riverside
Department of Cell and Molecular Biology, Loma Linda University Medical School

1995 Department of Cellular Biology, The University of California - Davis
Department of Cell and Molecular Biology, Loma Linda Medical Center
Gordon Conference on Fertilization and the Activation of Development
Department of Biology, California State University, Fullerton

1996 Department of Cellular and Developmental Biology, The University of California - Santa Barbara
Department of Biochemistry, The University of California - Riverside

1998 Department of Physics, The University of California - Riverside
NSF Conference on Computing in Life Sciences, Claremont, CA
Department of Anatomy and Cell Biology, Tufts University Medical School, Boston, MA
VIII International Congress on Spermatology, Montreal, Canada
Department of Biomedical Sciences, The University of California-Riverside

1999 Departments of Biology and Physics, Occidental College

2000 Department of Biochemistry, Texas Tech University, Lubbock

2002 Department of Molecular Biology and Biochemistry, Johns Hopkins University
Department of Veterinary and Animal Sciences and Biology, University of Massachusetts
Department of Biology, University of California, Riverside

2003 Gordon Conference on Fertilization and Activation of Development
“How People Learn for developing courses and curricula” National Research Council, Washington, D.C.

2004 Department of Biological Sciences, Notre Dame University

2005 Gordon Research Conference on Fertilization and Activation of Development

2007 Center for Conservation and Research for Endangered Species, San Diego

2008 Keynote speaker, Math Science Partnership Conference (NSF), Washington, D.C.

2009 Annual Meeting for the American Society for Cell Biology, San Diego, CA
National Evolutionary Synthesis Center, Durham, NC

2010 College of Science and Mathematics, Wright State University, Dayton, OH
Cellular Dynamics Program, Marine Biological Laboratory, Woods Hole, MA

2011 Gordon Conference on Fertilization and Activation of Development
Beckman Center, City of Hope, Duarte, CA
International Relations, California State University, Fullerton, CA
Molecular Genetics Graduate Program, Loma Linda University

2012 American Society for Andrology Annual Meeting, Tucson, CA
Department of Obstetrics and Gynecology, University of Pennsylvania, Philadelphia, PA

2013 Department of Biology, California Lutheran University, Thousand Oaks, CA
Department of Veterinary and Animal Sciences, University of Massachusetts, Amherst, MA

2014 Department of Cell Biology and Biochemistry, Texas Tech University, Lubbock, TX
Department of Anatomy and Cell Biology, Kansas University Medical Center, Kansas City, KS
UCR Citizens University Committee, Riverside, CA
Department of Molecular Biology and Genetics, Cornell University, Ithaca, NY
Department of Biological Sciences and the RNA Institute, University of Albany, NY

DEPARTMENTAL COMMITTEES
Member, Electron Microscopy Committee, 1992 – 1994
Richard A. Cardullo, Ph.D.

Co-chair, Seminar Committee, Winter, 1993; Fall, 1993; Fall, 1994; Fall 1995, Fall, 1997, Fall, 1998
Chair, Computer Committee, 1991 – 2002
Member, Graduate Advisory Committee, 1993 – present
Editor, Graduate Brochure, 1994 – 1995
Graduate Poster in Cell and Molecular Biology, 1995
Faculty Advisor, Cell and Molecular Ph.D. Qualifying Examination, 1995
Graduate Advisor, Department of Biology (Recruitment), 1996 – 1999
Chair, Space Committee, 1998-2003
Graduate Advisor, Department of Biology (Continuing Students), 2001 – 2003
Chair, Faculty Search Committee in Developmental Biology, 2001
Chair, Department of Biology, 2004 – 2009
Editor, Biology Department Newsletter, 2006 - 2010
Faculty Advisor, Physiology Ph.D. Written Qualifying Examination, 2007
Chair, Development committee, 2008 – present
Chair, EEOB Graduate Program Teaching Committee, 2010 – 2013
Chair, Biology Curriculum Committee, 2014 - present

CAMPUS COMMITTEES
Member, Academic Computer Committee, 1992 – 1994
Chair, Academic Computer Committee, 1995 – 1996
Member, Institute for Molecular Biomedical Research Planning Committee, 1993 – 1995
Member, Strategic Planning Subcommittee for College of Natural and Agricultural Sciences, 1994
Member, Scholarship Committee, 1996 - 1999
President, Riverside Chapter of Sigma Xi, 1998 - 2000
Member, Graduate Program Reorganization Committee, 1996 - 1997
Member, Academic Senate Educational Policy Committee, 1997 - 2000
Vice Chair, Academic Senate Educational Policy Committee, 1998 - 2000
Member, Distinguished Teaching Committee, 2002 – 2005
Member, Life Science Committee of Chairs, 2004 - 2009
Member, Committee on Committees, 2006 – 2009
Member, Academy of Distinguished Teachers, 2006 – 2011
Co-Chair, Search Committee for Endowed Chair in Innovative Teaching Across Disciplines, 2007
Member, General Education Planning Committee, 2007
Member, School of Medicine Curriculum Planning Committee, 2007
Member, Academic Senate General Education Committee, 2008 - 2011
Chair, Academic Senate Committee on Committees, 2008 - 2009
CNAS Faculty Representative, Campus Budget Advisory Committee, 2009 - 2010
Member, University Strategic Planning Committee on Community Engagement, 2009 – 2010
Member, Academic Senate Committee on Academic Personnel, 2014
Member, Academic Senate Committee on International Education, 2014 -

UNIVERSITY COMMITTEES
Representative, Information Technology and Telecommunication Policy, 1995 - 1996
Member, Teaching and Learning Technologies and the Future of the University, 1997
Member, UC System-wide Committee on Committees, 2008 - 2009

PUBLIC SERVICE AND OUTREACH
Provider, School University Partnership Teacher In-service, Alvord Unified School District, 1997-2001
Member, Board of Directors, Inland Empire Chapter Juvenile Diabetes Research Foundation, 1998 - 2001
Coordinator, Riverside Unified School District Science Fair, 1999 - 2002
Judge, Riverside Unified School District Science Fair, 1995 - present
Coordinator, Weekly Summer Science Institute for Teachers and Students at UCR, 1999 - 2008 (Project ALIAS)
Judge, Alvord Unified School District Science Fair, 1998 - 2001
Judge, Jurupa Unified School District Science Fair, 2002 - 2007
Judge, California State Science Fair (Biochemistry), 2004, 2006
Judge, California State Science Fair (Zoology), 2005
Coordinator, 2-week Summer Science Institute for Teachers and Students in Ontario-Montclair Unified School District (Project POSE), 2009 – 2012
Coordinator, 2-week Summer Science Institute for Teachers in Riverside County (Project SCAN), 2011-2014
Chia-en A. Chang  
April, 2016

Department of Chemistry,  
University of California, Riverside  
Phone: 951-827-7263  
Email: chiaenc@ucr.edu  
http://www.chem.ucr.edu/chang

Research Interests
• Non-covalent binding kinetics and thermodynamics  
• Modeling and design of multi-enzyme complexes for enhanced catalysis  
• Molecular recognition and protein dynamics  
• Physical chemistry and statistics mechanism of biomolecules  
• Computer-aided drug and peptide inhibitor design

Employment
• Associate Professor, Department of Chemistry, University of California, Riverside, 7/2014 – present.  
• Assistant Professor, Department of Chemistry, University of California, Riverside, 2008-2014.

Education and Training
• Postdoctoral research, Department of Chemistry and Biochemistry, University of California, San Diego and HHMI. Advisor: Dr. J. Andrew McCammon, 2/2005-11/2007.  
• Graduate School, Ohio State University, Columbus, OH, M.S. Civil and Environmental Engineering, 9/1995-6/1997  
• Undergraduate, National Taiwan University, Taiwan, B.S. Plant Biology, 9/1991-6/1995.

Research Recognition and Honors
• Career Award, National Science Foundation, 2014  
• Faculty Development Award, University of California, 2012  
• Omnibus Travel Award, Academic Senate Research, University of California, 2012, 2014  
• Robert T Poe Faculty Development Award, 2009  
• HP Outstanding Junior Faculty Award, American Chemical Society, 2009
• Regents’ Faculty Fellowship, University of California, 2008
• Outstanding Graduate Student, University of Maryland Biotechnology Institute, 2003.
• College Travel Award, University of Maryland at College Park, 2002.

Extramural Funding
• National Science Foundation, CAREER: Development and Application of Multi-scale Modeling for Biomolecular Association, 2014-2019
• National Institutes of Health R01 Supplement Equipment Fund: Computational and theoretical characterization of ligand-protein binding mechanism, 2015-2016.
• National Institutes of Health R01 (co-PI; L. Mueller PI): Enhancing Chemically-rich structure and dynamics in the active site of tryptophan synthase, 2011-2016.

Service (selected)
• Member, NSF, NSF BIO/MCB Computational Biochemistry, 2016
• Member, NSF, NSF BIO/MCB Molecular and Cellular Biosciences, 2015
• Member, National Academies of Sciences, Study of Molecular Dynamics 2015
• Member, NIH NIAID Special Emphasis Panel ZA1 Sm-MJ-2 R21/R33 study section, 2013
• Reviewer for NSF, 2009-present, ad hoc.
• Reviewer for ACS petroleum fund, 2011-2012
• Reviewer for Cottrell college science award, 2012
• Oversight Board committee, University of California Shared Research Technology, 2009-2012

Service as referee for the following journals (selected):

Visiting scholars in the group
• Wei Chen, Visiting assistant professor (1/2015 – present)

Students and postdoctoral researchers advised
Current group members:
• Chris Roberts, Postdoctoral fellow (1/2015 – present)
• Zhiye Tang, Graduate student (9/2011 – present)
• Wanli You, Graduate student (9/2012 – present)
• Mary Raymundo, Graduate student (9/2015 – present)
• Yuliana Bosken, Graduate student (9/2015 – present)
• Viktoriia Liu, Graduate student (7/2016 – present)
• Tim Cholko, Graduate student (8/2016 – present)
• Jennifer Clark, undergraduate (9/2014 – present)

Former group members:
• Safieh Ladani, Postdoctoral fellow (4/2015 – 4/2016)
• Xuqing Liu, Master student (9/2014 – 4/2016)
• Steven Ahrendt, Graduate student (9/2010 – 6/2015, UC Berkeley)
• Chris Roberts, Graduate student (6/2010 – 12/2014, UCR)
• Mindy Huang, Graduate student (9/2009 – 8/2014, UCSD)
• Rizi Ai, Graduate student (1/2008 – 8/2012, UCSD)
• Myungshim Kang, Postdoc (9/2009 – 2/2013, CUNY)
• Lawrence Pointer, undergraduate (1/2013 – 6/2013)
• Sean Jayasekera, undergraduate (9/2012 – 6/2013)
• Jaspreet Kaur, undergraduate (Summer 2011)
• Sepideh Yaghmaeim, Postdoc (2/2011– 12/2011, community college lecturer)
• Qaiser Fatmi, Postdoc (6/2008 – 10/2010, Quaid-e-Azam University in Pakistan)
• Alfonso Lam, Postdoc (7/2008 – 6/2009, subsequently, UC, Irvine)
• Kirmanj Atrushi, undergraduate (Summer 2008)
• Kevin Kim, undergraduate (Summer 2010)
• Shivali Gowda, Georgette Sabbah and Ashraf Sabbah, High school students (summer 2013)
• Apoorva Panse, high school student (6/2012 – 5/2014, UCLA)
• Alejandro Cabian, undergraduate (6/2013 – 9/2014, high school teacher)

Invited Talks (recent and selected)
• Modeling molecular recognition: from host-guest binding kinetics and thermodynamics to large enzyme nanostructure design, Institut für Physik, Humboldt Universität zu Berlin, 6/2016.
• Understand non-covalent binding: enthalpy, entropy, thermodynamics and kinetics, Centre of New Technologies, University of Warsaw, 6/2016.
• Modeling ligand-protein binding kinetics: the continuous and dynamical processes in
• Insights from Drug-Protein Binding Free Energy Calculations: Entropy, Enthalpy and Inhibitor Design, School of Pharmacy, University of Maryland, Baltimore, 5/2016.
• Modeling molecular recognition: multi-scale simulations for ligand-receptor binding processes. Seminar, Sichuan University, Chengdu, China, 10/2015.
• Modeling of enhanced catalysis in multienzyme nanostructures: effect of molecular scaffolds, spatial organization, and concentration. Multiple faces of Biomolecular Electrostatics Workshop, Columbus, OH, 10/2015.
• Simulations of Biomolecular Systems: from small ligand binding affinity prediction to large enzyme nanostructure design. Seminar, School of Chemistry, University of Edinburgh, UK, 6/2015.
• Simulations of Biomolecular Systems: Protein Dynamics, Docking, and Inhibitor Discovery. CEPCEB Symposium, UCR, 12/2014.
• Effect of Spatial Organization and Molecular scaffolds on the Diffusional Activity of substrates in Enzyme Nanostructures. AAAS Regional Meeting, Riverside, CA, 6/2014.
• Bindin kinetics Studies for Cryptophane Host-Guest and Ligand-Protein Complexes, CECAM, Genoa, Italy, 6/2014.
• Modeling of Biomolecular Systems: Protein Dynamics, Binding Affinity Calculation, and Inhibitor Design, Seminar, National Taiwan University, 3/2014.
• Insights from Free Energy Calculations: Protein Conformational Equilibrium, Driving Forces and Ligand Binding Processes, Seminar, Georgia State University, 11/2013.
• Insights from Free Energy Calculations, AAAS Regional Meeting, Las Vegas, 6/2013.
Publications (referred, with a few exceptions as noted)


Publications after joining UCR


34. Zeng, S., Huang, Y.-M. M., Chang, C.-E. A.*, and Zhong, W*. Protein Binding for Detection of Small Changes on Nanoparticle Surface, Analyst, 2014, 139, 1364-1371 [cover art]


Recognition: Case of the FHA domains. *PLoS ONE, 2014, 9, e98291*


Richard J. Debus
Professor and Chair
Department of Biochemistry
University of California, Riverside

Education and Training

California Institute of Technology Chemistry B.S. 1977
University of California, San Diego Chemistry M.S. 1980
University of California, San Diego Chemistry Ph.D. 1985
MSU-DOE Plant Research Laboratory Plant Molecular Biology Postdoctoral 1985-1988
Michigan State University

Research and Professional Experience

1977-1985 Research Assistant, Departments of Physics & Chemistry, University of California, San Diego
1985-1988 Postdoctoral Fellow, MSU-DOE Plant Research Laboratory, Michigan State University
1988-1995 Assistant Professor, Department of Biochemistry, University of California, Riverside
1995-2001 Associate Professor, Department of Biochemistry, University of California, Riverside
2001-present Professor, Department of Biochemistry, University of California, Riverside
2006-present Cooperating Faculty Member, Department of Chemistry, University of California, Riverside,
2006-2007 Interim Chair, Department of Biochemistry, University of California, Riverside
2008-2010 Vice Chair, Department of Biochemistry, University of California, Riverside
2010-present Chair, Department of Biochemistry, University of California, Riverside

Honors

Fellow, American Association for the Advancement of Science (Elected 2009)

Publications

Peer-Reviewed Technical Journal Articles (numbering corresponds to that in UCR’s eFile system)


A25. Komenda, J., Hassan, H. A. G., Diner, B. A., Debus, R. J., Barber, J., and Nixon, P. J. (2000) “Degradation of the Photosystem II D1 and D2 Proteins in Different Strains of the Cyanobacterium Synechocystis sp. PCC 6803 Varying with Respect to the Type and Level of psbA Transcript,” Plant Mol. Biol. 42, 635-645 (http://download.springer.com/static/pdf/557/art%253A10.1023%252FA%253A1006305308196.pdf?origin=static-pdf%253Aart%2525253A10.1023%25252FA%25253A1006305308196%26token2 =exp%253A144325151→a%253C%252Fstatic%252Fpdf%25252F557%252Fpart%2525253A1006305308196%26hmac%3D6b37e379f4b4302cc84a0c42860b7ef0d3a01feb0629e1215d4c d07dd4f1b0f6e).”


Review Articles (numbering corresponds to that in UCR’s eFile system)


Edited Journal Articles (numbering corresponds to that in UCR's eFile system)


Abstracts (numbering corresponds to that in UCR's eFile system)


**EXTRAMURAL FUNDING**

**Past Funding Support**


National Science Foundation, MCB 0111065, “Mechanism of Photosynthetic Oxygen Evolution” (R. J. Debus, PI) $360,000 Total Award, 08/01/2001 – 07/31/2004

National Institutes of Health, R01 GM66136; “EPR & Optical Studies of Photosynthetic Water Oxidation” (R. J. Debus, PI) $746,467 Total Award, 08/02/2002 – 07/31/2006

National Institutes of Health, R01 GM76232; “FTIR Studies of Photosynthetic Oxygen Evolution” (R. J. Debus, PI) $847,048 Total Award, 07/03/2006 – 05/31/2010

Department of Energy, Office of Energy Biosciences, DE-FG01-10ER16191; “FTIR Studies of Photosynthetic Oxygen Production (R. J. Debus, PI) $499,725 Total Award, 09/01/2010 – 08/31/2013

**Current Funding Support**

Department of Energy, Office of Energy Biosciences, DE-SC0005291, “FTIR Studies of Photosynthetic Oxygen Production (R. J. Debus, PI) $499,177 Total Award, 09/01/2014 – 08/31/2017

**Synergistic Activities (since 2001)**

Editorial Board, Photosynthesis Research, 1995-present.

Member, NSF Molecular Biophysics Grant Review Panel, 2001-2002.

Member, NSF Molecular Biochemistry Grant Review Panel, 2002

Vice Chair, Gordon Research Conference on Photosynthesis, 2011

Chair, Gordon Research Conference on Photosynthesis, 2012

**Invited Presentations at International Meetings (since 2000)**


Li Fan

http://biochemistry.ucr.edu/faculty/fan/fan.html

Department of Biochemistry   Phone:   (951)8273630
Boyce Hall 2466   Fax:        (951)8274434
University of California, Riverside   E-mail:    lifan@ucr.edu
Riverside, CA 92521

Education:
Bowling Green State University, Bowling Green, Ohio,  M. S. in Chemistry, 1993.
Beijing University, Beijing, China,  B. S. in Chemistry, 1987.

Professional Experience:
University of California at Riverside, Department of Biochemistry, Riverside, California
Associate Professor        2016-Present
Assistant Professor        2009- 2016
Director of Macromolecular X-ray crystallography core facility  2009-present

The Scripps Research Institute, Department of Molecular Biology, La Jolla, California
Senior Research Associate 2007- 2008
Research Associate 2000 – 2007

Manuscripts in Preparation (*corresponding author)
1.   K. DuPrez, I. Wang, and Li Fan* “Crystal structure of archaeal XPB associated with an endonuclease complex”.

2.   Binyuan Zhai, K. Duprez, T. I. Doukov, Jinfeng Ni, Lichuan Gu, Yulong Shen*; Li Fan* “A novel P-loop ATPase conserved in archaea is associated with Holliday junction processing and essential for cell viability”

Manuscripts Submitted (*corresponding author)
1.   K. DuPrez, I. Wang, E. Hilario, Li Fan* “ATP-Driven domain rotation in XPB helicase supports a unified DNA unwinding mechanism for transcription and DNA repair”.

Publications (22 listed out of 25, H-index 11) (*corresponding author)
Review articles


Book chapters
Journal articles


"Must read” Recommended by Faculty of 1000 Biology [http://www.f1000biology.com/article/id/1115102]

Highlighted by C&E News Enzyme Structure And Mutations Reveal Disease Roles (http://pubs.acs.org/subscribe/journals/cen/86/i23/toc/toc_i23.html#sci)


Recommended by Faculty of 1000 Biology (http://www.f1000biology.com/article/16600867/).


Grants, Honors and Awards

2015-2020 NIH grant 1R01GM108893-01A1 “Investigating the role of XPB helicase in DNA nucleotide excision repair” $1,624,416. Sole-PI.
2015-2016 University of California Regents Faculty Development Award ($9,000).

2011-2016 NIH grant R01GM097569 (PI: L. J. Mueller) “Chemically-Rich Structure and Dynamics in the Active Site of Tryptophan Synthase” $1,872,803 total cost. Co-PI ($225,000 direct cost)

2012-2016 US Department of Agriculture AES/RSAP award at UCR “Structural biology of citrus canker disease”. $45,000. Sole PI.

2012-2013 Hellman Scholar, Hellman Fellowship Foundation, USA. ($30,000)

2012 Recent Alumni Award, College of Natural Sci. Alumni Association, Michigan State Univ.

2012, 2013, 2014, 2015 Academic Senate Omnibus Travel Award, UCR.

Honorable Guest Professor (May 09, 2011), Central South University, Changsha, China.

R. Gaurth Hansen Award (2011) for outstanding alumni at early academic career, 50th anniversary of Department of Biochemistry and Molecular Biology, Michigan State University

Outstanding Graduate Student Award for Excellence in Research, Scholarship and Teaching (2000), Department of Biochemistry, Michigan State University, Michigan.

Graduate travel award (1999), College of Natural Sciences, Michigan State University, Michigan.

Professional Association Memberships

American Crystallography Association, Advanced American Association of Science, Protein Society, American Pharmaceutical Scientists Society.

Structural coordinates (12) in PDB hold prior publication


**Published structural coordinates (12) in PDB.**


**Conference and Seminar Presentations:**

- **06/13-17/2016** Poster presentation at the 2016 Cold Spring Harbor Asia Conference on DNA metabolism, Genomic Stability and Disease at Suzhou, China. Title: “Structural and functional study of a novel ATPase associated with Holiday junction resolvase Hjc”.

- **05/26-29/2016** Oral presentation at the 2016 International Conference on Nucleic Acid-Protein Chemical and Structural Biology for Novel Drug Discovery at Chengdu, China. Title: “Identification and characterization of a novel RuvB-like ATPase from *S. Islandicus*”

- **03/15/2015** Session Chair and Oral presentation at 22nd West Coast Protein Crystallography Workshop, Monterey, CA. Title: “Structural evidence supporting XPB helicase as a molecular wrench”.

- **02/08/2015** Poster presentation at Gordon Research Conference of Mammalian DNA Repair, Ventura, California. Title: “Structural evidence supporting XPB helicase as a molecular wrench”.

- **02/15/2014** Oral presentation at International Fusion conference of Dynamic Structures in DNA Damage Responses and Cancer, Cancun, Mexico. Title: “Structural study of XPB helicase: insight into molecular mechanism of DNA unwinding and impact of disease-causing mutations”

- **10/04/2013** Invited lecture at Molecular and Computational Biology program at University of Southern California (USC). Title: “Structural study of XPB helicase: insight into molecular mechanism of DNA unwinding and impact of disease-causing mutations”.

- **03/25/2013** Invited lecture at School of Life Sciences, Shangdong University, Jinan, China. Title: “How two helicases work together within the TFIIH complex, a perspective from structural studies of XPB and XPD helicases”.

- **03/25/2013** Invited lecture at State Key Laboratory of Microbial Technology, Shangdong University, Jinan, China. Title: “Structural biology of citrus canker: structural and functional studies on Xanthomonas proteins important for the disease”.

- **03/22/2013** Oral presentation at BIT’s 6th Annual World Protein and Peptide Conference 2013 at Suzhou, China. Title: “Crystal structures of Xanthomonas small heat shock protein provide a structural basis for active molecular chaperone oligomers”.

- **03/17/2013** Poster presentation at the West Coast Protein Crystallography Workshop XXI in Monterey, CA. March 16 - 21, 2013. Title: “The crystal structure of C-terminal half of the human XPB helicase at 1.8 Angstroms and the impact of the genetic disease-causing mutation XP11BE”.


11/30/2012  Invited lecture at Department of Botany and Plant Sciences and Center for Plant Cell Biology, University of California Riverside. Title: "Structural biology of citrus canker: structural and functional studies on Xanthomonas proteins important for the disease".

05/10/2011 Invited lecture at Institute of Cancer Research, Central South University, Changsha, China. Title: “Structural biology of XPB and XPD in nucleotide excision repair and insights into clinical mutations in cancer and aging”.

05/09/2011 Distinguished lecture at Central South University, Changsha, China. Title: “Genome-wide structural and functional studies on Xanthomonas axonopodis pv citri (Xac)-citrus infections”

04/26/2011 Oral presentation at the 2nd International Symposium on Enzymes & Biocatalysis-2011 in Dalian, China. Title: “Structural Basis of Disease Causing Mutation G47R at the ATP Binding Site of DNA Repair Helicase XPD”.

04/21/2011 Keynote speaker at 50th anniversary of Department of Biochemistry and Molecular Biology, Michigan State University, East Lansing, MI. Title: “Helicases are not built the same: crystal structures of archaeal XPB and XPD helicases reveal the “transmission” and “driving wheel” of TFIIH to open damaged DNA for DNA repair”.

04/07/2011 Invited lecture at Department of Chemistry and Biochemistry, California State University, Fullerton, California. Title: “Genome-wide structural and functional studies on Xanthomonas axonopodis pv citri (Xac)-citrus infections”

11/17/2010 Invited Seminar for Enviromental Toxicology Seminar Series 2010 Fall, UCR. Title: "Helicases are not built the same: crystal structures of archaeal XPB and XPD"


3/02/2010 Invited Seminar in Biochemistry of BMB graduate program, UCR. Title: "Genome-wide studies on Xanthomonas axonopodis pv citri (Xac)-citrus infections by protein X-ray crystallography"

11/02/2009 Invited Guest lecture at BCH095, UCR. Title: “Introduction to protein structure determination by X-ray crystallography”

July 18-22, 2008. DNA Replication and Genome Integrity meeting. Salk Institute for Biological Studies, La Jolla, California. (Selected for Oral presentation). Title: "Insights into the Cancer and Aging Phenotypes from XPD Mutations: structural and function studies on archaeal XPD helicase”.

May 8-10, 2008. The 7th Workshop of Structural Biology of DNA Repair. Berkeley, California. (poster) Title: "Crystal structures of XPD helicase from Sulfolobus acidocaldarius."


May 20-25, 2004. The 3rd Workshop of Structural Biology of DNA Repair. Berkeley, California. (poster). Title: "XPB crystal structure reveals a damage verification domain flexibly linked to a helicase core."

August 17-21, 2002. The 16th Protein Society Meeting. San Diego, California. (poster). Title: "A 1.47 Å resolution crystal structure of human manganese superoxide dismutase Y166F mutant".


**Regular Class-room Teaching**

**BCH101**: Fundamental Biochemical Laboratory (3 units, Winter)

**BCH184**: Topics in Physical Biochemistry (4 units, 1/3 Winter)

**BCH210**: Biochemistry of Macromolecules (4 units, 1/4 Spring)

**BCH252**: BMB graduate seminar series (2 units, 1/3 Fall)

**NASC093**: Freshman Advising Seminars in Natural and Agricultural Sciences (2 units, fall)
NAME: Theodore Garland, Jr.

eRA COMMONS USER NAME (credential, e.g., agency login): tgarland

POSITION TITLE: Professor of Biology

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE</th>
<th>Completion Date</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Nevada, Las Vegas, Highest Honors</td>
<td>B.S.</td>
<td>05/1978</td>
<td>Zoology</td>
</tr>
<tr>
<td>University of Nevada, Las Vegas</td>
<td>M.S.</td>
<td>08/1980</td>
<td>Biology</td>
</tr>
<tr>
<td>University of California, Irvine</td>
<td>Ph.D.</td>
<td>08/1985</td>
<td>Biological Sciences</td>
</tr>
<tr>
<td>University of Washington</td>
<td>Postdoctoral</td>
<td>08/1987</td>
<td>Zoology</td>
</tr>
</tbody>
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A. Personal Statement

As a faculty member of the University of Wisconsin-Madison, I began study of the quantitative genetics of exercise behavior and physiology in outbred mice, and then implemented a long-term selective breeding experiment, beginning in 1993. Using our High Runner and Control mouse lines, my collaborators and I have successfully utilized all of the proposed methods, including administration of Western diet; manipulation of access to running wheels; characterization of voluntary exercise, spontaneous physical activity, and additional behavioral parameters; measurement of basal metabolic rate; and non-invasive assessment of body composition. In addition, we have extensive experience employing the mixed-model statistical techniques required for appropriate analysis of data derived from this selection experiment.

I have the experience, resources, and collaborators necessary to advise graduate students in the proposed graduate program. I have served as PI on multiple federally funded grants to support the selection experiment and to study the physiological, biochemical, anatomical, and experiential influences on differences in voluntary activity and spontaneous physical activity in High Runner vs. Control lines of mice. I have administered the budgets, made recruitment and hiring decisions, and supervised all personnel for these projects since the selection experiment was begun in 1993. I have developed leadership skills and demonstrated the ability to carry out a long-term selection experiment extending for 75 generations and over 23 years. I have also served as the sponsor for NIH NRSA awards at both the predoctoral and postdoctoral levels for additional studies on these lines of mice, as well as an existing R21.

Most of my research, and especially that involving the selection experiment, has involved numerous collaborators, including internationally. Hence, I understand the importance of clear and effective communication among participants, as well as developing a realistic budget, research plan, and timeline for graduate students. I know what it takes to advise graduate research projects on time and within budget.

B. Positions and Honors

**Positions**

1986-87  Lecturer, Department of Zoology, University of Washington
1987    Lecturer, Department of Ecology and Evolutionary Biology, Univ. of Calif., Irvine
1987-01  Assistant/Associate/Full Professor, Department of Zoology, University of Wisconsin-Madison
1991-92  Assistant/Associate Program Director, National Science Foundation, Population Biology and Physiological Ecology Program
2001-2016  Professor, Department of Biology, University of California, Riverside (also member of graduate programs in Evolution, Ecology, and Organismal Biology; Biomedical Sciences; Genetics, Genomics, and Bioinformatics; Neuroscience)

2001-2016  Distinguished Professor, Department of Biology, University of California, Riverside (also member of graduate programs in Evolution, Ecology, and Organismal Biology; Biomedical Sciences; Genetics, Genomics, and Bioinformatics; Neuroscience)

2006-  Associate Director, University of California Multicampus Research Program: Network for Experimental Research on Evolution (NERE) (http://nere.bio.uci.edu/)

2014-  Founding Director, Institute for the Development of Educational Applications (IDEA), University of California, Riverside (http://idea.ucr.edu/)

Other Experience and Professional Memberships

2007  NIH CADO Study Section, ad hoc phone reviewer
2008  NIH CADO Study Section, ad hoc phone reviewer
2010  NIH Peer Review Committee: Genetics of Longevity P01 consortium, ad hoc phone reviewer
2011  NIH Aging Consortium, ad hoc phone reviewer
2012  NIH Comparative Physiology of Aging, Special Emphasis Panel via phone
2013  NIH Comparative Physiology of Aging, Special Emphasis Panel Chair via phone
2015  NIH Comparative Physiology of Aging, Special Emphasis Panel Chair via phone

Honors
1974  Rotary Club Scholarship, U.N.L.V.
1974-78  Dean’s Honor List, U.N.L.V.
1975  East African Natural History Safari Scholarship, U.N.L.V.
1976  Charter Member, Alpha Epsilon Delta, U.N.L.V.
1977  Elected Phi Kappa Phi, U.N.L.V.
1980  Regent's Fellowship, U.C., Irvine
1981  Honorable Mention, Edward A. Steinhaus Teaching Award, U.C., Irvine
1983-84  Fulbright Predoctoral Grant, Australia
1985  Regent's Dissertation Fellowship, U.C., Irvine
1985  Edward A. Steinhaus Teaching Award, U.C., Irvine
1985  Outstanding Graduate Student Scholar Award, U.C., Irvine
1986  Alternate Fellow (no funding), National Science Foundation Fellowship in Environmental Biology
1991-96  Presidential Young Investigator Award, National Science Foundation
1994  H. I. Romnes Faculty Fellowship, Wisconsin Alumni Research Foundation
1998  Vilas Associates Program, Wisconsin Alumni Research Foundation

Editorial Experience
1993-2000  Associate Editor, The American Naturalist
1997-2005  Editorial Board, Physiological and Biochemical Zoology
1999-  Editorial and Advisory Board, Zoology
2000-2010  Editorial Board, Journal of Morphology
2000-2002  Associate Editor, Evolution
2003-  Advisory Board, Ecological and Environmental Physiology book series, Oxford University Press
2005-2014  Associate Editor, Physiological and Biochemical Zoology
2009-  Editor of the Evolutionary Physiology section of Comprehensive Physiology
2014-  Editor in Chief, Physiological and Biochemical Zoology

Professional Memberships (current)
American Physiological Society
Society for Integrative and Comparative Biology
Society for the Study of Evolution

Teaching Experience at UCR
2002-present  Ecological and Evolutionary Physiology (BIOL 174, 3 credits)
2003-present  Evolution (BIOL 105, 4 credits)
C. Contribution to Science

1. Individual Variation in the Exercise Physiology of Natural Populations

Beginning with my Ph.D. dissertation research, I have explored the nature of individual variation in exercise physiology and activity metabolism in wild populations of vertebrates. I developed techniques for obtaining valid, reproducible, and physiologically based measures of locomotor endurance in lizards and snakes. I pioneered the use of residuals from regression equations as a way to remove statistically the confounding effects of such variables as body size, age, sex, and season. My studies were successful in demonstrating that individual differences in locomotor performance abilities are indeed repeatable on a day-to-day basis and represent variation in lower level traits expected to affect performance (e.g., heart size). They set the stage for subsequent quantitative genetic analyses by myself and many other workers.


2. Quantitative Genetics of Exercise Physiology in Squamates and Laboratory Rodents

Having demonstrated the physiological solidity of individual differences in squamate exercise performance abilities, the next logical question was the extent to which they were genetically based as opposed to the consequence of "natural training" that might occur as individuals moved about home ranges of different sizes, etc. By use of newborn snakes, we were able to demonstrate that a substantial fraction of the individual variation did, in fact, seem to be based in the additive effects of polygenes. I then applied a similar approach with laboratory mice, except that breeding designs could be much more sophisticated including cross-fostering, hence allowing much cleaner estimates of narrow-sense heritability and genetic correlations. These studies helped set the stage both for selection experiments with laboratory rodents and also subsequent genetic mapping efforts.


3. Selection Experiments as a Tool to Understand the Genetics and Evolution of Complex Behavior/Physiological Traits

Following from my quantitative genetic analyses of squamates and rodents, I turned to replicated artificial selection as an approach to elucidate the genetics, physiology, neurobiology, and evolution of activity levels.
Initially, this was motivated by interests in the evolution of exercise physiology, but in recent years we have turned towards studies with more direct biomedical relevance. This is a fairly easy transition because activity levels are intimately related to energy balance and health effects on numerous metabolic processes, organ systems, and disease processes. Most of our current research with the High Runner lines of mice involves (1) genetic mapping studies via SNP chips and whole-genome sequencing in the context of a fully defined pedigree for all eight lines across the entire experiment (76 generations) and (2) elucidation of the role of early-life effects in the high-activity phenotype of the HR mice.


4. Phylogenetic Analyses of Physiological Diversity

My training as a comparative physiologist led me to explore interspecific variation in exercise physiology, locomotor behavior, and related traits, primarily in small mammals and lizards. In the mid-1980s it became apparent from seminal studies in evolutionary biology that the standard way of analyzing variation among species was statistically inappropriate and often highly misleading. Therefore, as an Assistant Professor I initiated a research program to develop and test phylogenetically based statistical methods and associate computer software, which we have made freely available.


5. Development of the Field of Evolutionary Physiology

At the time I began my dissertation studies in 1980, the term "evolutionary physiology" did not exist. My work on individual variation, quantitative genetics, and phylogenetic analyses helped lay the groundwork for a burgeoning field that crystallized in the later 1980s and early 1990s. Review and perspective pieces brought the field into sharp relief. Presently, I serve as Editor-in-Chief of Physiological and Biochemical Zoology, one of the top journals in the field, and am enforcing a strict policy of ecological/evolutionary relevance for all manuscripts. In addition, I am the founding editor of the Evolutionary Physiology section of Comprehensive Physiology, in charge of commissioning review articles in this area.


Complete List of Published Work in My Bibliography:

Alternatively, all publication PDF files are available here:

As of 2 Feb. 2016, my publications have been cited a total of ~20,943 times, with an H-index of 72 (Web of Science) or 25,740 times, with an H-Index of 83 (Google Scholar: https://scholar.google.com/citations?user=iSSbrhwAAAAJ&hl=en).

D. Research Support

Current Research Support

R21HD075021 Saltzman, Garland, Chappell (PIs) 7/01/13-4/30/15 NIH/NICHD plus 1-year no-cost extension
"Metabolic and Energetic Consequences of Fatherhood"
This research investigates the effects of fatherhood on energy balance, metabolism, behavior, and circulating concentrations of metabolically important hormones, and the influences of parity and stress on these effects, in the monogamous, biparental California mouse. Garland is responsible for organismal phenotyping, student training (graduate and undergraduate), data management, statistical analyses, and participation in manuscript preparation.
Role: PI

IOS-1256572 Saltzman (PI), Garland & Chappell (Co-PIs) 7/01/13-6/30/16 NSF
"Energetic and Immune Consequences of Fatherhood in a Biparental Mammal"
This research investigates the effects of fatherhood on exercise performance, energetics, and immune function, as well as possible modulatory effects of parity and chronic stress, in males of the biparental California mouse. Garland is responsible for organismal phenotyping, student training (graduate and undergraduate), data management, statistical analyses, and participation in manuscript preparation.
Role: Co-PI

R21HD084856 Garland, Saltzman (PIs) 7/10/15-6/30/17 NIH/NICHD
"Early-life Effects on Adult Physical Activity"
This research investigates the effects of early-life exposures to voluntary exercise and/or Western diet on adult physical activity, energy balance, metabolism, behavior, and circulating concentrations of metabolically important hormones, in selectively bred High Runner lines of mice and their non-selected control lines. Garland is responsible for overall organization and supervision, organismal phenotyping, student training (graduate and undergraduate), data management, statistical analyses, and manuscript preparation.
Role: PI

Recently Completed Research Support

IOS-1121273 Garland (PI) 8/1/11 - 8/31/15 NSF (including 1-year, no-cost extension)
"Responses to Selective Breeding for High Voluntary Activity in House Mice"
This renewal used a holistic approach to elucidate how a complex behavior changes genetically in response to controlled and replicated cross-generational selective breeding. It tested physiological and neurobiological hypotheses concerning the limits to high levels of voluntary exercise, including effects of a high-fat diet. Garland was responsible for overall organization and supervision, organismal phenotyping, student training (graduate and undergraduate), data management, statistical analyses, and manuscript preparation.
Role: PI
Joseph C. Genereux

320 Chemical Sciences
University of California - Riverside
501 Big Springs Rd.
Riverside, CA 92521
(951) 827-3759
josephg@ucr.edu

University of California at Riverside Riverside, CA 2015-present
Assistant Professor, Department of Chemistry
CFM in Biochemistry, Environmental Toxicology, and Microbiology
Molecular characterization of protein homeostasis in health and disease

EDUCATION and TRAINING

The Scripps Research Institute La Jolla, CA 2010-2015
Protection of the Extracellular Space by Unfolded Protein Response Signaling

California Institute of Technology Pasadena, CA 2003-2009
Ph.D. in Chemistry from Prof. Jacqueline K. Barton
Exploring DNA-mediated Charge Transport with Fast Radical Traps

University of California Irvine, CA 2001-2002
B.S. Physics, minor in Mathematics

Swarthmore College Swarthmore, PA 1997-2001
B.A. Chemistry, minor in Economics, with High Honors

PUBLICATIONS

26) Hulleman*, J.D.; Genereux*, J.C.; Nguyen, A. “Mapping wild-type and R345W fibulin-3 intracellular interactomes”, in review. * indicates co-first author


**AWARDS AND HONORS**

The Scripps Research Institute
- *American Heart Association Postdoctoral Fellowship* 2014-2015
- *Ruth Kirchstein National Research Service Award (NHLBI F32)* 2010-2013

California Institute of Technology
- *Outstanding Graduate Teaching Assistant Service Award* 2008

**TEACHING AND MENTORING EXPERIENCE**

University of California, Riverside 2015-present
- Instructor for Chem 221E, *Bioanalytical Chemistry and Chem 1B, Introduction to Chemistry*
- Advisor to 3 Graduate students, 2 Postdoctoral scholars, 5 UCR Undergraduate students

The Scripps Research Institute
- Protein Folding in the Cell, Teaching Assistant 2013
- SURF Program Undergraduate Research Mentor 2012

California Institute of Technology
- SURF Program Undergraduate Research Mentor 2008
- Introduction to Chemistry, Recitation Teaching Assistant 2005-2008
- Biophysics of Macromolecules, Teaching Assistant 2004
- Frontiers in Chemistry, Teaching Assistant 2003-2004

University of California - Irvine
- LARC Tutor: Biochemistry and Physics courses 2002

Swarthmore College
- Laboratory Teaching Assistant: General and Organic Chemistry 2001

**PROFESSIONAL SERVICE**

- Ad hoc reviewer for the Medical Research Council
ROHLFS CURRICULUM VITAE
CHARLES RUSSELL HILLE

Distinguished Professor of Biochemistry              telephone:  951-827-6354
University of California, Riverside                facsimile:     951-827-2364
Riverside, CA 92521                               e-mail:        russ.hille@ucr.edu

BIRTHDATE  November 15, 1951
CITIZENSHIP  U.S.
MARITAL STATUS Married, four children

EDUCATION  B.S. with Honors (Chemistry) Texas Tech University, Lubbock, TX, 1974
           Ph.D. (Biochemistry) Rice University, Houston, TX, 1979

PROFESSIONAL EXPERIENCE
Graduate Study (with Dr. John S. Olson, Rice University, Houston, TX), 9/74 – 8/78
Post-doctoral Study (with Dr. Vincent Massey, University of Michigan, Ann Arbor, MI), 9/78 – 8/81
Lecturer, Department of Biological Chemistry, University of Michigan, Ann Arbor, MI, 9/81 – 10/82
Assistant Professor, Dept. of Biological Chemistry, University of Michigan, Ann Arbor, MI, 11/82 – 8/85
Assistant Professor, Dept. Mol. Cell. Biochemistry, The Ohio State University, Columbus, OH, 8/85 – 8/90
Associate Professor, Dept. Mol. Cell. Biochemistry, The Ohio State University, Columbus, OH, 9/90 – 6/95
Professor, Dept. Mol. Cell. Biochemistry, The Ohio State University, Columbus, OH, 7/95 – 9/07
Professor, Department of Chemistry, The Ohio State University, Columbus, OH, 10/95 – 9/07
Professor, Dept. of Biochemistry, University of California, Riverside, 9/07 – 6/14
Distinguished Professor of Biochemistry, University of California, Riverside, 7/14 - present

HONORS AND AWARDS
Phi Kappa Phi Honors Fraternity, Texas Tech University, Lubbock, TX, April 1974
Rice University Fellowship, Rice University, Houston, TX, Academic Year, 1974 - 1975
Michigan Society of Fellows, University of Michigan, Ann Arbor, MI, August 1978 - August 1981
Simson Faculty Research Award, College of Medicine and Public Health, The Ohio State University, 1997
Humboldt Senior Research Prize, Alexander von Humboldt Foundation, Germany, 2003-2004
Fellow of the American Association for the Advancement of Science, October, 2004
Wenner-Gren Fellow, University of Lund, Sweden, 2007
Chancellor’s Chair, University of California, 2007-2010
Humboldt Senior Research Prize, Alexander von Humboldt Foundation, Germany, 2011-2012
Distinguished Professor of Biochemistry, University of California, Riverside, 2014

PROFESSIONAL SOCIETIES
American Association for the Advancement of Science
American Society of Biochemistry and Molecular Biology
American Chemical Society

RECENT PROFESSIONAL SERVICE
Co-Founder, Molybdenum and Tungsten Enzymes Gordon Conference, Plymouth, NH (July 1999)
Chair, Molybdenum and Tungsten Enzymes Nomenclature Committee (advisory to the IUBMB/Enzyme Commission); July 2001 – August 2003
Scientific Advisory Committee, International Symposia on Flavins and Flavoproteins, April 2003 – present
Chair, Computational Biophysics Study Section, National Institutes of Health – November, 2005
Contributing Member, Faculty of 1000 – August 2006-present
Member, Biophysical and Biochemical Sciences Fellowship Study Section – March, 2010
Local Organizing Committee, 14th International Symposium on Flavins and Flavoproteins – July 24-29, 2011
Member, National Institutes of Health MSFE study section – February 2013
Member, Life Sciences Review Panel for the National Research Council – March 2013 - present
RECENT UNIVERSITY SERVICE/ADMINISTRATION

Search Committee for Chair of the Department of Neuroscience (OSU), January 2001 - June 2002
Promotion and Tenure Committee, College of Medicine and Public Health (OSU), July 2002 – October 2003
Chair, Structural Biology I Search Committee, Dept. Mol. Cell. Biochemistry (OSU), 2001/02 Academic Year
Chair, Structural Biology II Search Committee, Dept. Mol. Cell. Biochemistry (OSU), 2002/03 Academic Year
Interim Chair, Department of Molecular and Cellular Biochemistry (OSU), October 1, 2004 – January, 2007
Research Committee, College of Medicine and Public Health (OSU), October 2004 – September, 2005
Steering Committee, Medical Scientist Program, College of Medicine (OSU), Oct 2004 – January, 2007
Organizer, “Mathematical Modeling of Enzyme Dynamics and Reactivity”, Mathematical Biosciences Institute, (OSU), May, 2005
Chair, Department of Biochemistry, University of California, Riverside, August, 2007 – November, 2010
Member, Search Committee for CNAS Dean, UC Riverside, 2008
Member, Search Committee for Dean of the Medical School, UC Riverside, 2009
Chair, Structural Biology Search Committee, Department of Biochemistry – 2010/2011 Academic Year
Graduate Advisor, Biochemistry and Molecular Biology graduate program – July 2012 - present
UCR Senate Committee on Academic Personnel – July 2013 - present

RESEARCH INTERESTS

Structure/function relationships in redox-active enzymes; Inorganic biochemistry, particularly involving molybdenum; Spectroscopy of redox-active proteins; Biological electron transfer

15-YEAR GRANT HISTORY

National Science Foundation MCB 9420185; “Physical Studies of Xanthine Oxidase and Trimethylamine Dehydrogenase” (R. Hille, PI) $305,000 TDC, 1/95 - 12/97
National Science Foundation INT 9513747; “Pulse radiolysis studies of xanthine oxidase and trimethylamine dehydrogenase” (R. Hille, PI) $18,000 TDC, 12/1/95 – 11/30/99
National Institutes of Health R01 GM52322; “Mechanistic Studies of Oxomolybdenum enzymes” (R. Hille, PI) $565,074 TDC, 3/1/96 – 2/29/00
Monbyuso (Japanese Ministry of Science) “Structure/function studies of xanthine oxidoreductase” (T. Nishino, PI; R. Hille and E.F. Pai, additional PI’s) $18,000 TDC, 4/01 – 3/04
National Institutes of Health R01 GM59953 "Studies of Molybdenum-containing Enzymes" (R. Hille, PI) 9/1/99-12/31/04, $756,500 TDC
National Institutes of Health R01 GM58481 "Studies of Trimethylamine Dehydrogenase" (R. Hille, PI) $453,350 TDC, 1 2/1/99-12/31/04
National Institutes of Health R01 GM075036 “Structure/activity studies of two molybdenum enzymes” (R. Hille, PI) $650,000 TDC, 7/12/05 – 6/30/11
National Institutes of Health R01 ES012658 “Studies of environmentally important molybdenum enzymes” (R. Hille, PI) $1,092,500 TDC, 9/1/05 – 8/31/12
Department of Energy DE FG02-13ER16411 “Structure, Function and Reactivity of CO Dehydrogenase from Oligotropha carboxidovorans” (R. Hille, PI) $480,000 TDC, 8/1/13 – 7/31/16

ACTIVE GRANT SUPPORT

Department of Energy DE FG02-13ER16411 “Structure, Function and Reactivity of Energy-Relevant Molybdenum Enzymes” (R. Hille, PI) $725,000 TDC, 8/1/16 – 7/31/19


75. Ellis, P., Conrads, T., Hille, R., & Kuhn, P. (2001) Crystal structure of the 100 kDa arsenite oxidase from *Alcaligenes faecalis* in two crystal forms at 1.64 and 2.03 Å. *Structure* **9**, 125-132.


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**Manuscripts submitted or in preparation**


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**REVIEW ARTICLES**


**PEER-REVIEWED BOOK CHAPTERS AND SYMPOSIUM PROCEEDINGS**


Editorships


Invited Talks at National and International Meetings (since 2000)
Iron-Sulfur Proteins Meeting, King’s College London, UK – May, 2000
Inorganic Biochemistry Summer Workshop, University of Georgia, Athens, GA – August, 2000
International Symposium on Bioinorganic Chemistry, Mumbai, India – November, 2000
Robert C. Bray Memorial Symposium, University of Sussex, UK – September, 2002
Japanese Biochemical Society Meeting, Kyoto, Japan – October, 2002
Midwest Metals Meeting, Washington University, St. Louis – May, 2003
7th European Symposium on Bioinorganic Chemistry, Garmisch-Partenkirchen, Germany – August, 2004
Curti Symposium on Flavins and Flavoproteins, University of Milan, Italy – October, 2006
FLAK Symposium, Brosarp, Sweden – June, 2007
2nd Intl Conference on Vitamins, Coenzymes and Biofactors, University of Georgia – October, 2008
Molybdenum and Tungsten Enzyme Gordon Conference, II Ciocco, Italy – July, 2009
Symposium on Advances in Biological Inorganic Chemistry, TIFR, Mumbai, India – November, 2009
Second International Symposium on Enzymes and Biocatalysis, Dalian, China – April, 2011 (Keynote Lecture)
Second International Symposium on Enzymes and Biocatalysis, Dalian, China – April, 2011 (Session Lecture)
17th International Symposium on Flavins and Flavoproteins, Berkeley, CA – July, 2011
Molybdenum and Tungsten Enzyme Conference, Edmonton, Alberta – August, 2011
DFG “Prosthetic Groups: Transport and Insertion” Meeting, Burg Warberg, Germany – September, 2011
US Department of Energy CO₂ Reduction Workshop, Annapolis, MD – October, 2011
Metal Hydrides in Biology Workshop, University of Oxford, UK – March, 2012
C1 Metabolism Gordon Conference, Bates College, NH – August, 2012
16th International Conference on Bioinorganic Chemistry, Grenoble, France – July, 2013

DoE Physical Biosciences Meeting, Annapolis, MD – October, 2014
Molybdenum and Tungsten Enzymes Meeting, Balatonfüred, Hungary – September, 2015
38th Solar Photochemistry Meeting, Gaithersburg, MD – January, 2016
6th Symposium on Bioinorganic Chemistry, Kolkata, India – January, 2017
11th Molybdenum and Tungsten Enzymes Meeting, Santa Fe, NM – June, 2017
19th International Symposium on Flavins and Flavoproteins, Groningen, Netherlands – July, 2017

Invited Seminars (since 2000)
Department of Biochemistry, Pennsylvania State University – January, 2000
Department of Biochemistry, The John Innes Center, Norwich, UK – May, 2000
Department of Chemistry, The University of Edinburgh, UK – May, 2000
Departments of Biochemistry and Chemistry, The University of Leicester, UK – May, 2000
Central Research Division, Pfizer Inc., Groton, CT – July, 2000
Department of Chemistry, University of New Mexico – October, 2000
Department of Biochemistry, Wright State University – January, 2001
Department of Chemistry and Biochemistry, Utah State University – January, 2001
Department of Chemistry, Duquesne University – March, 2001
Chemical Biology and Biophysics Programs, The University of Michigan, Ann Arbor – October, 2001
Biochemistry and Molecular Biology Program, University of Texas Health Sci Ctr, Houston – October, 2001
Department of Microbiology, University of Brisbane – January, 2002
Department of Chemistry, University of Wisconsin (Milwaukee) – February, 2002
Department of Chemistry, University of Osaka (Japan) – October, 2002
Department of Microbiology and Immunology, University of Illinois, Chicago – November, 2002
Department of Biochemistry and Molecular Biophysics, University of Arizona – November, 2002
Department of Chemistry, University of Auckland, New Zealand – February, 2003
Department of Biochemistry, University of Texas Health Science Center, San Antonio – April, 2003
Department of Plant Biology, Technical University of Braunschweig, Germany – September, 2003
(Humboldt Lectures on Enzymology and Spectroscopy of Metalloenzymes)
Department of Microbiology, Technical University of Braunschweig, Germany – September, 2003
Department of Biophysics, Medical College of Wisconsin – February, 2004
Department of Biochemistry, Medical College of Wisconsin – May, 2004
Department of Microbiology, University of Halle, Germany – June, 2004
Department of Microbiology, University of Bayreuth, Germany – June, 2004
Departments of Biochemistry and Microbiology, Michigan State University – March, 2005
The subject of these presentations was one of the following: (1) the mechanism of xanthine oxidase and other molybdenum enzymes; (2) the mechanism of trimethylamine dehydrogenase; (3) electron transfer in biological systems; (4) structure and function of arsenite oxidase; or (5) the reaction mechanism of CO dehydrogenase.
Research Program

My research program focuses the reaction mechanisms of oxidoreductase enzymes - particularly those possessing molybdenum or flavin in their active sites - and biological electron transfer. The molybdenum-containing enzymes catalyze the incorporation of oxygen into a variety of organic and inorganic compounds, and constitute an important enzyme class within the oxidoreductases. These enzymes have been only poorly understood in comparison to other biological systems that contain heme, flavin, non-heme iron or copper. Working with representative members of each of the three major families of molybdenum enzymes, we have successfully identified the fundamental aspects of the catalytic sequences of these enzymes, and in each case established the overall chemical course of the reaction. Particularly in the case of the molybdenum hydroxylase family (as represented by xanthine oxidase), work in our laboratory has elucidated the overall reaction mechanism, characterizing each of the principal intermediates in the course of the reaction both spectroscopically and crystallographically. This work has demonstrated that molybdenum-based hydroxylation of carbon centers is carried out without the generation of a highly reactive oxygenated intermediate (e.g., the perferryl oxide and 4a-peroxide "oxygen guns" of heme and flavin containing enzymes, respectively). These studies have provided an increasingly clear picture of the chemical sequence of events that lead to oxygen atom transfer in the absence of a high-energy intermediate, and our reaction mechanism is generally accepted in the literature. Other enzymes under active investigation in the laboratory include: sulfite oxidase and nitrate reductase from plants (such as Arabidopsis thaliana), the latter of which catalyses the first and rate-limiting step in nitrogen assimilation in higher plants; carbon monoxide dehydrogenase and DMSO reductase from Rhodobacter capsulatus, which play major roles in environmental CO remediation and the global sulfur cycle, respectively; and newly discovered molybdenum-containing enzymes that play as yet undefined physiological roles in humans and bacteria (mARC, YedY, YcbX, YiiM).

Enzymes possessing multiple redox-active centers in a single polypeptide are useful systems in which to examine the factors governing rates of biological electron transfer without the complication of protein-protein interactions. We are utilizing pH-jump stopped-flow, flash photolysis and pulse radiolysis methodologies to examine the rates of electron transfer within several such enzymes, including xanthine oxidase (possessing a molybdenum center, two [2Fe-2S] clusters and FAD), trimethylamine dehydrogenase (with FMN and a [4Fe-4S] cluster) and succinate:quinone oxidoreductase (with FAD, three different iron-sulfur centers, a b-type cytochrome and a tightly bound equivalent of ubiquinone). Our work with xanthine oxidase has shown, for example, that protonation/deprotonation of the enzyme flavin occurs concomitantly with electron transfer. By contrast, in trimethylamine dehydrogenase, protonation and electron transfer occur as discrete steps, rather than concomitantly. We have recently extended this work to studies of succinate:quinone oxidoreductase, demonstrating, for example, that electron equilibration involving the enzyme’s heme is extremely rapid, despite the rather low reduction potential of the center. In each of these systems, electron transfer is generally extremely rapid and is typically not rate-limiting for turnover.

Laboratory Facilities

The above research program utilizes a wide range of spectroscopic techniques, including: x-ray absorption, electron paramagnetic resonance and resonance Raman. A variety of kinetic methods are also employed, including stopped-flow, freeze-quench, flash photolysis and pulse radiolysis. The principal instrumentation in the laboratory, most of which has been funded by two Shared Instrumentation Grants from NIH and one from NSF, is described below.

**EPR facility.** This facility consists of a computer-controlled Bruker ER300 EPR spectrometer capable of operating at 3, 9 and 34 GHz microwave frequency. The instrument is equipped with NMR gaussmeter and microwave frequency counter for the accurate determination of g-values. A variety of microwave cavities are available (including cylindrical and double-rectangular), as is cryogenic equipment for operation at both liquid nitrogen and liquid helium temperatures.

**Resonance Raman facility.** This instrument has been designed for optimal efficiency in the vis/NIR region. Kr+ and Ar+ lasers (Coherent, Inc.) provide a number of specific excitation lines and may also be used to pump either a titanium/sapphire or dye laser to provide excitation throughout the visible/NIR. The detector is a charge-coupled device whose active element is a 1024 x 1024 back-thinned element. Low-temperature capabilities are provided by an APD Cryogenics closed cycle liquid helium refrigerator. The
instrument is located in a specially designed room of the laboratory that is dedicated to spectroscopic instrumentation, including an Aviv Associates CD spectrophotopolarimeter (280 - 2,000 nm spectral range) and a recently upgraded Mattson Sirius 100+ FT-IR interferometer.

**Laboratory:** two large chromatography refrigerators, Millipore water purification system, and centrifuges (Beckman L7-65 and J2-21 ultra- and high-speed centrifuges, Tomy MTX-150 tabletop refrigerated centrifuge). New Brunswick BioFlow 415 fermentor; two Äkta FPLC protein purification systems; Millipore cell harvester; anaerobic trains, anaerobic glassware, etc. for manipulation of protein samples; two Applied Photophysics computer-controlled absorbance/fluorescence stopped-flow apparatuses; three Hewlett-Packard 8452A diode-array spectrophotometers; renovated Cary 14 spectrophotometer (including computer) with a 280-3000 nm scan range; Aviv Associates spectrophotometer (280 - 2,000 nm spectral range); Beckman HPLC apparatus; EG&G 363 potentiostat and associated electrodes; Coy glove box.

**Computer:** SGI Octane2/V10 molecular graphics workstation; two eight-processor Linux boxes; several desktop computers; software for the simulation of rapid kinetic transients and EPR spectra, analysis of x-ray absorption spectroscopic data, X-ray crystallography (COOT, ) and computational chemistry (MOPAC, GAUSSIAN ’08).

### Existing Scientific Collaborations

**Nationally**
- Gary Cecchini (Department of Biochemistry and Biophysics, University of California, San Francisco) – Kinetic studies of succinate dehydrogenase
- John Enemark (Department of Chemistry, University of Arizona) – ESEEM and NMR studies of molybdenum enzymes
- Brian Hoffman (Northwestern University) – ENDOR studies of paramagnetic intermediates of metalloenzymes
- Richard Holm (Department of Chemistry, Harvard University) – Isotopic labeling studies of molybdenum-containing enzymes
- Martin Kirk (Department of Chemistry, University of New Mexico) – Spectroscopic characterization and modeling of intermediates for molybdenum enzymes

**Internationally**
- Robert Anderson (Department of Chemistry, University of Auckland, New Zealand) – Pulse radiolysis studies of complex redox-active enzymes
- Fraser Armstrong (Department of Chemistry, University of Oxford, UK) – electrochemical studies of complex redox-active enzymes
- Holger Dobek (Department of Biochemistry Humboldt University, Berlin) – mechanistic studies of 2-oxoquinoline oxygenase and nicotinate dehydrogenase
- Graham George (University of Saskatchewan, Canada) – X-ray absorption studies of molybdenum-containing enzymes
- Silke Leimkühler (Department of Biochemistry, University of Potsdam, Germany) – Spectroscopic and kinetic studies of xanthine dehydrogenase from *Rhodobacter capsulatus*; molybdenum cofactor insertion
- Ralf Mendel (Institute of Plant Biology, Technical University of Braunschweig, Germany) – Mechanistic studies of molybdenum enzymes from plants
- Takeshi Nishino (Department of Biochemistry and Molecular Biology, Nippon Medical School, Tokyo, Japan) and Emil Pai (Department of Biochemistry, University of Toronto, Toronto, Canada) – Structure/function studies of xanthine oxidase and related enzymes
- Günter Schwarz (Department of Biochemistry, University of Cologne) – Structure/function studies of nitrate reductase from plants
- Matthias Ullmann (Department of Chemistry, University of Bayreuth) – computational studies of molybdenum-containing enzymes
Richard J. Hooley, Ph.D.
University of California, Riverside,
444 Chemical Sciences, 501 Big Springs Road, Riverside CA 92521.
richard.hooley@ucr.edu • (951)-827-4924

Professional Preparation
2004-2008: The Scripps Research Institute, Department of Chemistry and the Skaggs Institute for Chemical Biology, La Jolla, CA, Skaggs Postdoctoral Fellow, Mentor: Prof. Julius Rebek, Jr.

Appointments
Associate Professor, University of California, Riverside 2014-current
Assistant Professor, University of California, Riverside 2008-2014
Skaggs Postdoctoral Fellow, The Scripps Research Institute, La Jolla 2004-2008
Graduate Teaching/Research Assistant, Princeton University, NJ 1999-2004

Awards and Honors
University of California, Riverside Faculty Development Award, 2013.
2013 Chancellor's Award for Fostering Excellence in Undergraduate Research and Creative Achievement.
2012 NSF CAREER Award
2011-2012 Hellman Fellowship, University of California, Riverside, July 2011.
University of California, Riverside Regents’ Faculty Fellowship, 2009.
Association of Princeton Graduate Alumni University Teaching Award, June 2002.
Pickering Teaching Award, Princeton University, June 2001.

Peer-Reviewed Publications (Bold = Undergraduate Coauthor)

Independent Career


Postdoctoral Work


Graduate Work


Undergraduate Work

Research Funding, Last 48 Months

Hellman Faculty Foundation Grant, $30,000 07/01/2011 - 06/30/2013
"Molecular Motion and Molecular Recognition at the Nanoscale"

NSF CAREER Award, $600,000 02/01/2012 - 01/31/2017
"Functional Metal-Ligand Assemblies: Self-Sorting, Supramolecular Catalysis and Molecular Dynamics"

NSF TUES (Co-PI, 33%), $199,350 07/01/2012 - 06/30/2015
"Developing Pedagogies of Engagement in Foundation Chemistry Courses: Enhancing Minority Retention in STEM Majors"

UC Riverside IGF Program (PI, 80%) 08/01/2013 - 06/30/2014
"Synthetic Receptors as Selective Hosts and Transfection Agents in Living Cells"

UC Cancer Research Coordinating Committee, $50,000 07/01/2014 - 06/30/2015
"Synthetic Receptors As New Methods Of Drug Delivery For Cancer Therapy"

NSF IUES (Co-PI, 40%), $249,630 07/15/2015 - 06/30/2017
"A NIMBLE Approach to Active Learning in Large Enrollment Introductory Chemistry Courses (NIMBLE = New Implementations of Massive Blended Learning)"

Invited Talks

Syracuse University, Apr 2010
California State University, Long Beach, Sep 2010
American Chemical Society Western Regional Meeting, Mar 2011
Princeton University, Nov 2011
University of Southern California, Apr 2012
University of Texas - El Paso, September 2012
University of California, San Diego, October 2012
University of California, Santa Barbara, November 2012
University of California, Irvine, November 2012
Oregon State University, December 2012
University of Oregon, December 2012
Duke University, February 2013
University of North Carolina, February 2013
University of South Carolina, February 2013
Princeton University, February 2013
Georgetown University, February 2013
University of Maryland, February 2013
University of California, Davis, February 2013
University of Massachusetts, Amherst, March 2013
Dartmouth University, March 2013
University of San Diego, March 2013
University of Texas, Austin, April 2013
Denver University, May 2013 (Invited as the Marsico Lecturer)
University of California, Los Angeles, May 2013
University of Tennessee, Jan 2014
San Diego State University, Feb 2014
American Chemical Society National Meeting, Aug 2014 (Self-Assembled Coordination Architectures Symposium)
Synergistic Activities


Advising mentor: Maximizing Access To Research Careers (MARU*), California Alliance for Minority Participation (CAMP), UC Leadership Excellence through Advanced Degrees (UC-LEADS), Mentoring Summer Research Internship Program (MSRIP) programs, UC Riverside.

Current Collaborators: Prof. Christopher Bardeen, University of California, Riverside; Prof. Quan Cheng, University of California, Riverside; Prof. Ryan R. Julian, University of California, Riverside; Prof. Leonard Mueller, University of California, Riverside; Prof. Natasha Raikhel, University of California, Riverside; Prof. Yinsheng Wang, University of California, Riverside; Prof. Francisco Zaera, University of California, Riverside; Prof. Wenwan Zhong, University of California, Riverside. Prof. Yadong Yin, University of California, Riverside.

Previous Collaborators (Last 48 months): Prof. Roger Acey, California State University - Long Beach; Prof. Pingyun Feng, University of California, Riverside; Prof. Cynthia Larive, University of California, Riverside; Prof. Michael Schramm, California State University - Long Beach; Prof. Travis Williams, University of Southern California; Prof. Emma Wilson, University of California, Riverside.

Graduate and Postdoctoral advisors

M.Sci. Mentor: Dr. Stuart Warren, Dept. of Chemistry, Cambridge University.
Ph.D. Mentor: Prof. Martin F. Semmelhack, Dept. of Chemistry, Princeton University.
Postdoctoral Mentor: Prof. Julius Rebek, Jr., Dept. of Chemistry, The Scripps Research Institute.

Graduate Students and Postdoctoral Scholars Advised (B: Black, F: Female, H: Hispanic)

Current Graduate Students: Calvin Wiley, Magi Mettry\textsuperscript{B,F}, Lauren Holloway\textsuperscript{F}, Lizeth Perez\textsuperscript{F,H}, Paul Bogie, Tabitha Miller\textsuperscript{F}, Guy Quannrud.

Previous Graduate Students (attained Ph.D.): Katherine Djernes\textsuperscript{F}, Ana Gamboa\textsuperscript{F,H}, Amber Johnson\textsuperscript{F}, Michael Young, Melissa Padilla Moehlig\textsuperscript{F,H}, Yoo-Jin Ghang\textsuperscript{F}.

Previous Postdoctoral Scholars: Puhong Liao.
Current Undergraduate Researchers: Phoebe Nye\textsuperscript{F}, Samantha Byers\textsuperscript{F}, Manolia Ghouli\textsuperscript{F,B}.

Previous Undergraduate Researchers: Kelsi McCoy\textsuperscript{F}, Hannah Hughes\textsuperscript{F}, Brian Langloss, Orly Moshe\textsuperscript{F}, Cindy Tawfik\textsuperscript{B,F} (MARC U* Scholar), Donald Richards\textsuperscript{B} (MARC U* Scholar), Magi Mettry\textsuperscript{B,F}, Kristianna Wi, F Adam Gill, Erica Liew\textsuperscript{F}, Noora Siddiqui\textsuperscript{F,B}, Mi La\textsuperscript{F}, Jessica Arguelles (MARC U* Scholar), F,H Linhui Li\textsuperscript{F} (MARC U* Scholar), Wendy Carabajal\textsuperscript{F,H}, Hannah McGarraugh\textsuperscript{F}. 
**G. Darrel Jenerette**  
Department of Botany and Plant Sciences  
University of California Riverside  
Riverside, CA 92521-0124  
Tel: 951/214-0564  
Fax: 951/827-4437  
Email: darrel.jenerette@ucr.edu

**Research Interests**  
Landscape ecology • Ecosystem ecology • Ecohydrology • Global change • Sustainability

**Academic Appointments**  
Associate Professor 2013 – Present  
Assistant Professor 2008 – 2013  
Department of Botany and Plant Sciences, University of California Riverside

**Education and Training**  
Postdoctoral Researcher. Carbon Management and Sequestration Center, School of Natural Resources, The Ohio State University, Columbus, OH. 2004 – 2005  
Ph.D. Department of Plant Biology, Arizona State University, Tempe, AZ. 2004  
B.S. Virginia Polytechnic Institute and State University, Blacksburg, VA. 1995

**Awards**  
Visiting Fellowship for Young International Scientists, Chinese Academy of Sciences. 2011-2012  
Early Career Fellowship, Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) 2007  
Biological Informatics Postdoctoral Fellowship, National Science Foundation. 2005-2007  
Graduate Fellowship, Urban Ecology Integrative Graduate Education and Research Traineeship (IGERT), National Science Foundation. 2001-2004  
Tony Gonzales Excellence in GIS Scholarship. Arizona Geographic Information Council. 2004  

**Publications** *(Lab members in bold)*  
ISI H Index = 22  
Total Refereed Publications 88; Technical 69; Review 5; Other 14  
**Technical Journal Articles**

2016


(67) **Tayyebi A** and **GD Jenerette**. 2016. Increases in the climate change adaption effectivenes and availability of vegetation across a coastal to desert climate gradient in metropolitan Los Angeles, CA, USA. *Science of the Total Environment* 548-549:60-71


(64) **Jenerette GD**, SL Harlan, A **Buyantuev**, WL Stefanov, J Declet-Barreto, BL Ruddell, S Myint, S Kaplan, and X Li. 2016. Micro scale urban surface temperatures are related to land cover features and heat related health impacts in Phoenix, AZ USA. *Landscape Ecology* 31:745-760

2015

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(62) **Chatterjee A** and **GD Jenerette**. 2015. Variation in soil organic matter accumulation and metabolic activity along an elevation gradient in the Santa Rosa Mountains of Southern California, USA. *Journal of Arid Land* 7:814-819

(61) Xie JB, GQ Xu, **GD Jenerette**, YF Bai, ZY Wang, and Y Li. 2015. Apparent plasticity in functional traits determining competitive ability and spatial distribution: a case from the desert. *Scientific Reports* 5:12174


(53) Avolio ML, DE Pataki, S Pincetl, T Gillespie, **GD Jenerette**, and HR McCarthy. 2015. Understanding preferences for tree attributes: the relative effects of socio-economic and...
local environmental factors. *Urban Ecosystems* 18:73-86

(52) **Clarke LW** and **GD Jenerette**. 2015. Biodiversity and direct ecosystem service regulation in the community gardens of Los Angeles, CA. *Landscape Ecology* 30:367-653


(49) **Clarke LW**, **GD Jenerette**, and DJ Bain. 2015. Urban legacies and soil management affect the concentration and speciation of soil metals in Los Angeles community garden soils. *Environmental Pollution* 197:1-12

2014


(47) Barron-Gafford GA, JM Cable, LP Bentley, RL Scott, TE Huxman, **GD Jenerette**, and K Ogle. 2014. Quantifying the time scales over which exogenous and endogenous conditions affect soil respiration. *New Phytologist* 202:442-454


2013


2012


2011


2010 and Earlier


Curriculum Vitae – Jenerette, G. D.


(2) **Jenerette GD** and J Wu. 2001. Analysis and simulation of land-use change in the central Arizona - Phoenix region, USA. *Landscape Ecology* 16:611-626


**Refereed Review Articles**


**Refereed Conference Proceedings**

(4) Martin CA, **GD Jenerette**, SL Harlan. 2012. Air and near surface temperature regimes in neighborhood parks of Phoenix, Arizona, USA during extreme summer heat. 4 pgs. *8th International Conference on Urban Climates*


**Other Refereed Scholarly Publications**


419
Curriculum Vitae – Jenerette, G. D.

**Ecosystem Services and Resource Management**


(4) Scott RL, **GD Jenerette**, TE Huxman. 2010. Semiarid Ecohydrological Array – SECA. *Fluxletter* 2:10-12

(3) **Jenerette GD** and J Wu. 2010. Quantitative measures and landscape ecology. In L. Kapustka, W. Landis, and A. Johnson (eds.) *Environmental Risk Assessment and Management from a Landscape Perspective* John Wiley and Sons. 75-96


**Research Funding** ($19.8M total; $3.7M to Jenerette)

<table>
<thead>
<tr>
<th>Date</th>
<th>Funding Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/2016-12/2017</td>
<td><strong>United States Department of Agriculture</strong></td>
<td>Resampling the Los Angeles Urban Forest, $27,000 PI</td>
</tr>
<tr>
<td>04/2016-03/2018</td>
<td><strong>Earthwatch Institute</strong></td>
<td>Towards designing a more sustainable urban forest, $85,000 PI</td>
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<tr>
<td>04/2016-03/2019</td>
<td><strong>National Institute of Food and Agriculture</strong></td>
<td>USDA Cultivating Diversity in a 2+2+2 Collaborative Project, $90,490 coPI (with M McGiffen PI, and H Liu)</td>
</tr>
<tr>
<td>05/2016-04/2019</td>
<td><strong>National Institute of Food and Agriculture</strong></td>
<td>Reducing gaseous nitrogen losses from high temperature agricultural systems, $499,251 PI (with J Wang, POikawa)</td>
</tr>
<tr>
<td>09/2015-08/2018</td>
<td><strong>Earthwatch Institute</strong></td>
<td>Linking urban tree leaf traits to potential cooling benefits across a large US metropolitan area, $94,071 PI</td>
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<tr>
<td>07/2015-07/2016</td>
<td><strong>UC Agricultural and Natural Resources Division</strong>,</td>
<td>Ensuring the success of ANR Flux: Evaluation of long-term network configuration and initial science applications, $61,360 PI</td>
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<tr>
<td>08/2015-08/2020</td>
<td><strong>National Science Foundation</strong></td>
<td>Urban Water Innovation Network (U-WIN): Transitioning Toward Sustainable Urban Water Systems, $12,000,000 ($319,210 to UCR) Sub-Award PI, Project Senior Personnel (with M Arabi Project PI, A Berkowitz, E Bou-Zeid, GE Pivo, R Haggerty, C Welty, J Bolson, M Sukop)</td>
</tr>
</tbody>
</table>
01/2015-12/2018 **National Aeronautical and Space Administration**, Enhanced data-driven decision support for highly invasive vectors. $1,189,773 ($161,630 to UCR) Sub-Award PI (with C Barker Project PI, WK Reisen, T Scott, F Melton)

07/2014 - 12/2015 **UCMexus**, Effect of land use, soil type and agricultural practices on preserving organic soil carbon stocks. $14,900 coPI (with M Allen PI, E Allen, H Estrada Medina, J Jiminez-Osorno)

06/2014 - 05/2015 **National Science Foundation**, Dissertation Research: Connecting dryland soil trace gas emissions of NOx, N2O and CO2 to microbial community dynamics along a nitrogen deposition gradient. $19,745 PI in support of J Eberwein (DDIG)

08/2013 - 07/2015 **U.S. Agency for International Development**, Evaluating climate change impacts on the arid lands and water resources of Jordan, $87,000 coPI (with Y Jaraweh PI)

11/2012 - 10/2015 **National Aeronautic and Space Administration**, Assessing relationships between urban land cover, surface temperature, and transpiration along a coastal to desert climate gradient, $501,326 PI

08/2012 - 09/2013 **California Institute for Energy and the Environment**, Carbon balance in California deserts: Impacts of widespread solar power generation, $149,890 coPI (with M Allen PI, L Santiago)

06/2012 - 05/2014 **National Science Foundation**, Dissertation Research: The effect of human management and soil properties on heavy metal content of Los Angeles Community Garden soils, $14,980 PI in support of L Clarke (DDIG)

06/2012 - 08/2012 **California Avocado Commission**, Initial scoping of ecosystem services provided by avocado orchards in southern California, $20,000 PI

10/2011 - 11/2013 **United States National Park Service**, Atmospheric nitrogen deposition assessment in the Santa Monica Mountains NRA and the effects on weed invasion, $100,000 coPI (with E Allen PI, J Sickman, M Fenn)

07/2011 - 07/2014 **United States Forest Service**, Assessing the effects of local water district policies on urban forests and their implications across socio-economic groups, $64,000 coPI (with K Baerenklau PI, K Schwabe)

10/2011 - 12/2016 **United States Forest Service**, Base-level vegetation mapping for the Angeles National Forest, $164,740 PI

07/2011 - 06/2015 **National Institute of Food and Agriculture**, Life cycle assessment of sequestration and exchange of water, carbon and nitrogen in the dedicated bioenergy feedstock, energy cane, $967,769 coPI (with D Grantz PI)

07/2011 - 06/2014 **National Science Foundation**, Collaborative research: Assessing decadal climate impacts on urban populations in the Southwestern USA, $897,000 ($147,000 to UCR) PI on Collaborative Proposal (with B Ruddell Project PI, M Maoustaouri, E Vivoni)

02/2011 - 02/2014 **United States Golf Association**, Water-Use efficiency and carbon sequestration influenced by turfgrass species and management practices, $55,553 PI (with J Baird)

07/2009 - 06/2013 **National Science Foundation**, Collaborative research: Toward a biogeography of urban forests, $791,498 ($249,670 to UCR) PI on Collaborative Proposal (with D Pataki Project PI, S Pincetl, T Gillespie)

07/2009 - 06/2010 **National Science Foundation**, Research starter grant: An urban environmental observatory, $50,000 PI
01/2009 - Coachella Valley Association of Governments, JS-CVCC CVMSHCP Monitoring Program 2009 Administrator, $116,000 coPI (with M Allen Project PI, C Barrows, E Allen, R Redak, J Rotenberry, W Walton)

01/2009 - Kearney Foundation, Soil metabolic variability across a 3000 meter topographic gradient: Understanding the long term consequences of short duration dynamics, $89,900 PI (with M Allen)

10/2010 - National Park Service, Alien invasion: Effects of atmospheric nitrogen deposition on sagebrush steppe vegetation dynamics at Upper Columbia Basin network parks, $100,000 coPI (with E Allen Project PI, J Sickman)

09/2008 - National Science Foundation, Collaborative Research: Urban vulnerability to climate change: A systems dynamics analysis, $1,500,000 ($135,000 to UCR) PI on Collaborative Proposal (with S Harlan Project PI, C Martin, T Lant, S. Grossman-Clark, W. Stefanov, M Elser)

06/2008 - United States Department of Agriculture, LAMillion Trees: Distribution and physiological characteristics, $15,500 PI

Synergistic Activities

Congressional Briefings


Invited Outreach


Funding Agency Panel Member
National Science Foundation
Environmental Protection Agency

Funding Agency Ad hoc Reviewer
National Science Foundation
Department of Energy
Kearney Foundation of Soil Science

Editorial Board Member
Landscape Ecology 2008 - Present
Frontiers in Ecology and Evolution 2015 - Present

Journal Referee
Agricultural and Forest Meteorology • Applied Geography • Biogeosciences • Bioscience • Cities • Ecological Applications • Ecological Complexity • Ecological Economics • Ecological Modelling • Ecology • Ecology Letters • Ecosystems • Environmental Health Perspectives • Environmental Management • Environmental Pollution • Frontiers in Ecology and the Environment • Geographic Information Science • Global Change Biology • Global Ecology and Biogeography • Hydrological Processes • Journal of American Water Resources Association • Journal of Arid Environments • Journal of Ecology • Journal of Environmental
Management • Journal of Geophysical Research – Biogeosciences • Landscape and Urban Planning • Landscape Ecology • New Phytologist • Remote Sensing of the Environment • Science Advances • Science of the Total Environment • Scientific Reports • Water Resources Research • Urban Ecosystems

Societal Memberships and Service
Member: American Geophysical Union • Ecological Society of America • International Association for Landscape Ecology

Invited Member: American Geophysical Union Hydrology Section’s Ecohydrology Technical Committee 2010-2015

Workshops and Symposia Organized
Collaborative Interdisciplinary Research for Graduate Students. Workshop at the Long Term Ecological Research Graduate Student Symposium. Blue River, OR. 2005
Case Studies of Short Term Collaborations. Workshop at the Long Term Ecological Research All Scientists Meeting Seattle, WA. 2003

Invited Workshop / Working Group Participant
Growing the Urban Forest, Socio-Environmental Synthesis Center, Annapolis, MD. February 2016
The Role of Environmental Change on the Human-Wildland Interface: The Lowland Maya as a Model System, Merida, Mexico. December 2015
Detecting Signatures of Socio-Ecological Innovation in Urban Ecosystems, Socio-Environmental Synthesis Center, Annapolis, MD. October 2015
Eddy Flux Measurements for the Groundwater-Surface Water Interaction Zone, Pacific Northwest National Laboratory, Richland, WA. September 2014
Urban Heat Island Network Workshop, St. Paul, MN. June 2013
Global Ecology Workshop. Mathematical Biosciences Institute at the Ohio State University. Columbus, OH. June 2006
Dissertation Initiative for the Advancement of Climate Change Research Symposium (DISCCRS) II. National Science Foundation. Pacific Grove, CA. March 2006
Complex Systems Summer School. Santa Fe Institute. Santa Fe, NM. June 1997

**Invited Presentations**
United States – International Association of Landscape Ecologists, Asheville, NC April 2016
American Geophysical Union Fall Meeting, San Francisco, CA December 2015
Soil Science Society of America Annual Meeting, Minneapolis, MN November 2015
World Congress of the International Association of Landscape Ecologists, Portland, OR July 2015
2nd Southern California Chaparral Symposium, Arcadia, CA June 2015
American Geophysical Union Fall Meeting, San Francisco, CA December 2014
Natural History Museum, Los Angeles, CA December 2014
Pacific Northwest National Laboratory, Richland, WA September 2014
Ecological Society of America Annual Meeting, Sacramento, CA August 2014
American Association for the Advancement of Science Pacific Division, Riverside, CA June 2014
Air Pollution and Global Change Symposium, Pacific Grove, CA June 2014
International Conference of Geography and Environment, Mexico City, Mexico October 2013
University of California Los Angeles, Department of Atmospheric and Oceanic Sciences, Los Angeles, CA October 2013
University of California Agriculture and Natural Resources Statewide Conference, Ontario, CA April 2013
University of California Berkeley, Department of Environmental Science, Policy, and Management. Berkeley, CA March 2013
American Geophysical Union Fall Meeting, San Francisco, CA December 2011
University of Maryland Baltimore County, Center for Urban Environmental Research and Education, Baltimore, MD October 2011
8th World Congress International Association for Landscape Ecology, Beijing, China August 2011
Long Term Ecological Research Science Council Meeting, Jekyll Island, GA May 2011
Ecological Society of America Annual Meeting, Pittsburg, PA August 2010
University of Puerto Rico, Department of Biology, San Juan, Puerto Rico February 2010
American Geophysical Union Fall Meeting, San Francisco, CA December 2009
Xinjiang Institute of Ecology and Geography, Chinese Academy of Science. Urumqi, China September 2009
Chinese Agricultural University. Beijing, China September 2009
University of Arizona, Sustainability of Semi-Arid Hydrology and Riparian Areas (SAHRA)
Tucson, AZ September 2009


South China Botanical Garden, Chinese Academy of Science. Guangzhou, China June 2008

Institute of Botany, Chinese Academy of Science. Beijing, China June 2008

University of California Irvine, Department of Earth System Science. Irvine, CA March 2008

University of California Los Angeles, Department of Civil and Environmental Engineering. Los Angeles, CA January 2008

University of Illinois Urbana-Champaign, Department of Natural Resources. Urbana-Champaign, IL March 2007

North Carolina State University, Department of Forestry and Environmental Resources. Raleigh, NC February 2007

University of California Riverside, Department of Botany and Plant Sciences. Riverside, CA February 2007

University of California Davis, College of Agricultural and Environmental Sciences. Davis, CA January 2007

Chinese Academy of Science, Institute of Botany. Beijing, China November 2006

Second International Young Scientists’ Global Change Conference. Beijing, China November 2006

Monsoon Region Climate Applications: A Binational Workshop. Guaymas, Mexico May 2006

University of Washington, College of Forest Resources. Seattle, WA May 2006

Dissertation Initiative for the Advancement of Climate Change Research Symposium (DISCCRS) II. Pacific Grove, CA March 2006

University of California Davis, Department of Plant Sciences. Davis, CA June 2005

Auburn University, School of Forestry and Wildlife Sciences. Auburn, AL May 2004

Arizona Geographic Information Council Annual Meeting. Prescott, AZ August 2003

University of New Mexico, Biocomplexity Seminar Series. Albuquerque, NM April 2003


University of Washington, Urban Ecology IGERT. Seattle, WA May 2002

**National / International Presentations** *(Prior 5 Years) (Lab members in bold)*

Rossi, RJ, DJ Bain, **GD Jenerette**. Phosphorus deposition to roadside soils: Contributions to a unique biogeochemical environment. Goldschmidt Conference, Yokohama, Japan June 2016

**Tayyebi A** and **GD Jenerette**. Urban heat island variation across a dramatic coastal to desert climate zone: An application to Los Angeles, CA metropolitan area. American Geophysical Union, San Francisco, CA December 2015

**Eberwein J**, C Carey, E Aronson, **GD Jenerette**. Wetting-induced pulses produced unexpectedly high emissions of N₂O and NOₓ in a desert ecosystem. American Geophysical Union, San Francisco, CA December 2015

P Oikawa, D Baldocchi, S Knox, C Sturtevant, J Verfaille, I Dronova, **GD Jenerette**, C Poindexter, Y Huang. Using eddy covariance of CO₂, ^13^CO₂ and CH₄, continuous soil respiration measurements, and phenocams to constrain a process-based biogeochemical
model for carbon market-funded wetland restoration. American Geophysical Union, San Francisco, CA December 2015

Park I, GD Jenerette, J Hooper. Evidence for recent invasion of historically resistant chaparral shrublands to grasslands. American Geophysical Union, San Francisco, CA December 2015

Crum S and GD Jenerette. Impacts of land use and land cover on surface and air temperature in urban landscapes. American Geophysical Union, San Francisco, CA December 2015


Shiflett S, G Feyisa, Jenerette GD. C Relationships between urban land surface temperature, air temperature, and NDVI across a coastal to desert climate gradient. Ecological Society of America Annual Meeting, Baltimore, MD August 2015

Jenerette GD. Biodiversity and ecosystem services in the Los Angeles, CA metropolitan region. International Association of Landscape Ecologists World Congress, Portland, OR June 2015

Jenerette GD. Carbon cycling and sequestration in chaparral landscapes. 2nd Southern California Chaparral Symposium, Arcadia, CA June 2015

Jenerette GD. Are ecosystem services useful for a sustainable city? American Geophysical Union Annual Meeting. San Francisco, CA December 2014


Crum, S and GD Jenerette. Land use and climate effects on soil respiration quantified with a landscape sensor network. American Geophysical Union Annual Meeting. San Francisco, CA December 2014


Jenerette GD. Heat wave vulnerability and mitigation in urban ecosystems. Ecological Society of America Annual Meeting. Sacramento, CA August 2014


Bytnerowicz A, W Fraczek, R Johnson, M Fenn, L Zhang, GD Jenerette. From passive samplers to estimates of dry nitrogen deposition in the western United States. American Association for the Advancement of Science Pacific Division. Riverside CA June 2014

Jenerette GD. Vegetation and Urban Climate in a Changing World. American Association for the Advancement of Science Pacific Division. Riverside CA June 2014


Jenerette GD, A Buyantuyev, S Harlan, BL Ruddell, SW Myint. Regulation and consequences of parcel-scale microclimate variation in Phoenix, AZ. United States Chapter of the International Association of Landscape Ecologists. Anchorage, AK May 2014

Crum SM, GD Jenerette. Scaling soil respiration dynamics across regional land-use and climate gradients in southern California, USA. United States Chapter of the International Association of Landscape Ecologists. Anchorage, AK May 2014


Liang L, J Eberwein, P Oikawa, GD Jenerette, DA Grantz. Carbon dioxide(CO₂) and nitrous oxide (N₂O) fluxes in an agro-ecosystems under changing physical and biological conditions. American Geophysical Union Annual Meeting. San Francisco, CA December 2013

Scott RL, TE Huxman, G Barron-Gafford, GD Jenerette, JM Young. The ecohydrological consequences of woody plant encroachment: How accessibility to deep soil water resources affects ecosystem carbon and water exchange. American Geophysical Union Annual Meeting. San Francisco, CA December 2013


Bytnerowicz A, W Fraczek, R Johnson, GD Jenerette, EA Allen, M Fenn. From passive samplers to estimates of nitrogen deposition in arid and semi-arid areas of the western

**Velasco LM, J Hooper, GD Jenerette.** Variation in city tree ecophysiological characteristics under changing temperatures. Ecological Society of America Annual Meeting. Minneapolis, MN August 2013

**Crum SM, GD Jenerette.** Scaling soil respiration dynamics across regional land-use and climate gradients in southern California USA. Ecological Society of America Annual Meeting. Minneapolis, MN August 2013

Lan Z, Y Bai, **GD Jenerette.** N-induced biodiversity loss will persist with upscaling as beta diversity decreases by N. Ecological Society of America Annual Meeting. Minneapolis, MN August 2013

**Fertitta CN, PA Oikawa, GD Jenerette,** DA Grantz. Assessing the sustainability of *Sorghum bicolor* as a biofuel crop grown in a low desert environment: Constraints on productivity and water use efficiency. Ecological Society of America Annual Meeting. Minneapolis, MN August 2013

Avolio ML, DE Pataki, S Pincetl, TW Gillespie, **GD Jenerette,** HR McCarthy. Understanding the drivers of urban tree biodiversity in Los Angeles. Ecological Society of America Annual Meeting. Minneapolis, MN August 2013


**Oikawa PY, DA Grantz, A Chatterjee, JR Eberwein, LA Allsman, GD Jenerette.** Factors regulating soil CO₂ and NOₓ flux in response to high temperature, pulse water events, and nutrient fertilization. American Geophysical Union Fall Meeting. San Francisco, CA December 2012

Grantz DA, **PY Oikawa, GD Jenerette.** Carbon fluxes and yield of bioenergy Sorghum in an extreme desert production environment. American Geophysical Union Fall Meeting. San Francisco, CA December 2012


Ruddell BL, **GD Jenerette,** M Moustaous, ER Vivoni, WT Chow, S Shaffer, TJ Volo, CA Martin, A Mahalov, S Harlan. Modeling the urban climate at the human scale in a hot/dry region. American Geophysical Union Fall Meeting. San Francisco, CA December 2012

Chow WT, TJ Volo, ER Vivoni, **GD Jenerette,** BL Ruddell. Observations of the urban land surface energy balance in a Phoenix, AZ residential suburb. American Geophysical Union Fall Meeting. San Francisco, CA December 2012


Rossi R, DJ Bain, **GD Jenerette, LW Clarke.** Soil catio status in souther California: Interactions of vehicular emissions. American Geophysical Union Fall Meeting. San Francisco, CA December 2012


Teaching and Advising

Postdoctoral Advising (10 total)

PhD Student Advising (6 total)
Dion Kucera 2016-Present; Peter Ibsen 2015-present (GAANN Fellow); Holly Andrews 2015-present; Cara Fertitta 2012-present (GAANN Fellow); Steven Crum 2012-present; Jennifer Eberwein 2010-present (EPA STAR Fellow); Lorraine Weller 2008-2014

Visiting Scholar Host (6 total)

Undergraduate Research Advising (17 total)
Sandeep Aurora 2016-present; Bruno Pita 2016-present; Mia Rochford 2015-present; Sara Alperts 2015 (Bridges Fellow); Jeremy Gonzalez 2014; Neha Chandru 2013-2014; Colin Reis 2013; Ariana Contreras (CNAS Fellow, Chancellor’s Research Fellow) 2012-2014; Jen Antes 2012-2013 (Bridges Fellow); Kyle Ricio 2012-2014 (Chancellor’s Research Fellow); Alice Brown 2012; Sarah Juster (MRSP Fellow) 2011-2014; Angela Choi 2011-2013; Yuheng Ning 2011-2012; Anais Monay 2011-2012; Maeraj Sheikh 2010-2011(CNAS Fellow); Josue Jaimes 2009-2012; Justin Richardson 2009-2010; Alea Miehls 2008-2009

Courses
University of California Riverside
  Introductory Ecology and Evolution – 4 Credit, Undergraduate (470+ students)
  Introductory Organismal Biology – 4 Credit, Undergraduate (400+ students)
  Applied Ecological Modeling – 3 Credit Lecture, 1 Credit Lab, Graduate
  Landscape Ecology – 4 Credit, Graduate
  Sustainability Science – 2 Credit, Graduate
  Ethnobotany – 2 Credit, Graduate

University of Arizona
  Ecological responses to global changes – 1-3 Credit, Graduate

Arizona State University West
  Ecological Modeling – 3 Credit, Undergraduate

Invited Trainer
Collaborative Graduate Student Research Workshop, Long Term Ecological Research Student Symposium, Blue River, OR
(a). Professional Preparation
University of Utah
Chemistry
B.S. 1999
California Institute of Technology
Physical Chemistry
Ph.D. 2003
Indiana University
Physical/Analytical Chemistry
2003-2005

(b). Appointments
2015-present Full Professor, Department of Chemistry University of California, Riverside
2010-2015 Associate Professor, Department of Chemistry University of California, Riverside
2005-2010 Assistant Professor, Department of Chemistry University of California, Riverside

(c). Products

(i) Related products

(ii) Other important products

(d) Synergetic Activities
Software Development. My group developed Fragmentor, which is software for the analysis of hydrogen deficient radical peptide tandem mass spectra. It is freely available online at: (http://www.faculty.ucr.edu/~ryanj/fragmentor.html).

Editorial boards. I am a member of the Editorial Board for the Journal of the American Society for Mass Spectrometry and just finished a term on the Analytical Chemistry Features Advisory Panel.

Conference Organizing. I am currently organizing the 2015 Uppcon Meeting. I just finished a 3 year term on the Asilomar Conference organizing committee for the American Society for Mass Spectrometry. I co-organized the 2014 Sanibel Conference for the ASMS.

Community Outreach. I frequently volunteer as a science fair judge and provide science demonstrations at local elementary schools. I also volunteer a significant amount of time as movie consultant and have provided scientific and creative input into two movies that are slated for production.

(e) Collaborators and other Affiliations

Collaborators (48 months):
1. Steve Blanksby  Queensland University of Technology
2. Jennifer Brodbelt  University of Texas
3. Quan Cheng  UCR
4. Josh Coon  University of Wisconsin
5. Daniel Gallie  UCR
6. Richard Hooley  UCR
7. Cynthia Larive  UCR
8. Vince Lavallo  UCR
9. Joseph Loo  UCLA
10. John McLean  Vanderbilt
11. Todd Mitchell  University of Wollongong
12. Tom Rizzo  EPFL
13. Adam Trevitt  University of Wollongong
14. Frank Turecek  University of Washington
15. Brian Volkman  Medical College Wisconsin

Ph.D. and Postdoctoral Mentors:
1. Jesse L. Beauchamp, Ph.D. Advisor
2. David E. Clemmer, Postdoctoral Co-advisor
3. Martin F. Jarrold, Postdoctoral Co-advisor

Former Graduate Students and Postdoctoral Scholars (5 years):
Postdocs
Huong Thu Pham, currently a postdoc at Memorial University
Zhenjiu Liu, currently at Monsanto
Arun Agarwal, currently with Chlorox

Total (3)
Graduate Students
Tony Ly  postdoc at University of Dundee, UK
Jolene Diedrich  postdoc at Scrippps
Qingyu Sun  Bruker Daltonics
Benjamin Moore  Genentech
Xing Zhang  UCR, computer science
<table>
<thead>
<tr>
<th>Yuanqi Tao</th>
<th>Bristol-Myers Squibb</th>
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<tr>
<td>Omar Hamdy</td>
<td>FDA</td>
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<td>Total (7)</td>
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</table>
Mohideen, Umar

**eRA COMMONS USER NAME**

umohideen

**EDUCATION/TRAINING** *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
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<tbody>
<tr>
<td>Banaras Hindu University, India</td>
<td>B.Tech.</td>
<td>1978-83</td>
<td>Engineering</td>
</tr>
<tr>
<td>The Pennsylvania State University, State College, PA</td>
<td>M.S.</td>
<td>1984-87</td>
<td>Solid State Science</td>
</tr>
<tr>
<td>Columbia University, New York, NY</td>
<td>Ph.D.</td>
<td>1987-92</td>
<td>Physics</td>
</tr>
<tr>
<td>Bell Laboratories, Murray Hill, NJ</td>
<td>Postdoc.</td>
<td>1992-94</td>
<td>Physics</td>
</tr>
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**A. Personal Statement**

We have an internationally recognized group with expertise in applying optical interferometry for precision distance measurements and also applying it for precision force measurements using microfabricated cantilevers and membranes. These techniques have been applied to precision measurements of the Casimir force, single molecule force measurements and interaction energies of SNARE proteins. The PI Mohideen has an established reputation for interdisciplinary research with faculty in the department of Cell Biology & Neuroscience (CBNS) and Bio Engineering having worked and published collaborative research for the last fifteen years.

**B. Positions and Honors.**

**Positions:**

- 2002- Professor, Department of Physics, Univ. of California-Riverside.
- 2004-05 Vice Chair, Department of Physics, Univ. of California-Riverside.
- 2000-02 Associate Professor, Department of Physics, Univ. of California-Riverside.
- 1994-00 Assistant Professor, Department of Physics, Univ. of California-Riverside.

**Honors:**

- **Fellow**, American Physics Society.
- **Fellow**, American Association for the Advancement of Science.
- Co-author of 768 page book “Advances in the Casimir Effect” Published by Oxford University Press, Oxford, UK. Selected to be part of their premier “International Series of Monographs in Physics.”
- Plenary speaker at the 2008 Workshop on “Sixty Years of the Casimir Effect”, held from June 23rd to 27th, Brasilia, Brazil.
- Plenary speaker at the 01, 03, 05, 07, 09, Workshop on Quantum Field Theory Under the Influence of External Conditions (QFEXT01, QFEXT03, QFEXT05, QFEXT07, QFEXT09) held in Liepzg-Germany, Norman-OK, Barcelona-Spain, Leipzig-Germany and Norman-OK, respectively
- Co-organizer of 5 workshops and 2 meetings. The first workshop was organized with J.F. Babb on Casimir effects: Recent Developments held from Nov. 14 to Nov. 16, 2002 at the Institute for Theoretical Atomic and Molecular Physics at the Harvard-Smithsonian Center for Astrophysics and the Harvard Physics Department. The four workshops are on Quantum Field Theory Under the Influence of External Conditions (QFEXT03, QFEXT05, QFEXT07, QFEXT09) held in Norman-OK, Barcelona-Spain, Leipzig-Germany and...
The two meetings were the Sixth and Seventh A. Friedmann International Seminar on Gravitation and Cosmology held in Corsica, France, (2004), and Joao Pessao, Brazil, (2008).

- Invited physics department colloquia at 4 National Labs and at more than 21 universities.
- Fielded questions with published interviews on research from industrial trade journals, magazines and newspapers.

B. Selected peer-reviewed publications.

(10 publications selected from a total of 65 peer-reviewed journal publications based on relevance)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors. Follow this format for each person. DO NOT EXCEED FIVE PAGES.

NAME: Leonard J. Mueller

eRA COMMONS USER NAME (credential, e.g., agency login): LMUELLER

POSITION TITLE: Professor of Chemistry

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>Completion Date MM/YYYY</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Rochester, Rochester, NY</td>
<td>BS</td>
<td>05/1988</td>
<td>Chemistry</td>
</tr>
<tr>
<td>University of Cambridge, U.K.</td>
<td>CGPS</td>
<td>06/1989</td>
<td>Chemistry</td>
</tr>
<tr>
<td>California Institute of Technology, Pasadena, CA</td>
<td>PhD</td>
<td>06/1996</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Massachusetts Institute of Technology, Cambridge, MA</td>
<td>Postdoc</td>
<td>06/1998</td>
<td>Chemistry</td>
</tr>
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</table>

A. Personal Statement

As PI, I have assembled a close-knit team of scientists, all housed at UC Riverside, with expertise in biochemistry/enzymology (Dunn), X-ray crystallography (Fan), NMR spectroscopy (Mueller), organic synthesis (Hooley), and computational chemistry (Beran and Chang); our extensive published and new preliminary data show a focused and productive collaboration has been established. The goal of this research project is to establish the chemical level details in the enzymatic transformation of substrate to product in pyridoxal-5'-phosphate (PLP) dependent enzymes using a NMR crystallography – the synergistic combination of solid-state nuclear magnetic resonance, X-ray crystallography, and computational chemistry. Specifically, we are working to determine the chemically-detailed, three-dimensional structure of the substrate/analogue, co-enzyme, and side chains, allowing detailed mechanistic changes in protonation, charge states, and hybridization to be established. I have the ambition, technical expertise, and leadership skills necessary to direct this project. My graduate and postdoctoral education provided extensive training in the development and application of solid-state NMR spectroscopy and over the last ten years my research group has been at the forefront in the development and application of NMR crystallography to enzyme active sites. This work includes new experimental techniques in biological solid-state NMR and the development of ab initio computational methods to quantitatively interpret these shifts in terms of chemically-detailed, three-dimensional structures.


B. Positions and Honors

Positions and Employment

<table>
<thead>
<tr>
<th>Period</th>
<th>Position</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/96 – 6/98</td>
<td>Postdoctoral Fellow</td>
<td>Massachusetts Institute of Technology</td>
</tr>
<tr>
<td>7/98 – 6/05</td>
<td>Assistant Professor of Chemistry</td>
<td>University of California, Riverside</td>
</tr>
<tr>
<td>7/05 – 6/12</td>
<td>Associate Professor of Chemistry</td>
<td>University of California, Riverside</td>
</tr>
<tr>
<td>7/05 – present</td>
<td>Vice Chair, Department of Chemistry</td>
<td>University of California, Riverside</td>
</tr>
<tr>
<td>7/12 – present</td>
<td>Professor of Chemistry</td>
<td>University of California, Riverside</td>
</tr>
</tbody>
</table>

Other Experience

- 2009-present Organizing Committee, Rocky Mountain Conference on Magnetic Resonance
- 2011-present Associate Editor, *Magnetic Resonance in Chemistry*

Professional Memberships

- 1995-present American Chemical Society
- 2002-present International Society of Magnetic Resonance

Honors

- 1988 B.S. summa cum laude
- 1988 Churchill Foundation Fellowship
- 1988 National Science Foundation Graduate Fellowship
- 1991 National Defense Science and Engineering Graduate Fellowship
- 1991 Hertz Foundation Fellowship (declined in order to accept NDSEG Fellowship)
- 1996-1998 American Cancer Society Postdoctoral Fellow in Chemistry, MIT
- 1999 Research Corporation, Research Innovation Award
- 2002 UCR Regent’s Faculty Fellowship
- 2004 NSF CAREER Award
- 2012 UCR Academic Senate Distinguished Teaching Award
- 2015 Regitze R. Vold Memorial Prize, Alpine Conference on Solid-State NMR

C. Contribution to Science

1. **NMR-Assisted Crystallography in Structural Biology**: A major goal of my research is to understand the transformation of substrate to product in enzyme active sites at the atomic level – that is to define the position of all atoms, including protons. To accomplish this, we are pioneering the development and application of NMR-assisted crystallography – the synergistic combination of solid-state NMR, X-ray crystallography, first-principles (ab initio) and molecular dynamics computational approaches, and synthetic organic chemistry – to enzyme systems. Specifically, my group is establishing the atomic-level details in the enzymatic transformation of substrate to product in pyridoxal-5'-phosphate-requiring enzymes. By doing so, we are advancing an understanding of the relationship between chemical structure, conformational dynamics, and enzyme mechanism. What will emerge will be one of the most chemically-detailed mechanistic pathways of a multi-step enzymatic transformation.


2. Resonance Assignments and Structure in Organic and Biological Solids: Resonance assignments are an essential first step in structural studies with NMR and one of my group's most sustained contributions has been in the development of scalar-coupling-driven correlation spectroscopy for organic and biological solids. In this arena, we have introduced powerful new techniques to assign through-bond connectivity in complex organic solids, effect $^{13}$C-$^{13}$C correlation at natural abundance isotope levels, and obtain 2D and 3D correlation spectra with substantially increased spectral resolution in biological solids as large as 143 kDa.


3. NMR Crystallography in Materials Science: Building on the success of this approach, we have a parallel effort underway on the development of NMR crystallography in materials science, focusing on solid-state structure and dynamics in organic photoreactions. This is an ongoing, NSF-funded collaboration with the Bardeen group at UCR. A highlight of this work involves the identification of metastable crystalline intermediates in the solid-state photoreaction of anthracene derivatives and related compounds using $^{13}$C solid-state NMR. Our paradigm-shifting results show that the photomechanical response of these molecular crystal nanostructures is determined by non-equilibrium intermediate states and cannot be predicted based solely on knowledge of the equilibrium reactant and product crystal structures.


4. Structure and Dynamics from Solid-State and Solution-State NMR: In addition to these major initiatives, my group also maintains close and vigorous collaborations with several other groups at UCR. Recently, these have led to the solid-state NMR characterization of non-Watson-Crick hydrogen bonding motifs in nucleobases – part of a longstanding collaboration with the Morton group. We have also expanded considerably our collaboration with the Larive group at UCR to characterize hydrogen bonding in oligosaccharides in solution using both NMR and molecular dynamics simulations. We have successfully predicted and observed several novel hydrogen bonding interactions that help stabilize molecular conformations in solution. Understanding how elements of local structure impact the solution conformation of oligosaccharides can potentially provide insight into the nature of polysaccharide-protein interactions. Although oligosaccharides are thought to be flexible in solution, we have found that specific structural
motifs are favored by intramolecular hydrogen bonds that restrict the conformation and that we hypothesize pre-organize the local structure for high-affinity protein binding.


**Complete List of Published Work in MyBibliography:**

**D. Research Support**

**Current Research Support**

NIH R01GM097569  Mueller (PI)  9/30/2011-8/31/2016
"Chemically-Rich Structure and Dynamics in the Active Site of Tryptophan Synthase"
The goal of this project is to determine the chemical level details for the enzymatic transformation of substrate to product in tryptophan synthase using a synergistic combination of solid-state nuclear magnetic resonance, X-ray crystallography, synthetic organic chemistry, and computational chemistry.
Role: PI

NSF DMR1508099  Bardeen (PI)  8/1/2015-7/31/2018
"Reconfigurable Molecular Crystals through Solid-State Photochemistry"
The goal of this project is to develop new techniques for preparing and probing structure and dynamics of photomechanical molecular crystals.
Role: co-PI

**Completed Research Support**

NSF DMR1207063  Bardeen (PI)  7/1/2012-6/30/2015
"Preparation and Characterization of Microscopic Photomechanical Molecular Crystals"
The goal of this project is to develop new techniques for preparing and probing structure and dynamics of photomechanical molecular crystals.
Role: co-PI

NSF DUE1140522  Eichler (PI)  7/1/2012-6/30/2015
"Developing Pedagogies of Engagement in Foundation Chemistry Courses: Enhancing Minority Retention in STEM Majors"
Role: co-PI
DAWN NAGEL, Ph.D.  
Department of Botany and Plant Sciences  
1129 Batchelor Hall  
University of California, Riverside  
Riverside, CA 92521  
Email: dawnn@ucr.edu

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**EDUCATION**

<table>
<thead>
<tr>
<th>Institution</th>
<th>Location</th>
<th>Degree</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Georgia</td>
<td>Athens, GA</td>
<td>Ph.D., Plant Biology</td>
<td>2003 - 2008</td>
</tr>
<tr>
<td>University of Georgia</td>
<td>Athens, GA</td>
<td>B.S., Biology</td>
<td>1998 - 2000</td>
</tr>
</tbody>
</table>

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**RESEARCH EXPERIENCE**

*Assistant Professor: University of California, Riverside*  
06/2016 - present  
The long term goal of my research is to understand the underlying regulatory mechanisms of how the circadian clock modulate the plant’s ability to sense and respond to temperature stress. We use functional genomics, genetics and a variety of genome-scale approaches to address these questions. Mechanistic discoveries from my proposed research will contribute to the development of crop cultivars that are better resistant to temperature extremes.

*Postdoctoral Fellow: Dr. Steve Kay, The Scripps Research Institute, La Jolla*  
06/2009 – 06/2016  
(Previously at University of California, 2009-2014, San Diego and University of Southern California, 2014-2016, The Scripps Research Institute, La Jolla 02/2016 – 06/2016). Goals were to understand mechanistically how circadian clock genes are regulated to sustain robust rhythms, and in turn regulate numerous biological pathways. I used functional genomics approaches in combination with a variety of molecular and genomic techniques to screen for novel regulators underlying clock function, and to discover and characterize clock controlled transcriptional targets regulating key biotic and abiotic stress responses.

*Postdoctoral Scholar: Dr. Susan Wessler, University of Georgia*  
01/2009 – 05/2009  
Designed and performed computational analyses to identify and characterize transposable elements in the sequenced maize genome.

*Graduate Research Assistant: Dr. Susan Wessler, University of Georgia*  
08/2003 – 12/2008  
Combined computational and experimental approaches to determine the content and understand the impact of transposable elements on eukaryotic genomes.

*Research Assistant/Coordinator: Dr. Susan Wessler, University of Georgia*  
01/2000 – 07/2003  
Conducted experiments relevant to research projects in the lab. Assisted with supervision of undergraduate students and provided general lab support.

*Undergraduate Student: Dr. Susan Wessler, University of Georgia*  
03/1998 – 12/1999  
Performed experiments under the supervision graduate students. Maintained the lab, including buffer preparation and ordering supplies. Provided technical assistance to members of the lab.

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**AWARDS**

2013 NAASC International Conference on Arabidopsis Research Under-represented Minority Funding  
2012 NAASC International Conference on Arabidopsis Research Under-represented Minority Funding  
2010 National Institute of Health Ruth L. Kirschstein National Research Service Awards for Individual Postdoctoral Fellowships  
2006 UGA Center for Undergraduate Research Opportunities Excellence in Undergraduate Mentoring Award.
PUBLICATIONS


TEACHING EXPERIENCE

2015 Lecturer: BIMM116/PSYC133 - Circadian Rhythms - Bio Clocks (PI: Susan Golden). Lectured a class of ~300 students on the Plant Circadian Clock. Designed and conducted in class concept learning activities for three sections.

2006 Workshop Contributor: University of Georgia. Contributed to a one-week training module for two high school teachers from High Tech High Los Angeles on how to search and identify transposable elements using the available genomic sequences at NCBI.

2003 and 2004 Graduate Teaching Assistant: Biology 2107 Honors University of Georgia. Provided assistance to students related to the course work and graded quizzes and exams. Held review and study sessions to assist students with relevant course work.
PRESENTATIONS

Invited Speaker:
2014 Gordon Research Conference: Plant Molecular Biology, Holderness NH. Transcriptional targets of clock controlled outputs.
2007 University of Georgia Plant Biology Graduate Student Symposium, Athens GA. Developing an active assay for Lotus japonicus transposable elements.
2014 EMBO Workshop on Molecular Mechanisms of Transposition, its Regulation and Evolution, Roscoff, France. Transposable elements in Model Legumes.

Poster presentations:
2014 Gordon Research Conference: Plant Molecular Biology, Holderness NH. Transcriptional targets of clock controlled outputs.
2013 The 24rd International Conference on Arabidopsis Research (ICAR), Sydney, Australia. A Novel Circadian Clock Regulator in Arabidopsis.
2012 The 23rd International Conference on Arabidopsis Research (ICAR), Vienna, Austria. A Novel Circadian Clock Regulator in Arabidopsis.
2006 University of Georgia Plant Center Retreat, Lake Lanier GA. Developing an active transposon assay for Lotus Transposable Elements.
2003 Plant Transposon Meeting, Iowa State University, Ames IA. Functional analysis of the two ORFs of the active rice Pong element.

MENTORING EXPERIENCE
2013 – present Online Mentor for American Society of Plant Biologists (ASPB) Planting Science Mentoring Program.
2005 – 2007 Mentored undergraduate research students Deep Shah and Paul Ruddle. Designed small projects to identify transposable elements in plants, and conducted experiments to test several hypotheses.
2002 – 2003 Mentored minority undergraduate research student Tesheka Stevenson, who recently graduated with her Ph.D from the Department of Genetics and Molecular Biology at Emory University.

OUTREACH/VOLUNTEER SERVICE
2010 – 2011 Served as a postdoc representative on the Division of Biological Sciences Biology/Salk Retreat Planning Committee. Designed and organized activities to enhance interaction and mentorship between postdocs and faculty.
2010 Volunteered at the San Diego Festival of Science and Engineering, as a postdoc representative of UCSD, in the section on “Ask me I am a Scientist”.

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August 5th, 2016

Russ Hille,
Distinguished Professor of Biochemistry,
University of California, Riverside,
2404 Boyce Hall,
Riverside, CA 92521-0122.

Re: Interdepartmental Graduate Program in Biophysics

Dear Russ,

I would like to express my enthusiastic support for the proposed Interdepartmental Graduate Program in Biophysics at the University of California, Riverside.

During my past six years as a postdoctoral researcher at Stanford University School of Medicine, I was involved both in performing and in mentoring trainees in Biophysics research, focusing on applications of single-molecule fluorescence microscopy to study complex biochemical systems. Our research was a natural fit for, and benefitted enormously from students in the Biophysics program. The potential of a similar program at UCR is therefore really exciting. I will be delighted to participate in the program as it is established.

If I can assist in any way, please do not hesitate to contact me.

Sincerely,

Seán O'Leary
Curriculum Vitae

Seán O’Leary

Personal Information:

Address: Department of Biochemistry, University of California, Riverside, 3488B Boyce Hall, Riverside, CA 92521.

Phone: +1 (951) 827-4222
E-mail: sean.oleary@ucr.edu

Education:

2010 Ph.D., Chemistry and Chemical Biology, Cornell University
Dissertation: “Exploring Novel Enzymology in Bacterial Metabolism: Cysteine Synthase, Urate Oxidase, and Bacimethrin Biosynthesis.”
Advisor: Tadhg P. Begley

2008 M.S., Chemistry and Chemical Biology, Cornell University

2005 B.Sc.(Hons), Chemistry, University College Dublin, Ireland

Research Experience:

2016 – Assistant Professor of Biochemistry, University of California, Riverside

2014 – 2016 Basic Life Sciences Research Associate and
2010 – 2014 Postdoctoral Scholar, Stanford University School of Medicine
Project: Single-molecule, biophysical and biochemical studies on eukaryotic translation initiation
Advisor: Joseph D. Puglisi

2009 – 2010 Research Assistant, Texas A&M University
Projects: Biochemical studies on PKS11, a type-III polyketide synthase from M. tuberculosis.
Reconstitution and characterization of bacimethrin biosynthesis.
Advisor: Tadhg P. Begley

2005 – 2009 Graduate Research Assistant, Cornell University
Projects: Pre-steady-state kinetic studies on CysM, a cysteine synthase from M. tuberculosis.
Biochemical characterization of HpxO, a novel flavin-dependent urate oxidase from Klebsiella pneumoniae.
Investigation of the trapping of a glycosyl cation at the active site of crystals of uridine phosphorylase from Escherichia coli and Bos taurus.
Studies on the biosynthesis of bacimethrin.
Studies on the mechanism of formation of the DNA dimeric thymine lesion known as the “spore photoproduct”.
Advisor: Tadhg P. Begley

Honors and Awards:

2014 – NIH Pathway to Independence Career Development Award (K99/R00) (GM111858)
2011 Dean’s Postdoctoral Fellowship, Stanford University School of Medicine
2006 Hugh Ryan Memorial Medal, University College Dublin
2005 Eva Philbin Bowman Medal, University College Dublin
2004 University Scholarship, University College Dublin
2003 University Scholarship, University College Dublin
2002 University Scholarship, University College Dublin (*Two scholarships*)
2001 Entrance Scholarship, University College Dublin

**Publications:**


**Invited talks:**
2. Uppsala University, Uppsala, Sweden, 8/10/2016.

September 2nd, 2016.
Jeff Perry, Ph.D.
Jeff.perry@ucr.edu
Department of Biochemistry, UC Riverside 3401 Watkins Drive, Riverside, Ca 92521.

Professional Appointments:

Oct 2014 - Present  **Assistant Professor of Biochemistry**, University of California, Riverside.

Oct 2015 - Present  **Adjunct Professor**, Universidad Francisco de Vitoria, Madrid, Spain.

Jan 2015 - Present  **Co-Founder**, Arma Pharmaceuticals Inc., Delaware.

Dec 2012 - Present  **Co-Founder**, Neuromantis Pharmaceuticals Inc., San Diego, Ca.

Oct 2005 - Present  **Adjunct International Professor**, School of Biotechnology, Amrita University, India.

Education:

July 2001  **Ph.D.** Natural Science, University of Cambridge, UK.
Advisor: Sir Tom L. Blundell, FRS, FMedSci, PhD, Head of Biochemistry Department.

June 1996  **B.Sc.** Imperial College of Science Technology and Medicine, UK.
Biochemistry with a Year in Industry (Hons).

Research and Training Experience:

2011-2014  **Staff Scientist**, The Scripps Research Institute, Department of Integrative Structural and Computational Biology, La Jolla, Ca.

2006-2011  **Senior Research Associate**, The Scripps Research Institute.
Advisor: Dr. John A. Tainer.
Project: Structural biochemistry studies DNA repair and genome stability pathways.

2001-2006  **Postdoctoral Fellow**, Lawrence Berkeley National Laboratories & Visiting Scientist, TSRI.
Advisors: Dr. John A. Tainer & Dr. Priscilla K. Cooper.
Project: Structural biochemistry studies DNA repair and genome stability pathways.

1996-2001  **Ph.D. Student**, University of Cambridge, Department of Biochemistry, UK
Advisor: Prof. Sir Tom L. Blundell, FRS, FMedSci,
Project: Structural Biochemistry Studies on Cell Surface Glycoproteins.

1996  **Research Student**, Computational Chemistry Department, Pfizer Central Research Ltd, UK.
Advisor: Dr. David G. Brown. Project: Analyses of neutrophil inhibitory factor

1996  **Undergraduate Research Project Student**, Imperial College, UK
Advisor: Dr. K. Brown. Project: Cloning and Characterization of *M. tuberculosis* KATG.

1995  **Undergraduate Industrial Placement**, Glaxo-Welcome, UK
Advisor: Dr. Onkar Singh, Project: Biochemical characterization of the HIV-1 Rev protein.
New Investigator NIH Extramural Grant Support:
NIH/NIAMS New Investigator R03 AR059968-01A1 (PI) 07/01/2011 – 03/31/2015
“Structural Biochemistry Studies on MAP Kinase Allosteric Binding Sites”

NIH/NIGMS The HIV Interaction and Viral Evolution (HIVE) Center P50 GM103368 (Lead PI – Olson)
Collaborative Development Program Award on “Advanced SAXS technologies for HIVE center studies”
(Awarded as a Subcontract to Tainer & Perry as co-PIs) 03/01/2013 – 08/01/2014

Grant Applications In Preparation/Re-Submission:
“Roles of RNF4 at dysfunctional telomeres” NIH R01 (Boddy/Perry/Lazzerini-Denchi)
“A Unicellular Model for Determining DNA Repair Functions of the RecQ4 Disease-Suppressing Helicase”
NIH R01 (Boddy/Perry)
“Defining WD-repeat protein:small molecule interactions” NIH R01 (Perry/Reed/Cheltsov)
“Targeting Arm1 for cancer chemotherapy selectivity” NIH SBIR (Hoelz/Perry)
“A Novel therapeutic target for treating Parkinson's disease” NIH R01 (Perry/Reed/Cheltsov)

Honors and Awards:
1996-2000 Pfizer Central Research Ltd, UK, CASE sponsored Ph.D. studentship

Skills and Interests:
• Discovery of novel components in the SUMO and Ubiquitin post-translational modification pathways.
• Extensive experience in the production of protein crystals, collection and analysis of diffraction, and subsequent data analysis, structure determination, model building and refinement, and pdb submission.
• Experienced in small angle x-ray scattering methods.
• Adept in molecular biology, protein expression, purification and protein biochemistry methods.
• Skilled in structural bioinformatics analyses, including protein comparative modeling.
• Experienced in crystallographic, computational and biochemical methods in structural-based drug design.
• Extensive experience in both writing and in reviewing manuscripts and grants.

Scientific Achievements:
• Authorship of 4 manuscripts highlighted in the Faculty of 1000.
• Reviewer of 60 manuscripts for leading journals (Nature, Cell, Nature Struct & Mol Biol, etc)
• Reviewer of 17 grant applications (EBI, USA, Wellcome Trust, UK, M.R.C., UK, etc).

Teaching Experience:
2014-present Biochemistry UG courses at UCR, BCH-10, 96, 97 98i, 100, 110A & 120, 197.
2005-present Teaching ‘Structural Bioinformatics’ course for Bioinformatics MSc, and ‘Structure-based Drug Discovery’ for Biotechnology and Microbiology MSc degrees, Amrita University, Kerala, India.
2004-present Supervision of laboratory technicians, graduate students and post-doctoral fellows.
1999-2000 Biochemistry undergraduate tuition, St. Edmund’s College, University of Cambridge, UK.

PDBs:
Human MnSOD structures: 1SZX, 1XDC, 1XIL, 1ZSP, 1ZTE, 1ZUQ, 2GDS & 2P4K.
Human WRN Exonuclease Structures: 2FBT, 2FBV, 2FBX, 2FBY & 2FC0.
Human p38a Kinase inhibitor complex: 3HVC.
Human Sumo Like Domain: 3RD2; Yeast Sumo Like Domain: 3GOE.
Yeast Sumo Like Domain-Ubc9 SUMO E2 complex: 3RCZ.
Human RNF4 RING Domain: 4PPE.

Patents: Two patents filed.
Invited Presentations:
1) ‘RNF4 DNA Repair Functions at Telomeres’, Dynamic Structures in Damage Responses and Cancer, Cancun, Mexico, Feb 2014.
3) ‘SAXS at the SIBYLS beamline’, HIVE Structural Biology Workshop, Bethesda, June 2013.

Publications:


NICOLE E. RAFFERTY
Department of Biology | University of California-Riverside | Riverside, CA 92521
951.827.3800 | nicole.rafferty@ucr.edu | www.raffertylab.ucr.edu

Education

Ph.D. in Zoology (2011)
University of Wisconsin-Madison
Advisor: Anthony Ives

M.S. in Zoology (2006)
University of Wisconsin-Madison
Advisor: Janette Boughman

University of Washington
Advisor: Dee Boersma
magna cum laude, Distinction in Biology, Phi Beta Kappa

Academic Appointments

2017-present Assistant Professor
Department of Biology
Cooperating Faculty Member
Department of Entomology
University of California-Riverside

2016 Research Associate
Department of Entomology
Affiliate: Center for Environmental Research, Education, and Outreach
Washington State University

2015 Postdoctoral Fellow
Department of Ecology and Evolutionary Biology
University of Toronto
Mentor: James Thomson

2011-2014 NIH Fellow
Postdoctoral Excellence in Research and Teaching Program
Department of Ecology and Evolutionary Biology; Center for Insect Science
University of Arizona
Mentor: Judith Bronstein

Publications

* indicates mentored student

Published or In Press


- Editor’s Choice article
- Journal cover photo


- Recommended by Faculty of 1000
- Journal cover photo (credit: David W. Inouye)


- Featured on journal cover


- Journal cover photo
- Popular press by Science Daily and Treehugger


- Journal cover photo


In Revision or Review

Grants, Fellowships, and Awards

- 2016 Research Grant, Washington Tree Fruit Research Commission
  PI with 3 co-PIs ($76,634)
  “Development and validation of a precision pollination model”
- 2015-2016 Research Grant, British Ecological Society
  PI ($28,515)
  “How do joint spatial and temporal shifts affect plant-pollinator interactions?”
- 2015 Ecology and Evolutionary Biology Departmental Postdoctoral Fellowship, University of Toronto
- 2011-2014 Postdoctoral Excellence in Research and Teaching Fellowship, NIH
- 2010 John Jefferson Davis Travel Award, University of Wisconsin ($400)
- 2010 John and Virginia Emlen Award for Outstanding Graduate Work in Zoology, University of Wisconsin ($4,500)
- 2009 Carl A. Bunde Graduate Research Award, University of Wisconsin ($4,500)
- 2004-2007 Graduate Research Fellowship, NSF
- 2006 Research Grant, American Society of Primatologists ($1,445)
- 2006 Graduate Research Grant, University of Wisconsin ($1,315)
- 2003 Research Apprenticeship Grant, Friday Harbor Marine Labs ($3,000)

Presentations

Invited Talks: Conferences


Invited Talks: Departmental Seminars and Other Venues

2017 Department of Ecology and Evolutionary Biology, University of California-Los Angeles

2016 School of Biological Sciences, Washington State University
Department of Entomology, University of California-Riverside
Palouse Ecology, Evolution and Systematics, Washington State University and University of Idaho
Department of Biology, University of North Carolina
Department of Biology, University of California-Riverside

2014 USA National Phenology Network Headquarters, Tucson, Arizona
Department of Biology, Eastern Michigan University

Contributed Talks and Posters: Conferences


Contributed Talks: Departmental Seminars and Other Venues

2015 Department of Ecology and Evolutionary Biology, University of Toronto

2011 Department of Ecology and Evolutionary Biology, University of Arizona
Biology Colloquium, University of Wisconsin

Teaching Experience

2017 Ecological Communities Under Global Change
Department of Biology
University of California-Riverside

2016 General Entomology (writing-intensive)
Department of Entomology
Washington State University

RAFFERTY – Curriculum Vitae
Professional Service

Associate Editor, *Journal of Ecology* (2013-present)


Proposal Reviewer, Resource Conservation and Climate Change Program Area, Strategic Environmental Research and Development Program, Department of Defense (2016)


Proposal Reviewer, National Fellowship Program, Sigma Delta Epsilon/Graduate Women in Science (2015)


Co-organizer, Women in Natural Sciences, Panel discussions and seminars on professional issues for women in ecology and related disciplines, Department of Ecology and Evolutionary Biology, University of Arizona (2013-2014)


Invited Participant, USA National Phenology Network Research Coordination Network Meeting, Milwaukee, Wisconsin (2012)

Student Mentoring

*University of California-Riverside:*
Andrea Keeler (2017-present), Ph.D. student
Skyler Kim (2017), undergraduate
Eva Morton (2017), undergraduate
University of Arizona:
Victoria Scaven (2012-2014), undergraduate
Devon Makki (2014), undergraduate
Meghan Iacuelli (2013), undergraduate
Xi Chen (2011), undergraduate

University of Wisconsin:
Abigail Smith (2008-2009), undergraduate

Public Service and Outreach
Judge, 11th Annual Undergraduate Research Symposium, University of California-Riverside (2017)
Consulted on piece on spring flowering and plant-pollinator synchrony for *Science Friday*, National Public Radio (2017)
Judge, Showcase for Undergraduate Research and Creative Activities, Washington State University (2016)
Judge, Ecology and Evolutionary Biology Undergraduate Poster Session, University of Arizona (2014)
Volunteer, Arizona Insect Festival, University of Arizona (2013, 2014)
Judge, Flowing Wells High School Science Fair, Tucson, Arizona (2012)
Invited Speaker, “Climate change and shifts in flowering time: effects on plant-pollinator interactions”, 11th Annual Science Day, University of Wisconsin Arboretum (2011)
Invited Speaker, “Climate change-induced shifts in flowering phenology and plant-pollinator interactions”, 9th Annual Science Day, University of Wisconsin Arboretum (2009)

Professional Memberships
American Society of Naturalists
Botanical Society of America
British Ecological Society
Ecological Society of America
Carolyn G. Rasmussen
Department of Botany and Plant Sciences
University of California, Riverside
900 E. University Ave.
Riverside, CA 92521
(951) 827-4415
carolyn.rasmussen@ucr.edu

EDUCATION

2007 University of California, Berkeley
Ph.D. in Microbiology; Department of Plant and Microbial Biology
"Characterization of genes required for septation and cell fusion in Neurospora crassa." Research Advisor: Professor N. Louise Glass

1998 University of Chicago
B.A. in Chemistry, General Honors, Honors in Chemistry
"The regulation of expression of expansins in the parasitic plant Striga asiatica." Research Advisor: Professor David G. Lynn

RESEARCH AND PROFESSIONAL EXPERIENCE

07-2014-present Assistant Professor in Plant Cell Biology and Plant Cell Biologist

2013-2014 Principal Investigator, University of Wyoming, Molecular Biology
NSF-MCB award #1244202

2011-2013 Postdoctoral Researcher, University of Wyoming, Molecular Biology
Postdoctoral Advisor: Professor Anne W. Sylvester

2007-2011 American Cancer Society Postdoctoral Research Fellow
University of California, San Diego, Cell and Developmental Biology
Postdoctoral Advisor: Professor Laurie G. Smith

2000-2007 Graduate Student, Graduate Group in Microbiology
University of California, Berkeley, Plant and Microbial Biology
Graduate Student Advisor: Professor N. Louise Glass

PUBLICATIONS


Contributions:
Most of the work on this paper was done at UCR. Some tool development and strain generation was done at University of Wyoming. Pablo Martinez, UCR graduate student
in the Rasmussen lab, performed the majority of experiments and prepared most of the figures and helped write the manuscript. Anding Luo and Anne W. Sylvester, University of Wyoming postdoc and Professor respectively, contributed new tools. Carolyn Rasmussen directed the research, contributed new tools, assembled some figures, did some experiments, wrote the manuscript, and is the corresponding author.


Contributions:
Most of the work on this paper was done at UCR. Some tool development and initial experiments were done at University of Wyoming. Ricardo Mir, a UCR postdoc in the Rasmussen Lab, performed the majority of experiments and made most of the figures and helped write the manuscript. Leslie Aranda, a UCR undergraduate researcher performed some experiments. Tiffany Biaocchi, UCR graduate students first quantified the DII signal in telophase and G1 cells. Anding Luo and Anne W. Sylvester, University of Wyoming postdoc and professor respectively, contributed new tools. Carolyn Rasmussen directed the research, contributed new tools, assembled some figures, did some experiments, wrote the manuscript, and is the corresponding author.


Contributions:
Carolyn Rasmussen (UCR) developed the quantitative live cell imaging technique and wrote a methods book chapter on it.

2013 Rasmussen, C.G., Wright A.J., and Müller, S. The role of the cytoskeleton and associated proteins in determination of the plant cell division plane. The Plant Journal. 75: 258–269.

*Authors contributed equally to this work


* Authors contributed equally to this work

2008 Rasmussen, C.G., Morgenstein, R.M., Peck, S. and Glass, N.L. Lack of the GTPase RHO-4 in Neurospora crassa causes both reduced numbers and aberrant stabilization of

(Cover photograph)


*Highlighted in Nature Reviews Microbiology 5, 659 (2007)*, Cover photograph


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**TEACHING EXPERIENCE**

**Supervisor of Graduate Student Research**
Pablo Martinez, Biochemistry and Molecular Biology (BCMB) graduate student, started 10/2015
Marshal Bellinger, Plant Biology (PB) graduate student, started 01/2016
Alison Mills, Biochemistry and Molecular Biology (BCMB) graduate student, started 3/2017

**Rotation students**
Leticia Meza PB (Fall 2017), Danielle Garceau PB (Winter 2016), Leo Islas Genetics, Genomics and Bioinformatics (Fall 2015), Tiffany Biaocchi BCMB (Winter 2015), Michael Schwartz PB (Winter 2015).

**Supervisor of Undergraduate Research**
2014-current Leslie Aranda – MARC-U-STAR awardee, co-author
2015-current McKenzie Pickle- NSF-REU awardee, ASPB SURF awardee
2015-current Victoria Morris – HHMI- SALSA awardee, ASPB SURF awardee
2015-current Sareen Leon
2016-current Grecia Lizaola-Velazquez, Raquel Diffenbacher, Jocelyne Aranda (RISE scholar awardee 2017), Danielle Thomas (RISE scholar awardee 2017), Tammy Peng (Dynamic Genome HHMI SALSA awardee 2017)
2014 Christopher Hoyt- NSF-REU awardee
2014 Jenna Roper – MARC-U-STAR awardee

**Teaching**
BPSC011 Plants and Human Affairs, undergraduate level 4-unit class (Winter Quarters)
BPSC237 Plant Cell Biology, graduate level 4-unit class co-taught with Professor Zhenbiao Yang (Fall Quarters)
BPSC 240 Mathematical modeling in patterning and cell shape (Winter Quarter, 2015).
BPSC 250 (Fall Quarter, 2014 and Winter Quarter 2017 with Zhenbiao Yang).

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**FUNDING AND AWARDS**

**Pending**

2017  Hellman Fellowship ($30,000 requested)
2017  USDA Hispanic Serving Institution Education grant ($249,150 requested, PI with 3
UCR Co-PIs David Nelson, Linda Walling and Patricia Springer)
2017  UCR-Research Support Allocation Process (RSAP, $17,500 requested)
2016  NSF-MCB (PI, $870,309 requested)

**Funded**

2015  UCR Omnibus Travel Award ($1,400)
2015  Internal Research and Education Development (RED) grant for Mathematical
modeling ($10,000)
2014-2015  IIGB Internal Chemical genomics grant ($5,000)
2013-2018  NSF-MCB (Cellular Dynamics and Functions) proposal #1244202 and 1505848
($521,024.00)
2008-2011  American Cancer Society Postdoctoral Fellowship #PF-08-280-01 ($148,000)
2008  Finalist for Life Sciences Research Fellowship LSRF (No money awarded)
2006  Graduate Division Travel Grant UC Berkeley ($500)
2004  David D. Perkins Award for Neurospora Research ($100)
2004  Department of Plant and Microbial Biology Travel Grant ($500)
2001  National Science Foundation Graduate Fellowship Honorable Mention
2001  Patricia St. Lawrence Graduate Fellowship ($3,500)

---

**TALKS AND SEMINARS**

2017  Keynote speaker, Annual Conference of the Nordic Microscopy Society, SCANDEM,
Reykjavik, Iceland.
2017  Invited talk, 59th Annual Maize Genetics Conference, Saint Louis, MO
2017  Seminar, University of Georgia, Athens, GA
2016  Invited talk, Gordon Research Conference, Plant and Microbial Cytoskeleton, Andover,
NH.
2016  Invited talk, Plant Cell Dynamics Meeting, Saint Louis, MO
2016  Seminar, Penn State University, PA
2015  Seminar, CMBD-GGB-MCBL joint seminar series, UCR, Riverside, CA
2014  Invited talk, Twelfth Annual Award Symposium, Center for Plant Cell Biology
(CEPCEB), UCR, Riverside, CA
2014  Seminar, University of Saskatchewan, Saskatoon, Canada
2013  Seminar, University of California, Riverside, CA
2013  Seminar, University of California, Davis, CA
2013  Seminar, University of British Columbia, Vancouver, Canada

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2012  Invited talk, American Society for Plant Biology (ASPB) Conference, Austin, TX
2012  Invited talk, 54th Annual Maize Meeting, Portland, OR
2011  Seminar, Plant Gene Expression Center, USDA, Albany, CA
2011  Invited talk, Cell Cycle Symposium, Salk Institute, San Diego, CA
2011  Invited talk, San Diego Center for Systems Biology (SDCSB), UC San Diego, CA
2011  Invited talk, La Jolla Mesa Plant Biology Talks, UC San Diego, CA
2010  Seminar, John Innes Center, Norwich, UK
2010  Invited talk, American Society for Plant Biology (ASPB) Conference, Montreal, Canada
2010  Invited talk, Plant and Microbial Cytoskeleton Gordon Research Conference (GRC), Andover, NH
2009  Plant Development Supergroup, UC San Diego, CA
2008  Plant Development Supergroup, UC San Diego, CA
2007  Invited Seminar, Centro de Investigacion Cientifica y de Educacion Superior de Ensenada (CICESE), Ensenada, Mexico
2006  Genetics and Development Supergroup, UC Berkeley, CA
2005  Fungal Genetics Conference, Asilomar, CA.
2005  Invited Seminar, Max Plank Institute, Marburg, Germany
2005  Invited Seminar, Applied Microbiology, University of Basel, Switzerland.
2004  Neurospora Conference, Asilomar, CA
2004  Seminar, UC Davis, CA 2004
2002  Graduate Student Microbiology Symposium, UC Berkeley, CA
2002  Neurospora Conference, Asilomar, CA.

SYNERGISTIC ACTIVITIES

2017  Lab outreach activities for Plant Discovery Day (at UCR) and Science Night for Stork Elementary School
2017  Grant review Laboratory of Excellence Saclay Plant Science (Labex SPS)
2016  Reviewer for journal articles in Plant Cell (2), Plant Physiology and Developmental Biology
2015  Reviewer for journal articles in Molecular Plant, Plant Cell
2015  Activities leader for Plant Discovery Day 5/2015
2015  Grant review DOE-BES
2014-2016 Maize Editorial Board
2014  Mentorship panel for Postdocs “From Trainee to Tenure-Track Faculty: How to Navigate Within the Academic System to Reach the Top of the Pyramid.” Dec 9
2014  Grant review for NSF-IOS and BBSRC.
2014  Reviewer for journal articles in PLOS-ONE, Plant Cell Reports
2013-2014 Activities leader for Women in Science (WIS) conference at UW.
2010-2014 Member of professional societies AAAS and ASPB.
2011  Ad hoc reviewer for the Plant Journal.
2011  Science Fair Expo Day “Ask Me, I’m a Scientist or Engineer” volunteer.
2009-2012 American Cancer Society Cancer Action Network (ACS CAN) Member.
2009-2010 Participant in Making Strides Against Breast Cancer fundraising walk.
2008-2009 Activities leader for several one-day events and curriculum development for BioBridge, a program that promotes scientific leadership in traditionally underserved high school students at University of California, San Diego.

REFERENCES

Professor Anne W. Sylvester (Postdoctoral research advisor)
Department of Molecular Biology
224 AnSci/MOLB
1000 E. University Ave
Laramie, WY 82071
307-766-4993 annesyl@uwyo.edu

Professor Laurie G. Smith (Postdoctoral research advisor)
Section of Cell and Developmental Biology
5218 Muir Biology - MC 0116
9500 Gilman Drive La Jolla, CA 92093-0116
858-822-2531 lgsmith@ucsd.edu

Professor N. Louise Glass (Dissertation advisor)
Plant and Microbial Biology
111 Koshland Hall Rm. 341A
Berkeley, CA 94720-3102
510-643-2399 lglass@berkeley.edu
LOUIS S. SANTIAGO
Botany and Plant Sciences
University of California
2150 Batchelor Hall
Riverside, CA 92521
Faculty web page: http://plantbiology.ucr.edu/people/faculty/santiago.html
Lab web page: http://ecophys.ucr.edu/
Google Scholar Citations: http://scholar.google.com/citations?user=qxbpxTsAAAAJ&hl=en

Education

2003 PhD in Botany, University of Florida
1998 MS in Botany, University of Hawaii at Manoa
1993 BA in Integrative Biology, University of California at Berkeley

Other Education: 2002 Stable Isotope Ecology Course, University of Utah
2009 Mass Spectrometer Operator Course, University of Ottawa

Professional Experience

• Associate Professor of Physiological Ecology, Botany and Plant Sciences, Associate Physiological Ecologist, Agricultural Experiment Station, University of California, Riverside (UCR), 2012 – present

• Assistant Professor of Physiological Ecology, Botany and Plant Sciences, Assistant Physiological Ecologist, Agricultural Experiment Station, UCR, 2006 – 2012

• Research Associate, Smithsonian Tropical Research Institute, 2011 – present

• Co-Director, Facility for Isotope Ratio Mass Spectrometry, UCR, 2008 – present

• NSF Minority Postdoctoral Research Fellow, Integrative Biology, University of California, Berkeley, and Center for Scientific Investigation of the Yucatan (CICY), Merida, Mexico, 2003 – 2006

• Environmental Protection Agency – Science to Achieve Results (STAR) Graduate Research Fellow, 2000 – 2003

• Graduate Research and Teaching Assistant, 1995 – 2003

• Editorial Assistant, Mondo 2000 Publishing, Berkeley, CA, 1994
Grants, Awards and Fellowships


- “Air pollution studies: Understanding the deposition behavior and plant responses to gaseous ammonia pollution”. Principal Investigator, USDA Forest Service, 2015-2019 $15,000.

- “Hydraulics and Sap of Trees from the Amazonian Tropics (HydroSTAT)”. Co-Principal Investigator with Damien Bonal, Center for the Study of Amazonian Biodiversity (CEBA), 2014 $25,000.

- “Drought And Mortality in Amazonian forests (DRAMA)”. Co-Principal Investigator with Damien Bonal, Center for the Study of Amazonian Biodiversity (CEBA), 2013 $25,000.


- “Invasive Species in Wilderness”. Principal Investigator, Bureau of Land Management, current, 2012-2016 $13,000.

- “Ecosystem Ozone (O3) Flux and Stomatal Uptake: Assessment of Environmental Controls and Functional Responses of Mixed Conifer Sites Along Two Pollution Gradients”. Co-Principal Investigator with Karrin Alstad, USDA Forest Service 2012-2013 $72,000.

- USDA E. Kika de la Garza Fellowship, United States Department of Agriculture, Washington DC, July-August 2011.

• “Physiological and Biochemical Characterization of the Effects of Oxidant Air Pollutants, Ozone and Gas-Phase Nitric Acid on Plants and Lichen for Their Use as Early Warning Biomonitors of these Air Pollutants”. Co-Principal Investigator with Pam Padgett, USDA Forest Service, 2009-2010 $29,000.

• “Nutrient Limitation of Photosynthesis in Tropical Forest”. Principal Investigator, University of California, Regent’s Faculty Fellowship, 2009-2010 $4,500.

• “Consequences of drought-induced vegetation change for water cycling in desert chaparral”. Principal Investigator. National Science Foundation, 2008-2011 $175,000.


• Principal Investigator. UCR Travel Grants, 2008-2009 $2,040.

• “Using Stable Isotopes to Identify the Components of Forest Canopy Evapotranspiration”. Principal Investigator, National Science Foundation, 2007-2008 $50,000.


• “Cooperative Research and Training in Stable Isotope Methods: Applications in ecology, agriculture, and food chemistry”. UC Mexus 2006-2007 $15,000.

• “Physiological Responses of Redwood Forest Understory Plants to Water and Nitrogen Inputs by Fog”. Principal Investigator, National Science Foundation Postdoctoral Fellowship, 2003-2006 $150,000.

• “Symbiotic Nitrogen Fixation and Patterns of Species Diversity in a Tropical Dry Forest in Mexico”. Principal Investigator, National Science Foundation, International Research Fellowship Program 2004, Supplementary award.
• “Functional Diversity of Leaf Characteristics along an Environmental Gradient in Tropical Forest”. Environmental Protection Agency, Science to Achieve Results (STAR) Graduate Fellowship 2000-2003.

• Smithsonian Tropical Research Institute Short-Term Fellowship 2000.

• Florida-Georgia Alliance Graduate Fellowship 1998-1999.

• Mellon Foundation Grant for Comparative Research between La Selva and BCI 1997.

Editorial and Professional Positions

• Editorial Board, *Journal of Sustainable Forestry* (2010 – present)

• Founding Editor, *Prometheus Wiki* (2009 – present)


• Referee and panelist for faculty grants, postdoctoral grants, and dissertation research proposals, University of California Institute for Mexico and the United States (UCMexus) 2008, 2013.

• Referee for 1 proposal, National Fund for Scientific & Technological Development (FONDECYT), Chile, 2009.

• External Reviewer, Xishuangbanna Tropical Botanical Garden, China, 2010.

• Referee and panelist for 5 proposals for the Mildred E. Mathias Graduate Student Research Grant Competition, University of California, 2011.

Peer-Reviewed Publications (65 total)


Gorai M, Laajili W, Santiago LS, Neffati M (2015) Rapid recovery of photosynthesis and water relations following soil drying and re-watering is related to the adaptation of desert shrub Ephedra alata subsp. alenda (Ephedraceae) to arid environments. *Environmental and Experimental Botany* 109:113-121


Schreeg LA, Santiago LS, Wright SJ, Turner BL (*in press*) Stem, root and older leaf N:P ratios are more responsive indicators of soil nutrient availability than new foliage. *Ecology*


Web of Knowledge Core-Collection Statistics (19 August 2016)

• Sum of the Times Cited: 2281
• $h$-index: 21

Edited Book and Contributed Chapters


Coverage by Popular Press

“What Does a Dying Forest Sound Like?” Smithsonian.com, 21 April 2016

“Botanist to study responses of trees, shrubs to extreme drought” UC News, 23 September 2015

“Programa busca incentivar estudio de agricultura” La Prensa, Riverside, 12 May 2011

“Fall colors in ... Riverside? Stop your snickering” Los Angeles Times, 16 December 2010


“UC Riverside Botanist to Study Role of Plants in Southern California Drought” The Water Cooler: California’s Water Blog, 11 September 2008

“Decomposition of Leaves Related to Global Warming” Inside UCR, 18 July 2007, p. 3

473
Presentations at Professional Meetings (76 total)


Ávila-Lovera E, Tezara W, Herrera A, Ezcura E, Santiago LS (2016) Do photosynthetic stems have higher water use efficiency than leaves? Implications for drought responses of tropical and subtropical plants. Association for Tropical Biology and Conservation, Montpellier, France

Goldstein G, Santiago LS, Campanello PI, Avalos G, Zhang YJ, Villagra M (2016) Facing shortage of excessive light: how tropical and subtropical trees adjust their photosynthetic behavior and life history traits to a dynamic forest environment. Association for Tropical Biology and Conservation, Montpellier, France


Santiago LS (2016) Managing Tropical Biodiversity for Watershed Yield: Approaches, Challenges and Policy Implications, Rosenberg International Forum on Water Policy, Panama City, Panama


Pivovaroff A, Santiago LS (2013) Functional traits better correlate with wet season than dry season water potentials in a Californian chaparral plant community. Ecological Society of America, Minneapolis, Minnesota


Santiago LS, Alstad, KP, de Guzman ME, Pasquini SC, Pivovaroff AL (2011), Consequences of drought-induced vegetation change for water cycling along a desert-shrubland gradient, International Mediterranean Ecosystems Conference (MEDECOS), Los Angeles, California

Pasquini SC, Wright SJ, Santiago LS (2011) Are lianas physiologically and morphologically different from trees at the seedling stage? An evaluation using a long-term nutrient enrichment study, Ecological Society of America, Austin, Texas

Pivovaroff, AL, Santiago LS (2011) Decoupled stem and leaf hydraulic conductance in California chaparral and coastal sage scrub plant species, Ecological Society of America, Austin, Texas


Dickens SJ, Allen EB, Santiago LS, Crowley DE (2011) Environment is a stronger determinant of exotic plant feedbacks to soil than vegetation type in southern California ecosystems, Ecological Society of America, Austin, Texas


Curriculum vitae

Louis S. Santiago


Cervera JC, Santiago LS (2010) Predicting shifts in distribution of sympatric cacti from southeastern California: Physiological responses and productivity of crassulacean acid metabolism species to climate change may help explain changes in distribution ranges, Workshop on Crassulacean Acid Metabolism, Panama City, Panama


Dickens SJ, Allen EB, Santiago LS (2009) Soil responses following exotic plant invasion and restoration of coastal sage scrub of Southern California, Ecological Society of America, Albuquerque, New Mexico

Dickens SJ, Allen EB, Santiago LS (2009) Above and belowground feedbacks following exotic plant invasion and restoration of coastal sage scrub of southern California, California Native Plant Society, Sacramento, California


Cervera Herrera JC, **Santiago LS** (2008) Predictions of the productivity of CAM plants in response to climate change in southern California, Mexican Scientific Society of Ecology (SCME), Merida, Mexico

Ricalde Pérez MF, Simá Gómez L, Andrade Torres JL, Durán García R, **Santiago LS** (2008) Seasonal patterns and extent of CAM activity in plants from two ecosystems of the Yucatan Peninsula along an aridity gradient, Mexican Scientific Society of Ecology (SCME), Merida, Mexico


Salzman LK, Allen MF, **Santiago LS** (2008) Using leaf-level gas exchange and soil flux to estimate the carbon exchange in a mixed conifer and hardwood forest, Ecological Society of America, Milwaukee, Wisconsin

Dickens SJM, Allen EB, **Santiago L** (2008) Above and belowground feedbacks following exotic plant invasion and restoration of coastal sage scrub of Southern California, Southern California Academy of Sciences, Dominguez Hills, California


**Santiago LS** (2007) High rates of total N fixation in a tropical dry forest, Ecological Society of America, San Jose, California

Simonin KA, **Santiago LS**, Dawson TE (2007) Canopy wetness decouples plants from soil water deficit, Ecological Society of America, San Jose, California
Santiago LS (2007) Drought tolerance strategies of tropical forest plants from contrasting habitats, Association for Tropical Biology and Conservation, Morelia, Mexico


Santiago LS, Dawson, TE (2006) Photosynthetic light-use efficiency of California redwood forest understory plants along a moisture gradient, Botanical Society of America, Chico, California


Santiago LS (2005) Ecophysiological correlates of plant mortality rates in a wet tropical forest, Center for Tropical Forest Science Symposium, Panama City, Panama

Santiago LS, Quintal-Tun F, Andrade JL, Dawson TE (2005) Dominance of legumes in the Neotropics: Symbiotic nitrogen fixation contributes to high photosynthetic rates, Ecological Society of America, Montreal, Quebec, Canada

Meinzer FC, Goldstein G, Bucci SJ, James S, Santiago LS, Scholz FG (2005) Functional convergence in tropical forest canopy physiology, Ecological Society of America, Montreal, Quebec, Canada


**Curriculum vitae**

**Santiago LS**, Dawson TE (2004) The contribution of symbiotically-fixed nitrogen to nitrogen cycling in a deciduous forest in the Yucatan, Mexican Botanical Congress, Oaxaca, Mexico

**Santiago LS** (2003) Linking plant physiological ecology to ecosystem science: effects of life history traits on leaf decomposition, Ecological Society of America, Savannah, Georgia


**Santiago LS** (2002) Leaf photosynthesis and chemistry predict leaf decomposition rate in the lowland wet forest of Fort Sherman, Panama. Association for Tropical Biology, Panama City, Panama

**Santiago LS**, Mulkey SS (2002) Productivity along a precipitation gradient in lowland Panama: patterns from leaf to ecosystem. Association for Tropical Biology, Panama City, Panama

**Santiago LS** (2001) Photosynthetic capacity and associated leaf traits along a precipitation gradient in lowland tropical forest. Ecological Society of America, Madison, Wisconsin

Gutiérrez MV, **Santiago LS** (1999) A comparison of sap flow measurements and potometry in two tropical lowland tree species with contrasting wood properties. International Botanical Congress, St. Louis, Missouri

**Santiago LS** (1998) A bottom-up approach to scaling canopy transpiration in a Hawaiian montane cloud forest, Second International Canopy Conference, Sarasota, Florida


**Invited Seminars**

Occidental College, Los Angeles, October 2015
Universidad de los Andes, Bogota, Colombia, (given in Spanish) April 2015
Los Alamos National Laboratory, New Mexico, June 2014
Smithsonian Tropical Research Institute, Tupper Seminar, September 2012
University of California, Los Angeles, January 2012
Curriculum vitae
Louis S. Santiago

Rancho Santa Ana Botanic Garden, Claremont, November 2011
Hewett Lecture, Earth Sciences, UCR, November 2011
Guangdong Academy of Forestry, Guangzhou, China, September 2011
Chinese Academy of Sciences, Guangzhou, China, August 2011
Botany and Plant Sciences Department, April 2011
Evolution, Ecology and Organismal Biology Graduate Program, UCR, March 2011
Botany and Entomology Undergraduate Student Association, UCR, Riverside, March 2011
Guangdong Academy of Forestry, Guangzhou, China, September 2010
University of California, San Diego, January 2010
Statistics Department, UCR, Riverside, January 2010
Whittier College, November 2009
Barro Colorado Island, Smithsonian Tropical Research Institute, Panama, August 2008
California State University, Fullerton, April 2008
Department of Biology, UCR, February 2008
Botany and Entomology Undergraduate Student Association, UCR, Riverside, June 2008
Embassy of France, Washington, DC, October 2007
University of California, Irvine, June 2007
California State University, San Jose, April 2007
Lunch Bunch, UCR, November 2006
Macquarie University, Sydney, Australia, November 2006
California State University, San Bernardino, October 2006
California State University, Humboldt, March 2006
National Autonomous University of Mexico, Morelia, Mexico (given in Spanish), January 2006
Ecolunch, University of California, Berkeley, March 2005
Center for Scientific Study of the Yucatan (CICY), (given in Spanish) February 2004
Botany Department, University of Florida, April 2003
Ecophysiology Group, University of Miami, July 2002
Ecolunch, University of Florida, November 2001
Barro Colorado Island, Smithsonian Tropical Research Institute, Panama, November 2000
Center for Scientific Study of the Yucatan (CICY), (given in Spanish) July 2000
Tupper Seminar, Smithsonian Tropical Research Institute, Panama, July 1999
Tropi-Lunch, University of Florida, August 1998
Department of Botany, University of Panama, (given in Spanish) July 1998
Hawaiian Botanical Society, Honolulu, Hawaii, September 1997
Hawaiian Botanical Society, Honolulu, Hawaii, December 1996

Service to the University of California, Riverside

Service to the Department of Botany and Plant Sciences

• Undergraduate Advisor (2011 – present)
• Member, Graduate Education Advisory Committee (2008 – 2011)
Curriculum vitae

Louis S. Santiago

Service to the Evolution, Ecology and Organismal Biology Graduate Program
• Member, Executive Committee (2008 – 2013)
• Member, Committee for Graduate Admissions (2008 – 2013)

Service to the College of Natural and Agricultural Sciences
• Member, Job Search Committee, Director of EDGE Institute (2016)
• Member, Job Search Committee, Director of Center for Conservation Biology (2016)
• Member, Steering Committee for the Center for Conservation Biology (2010 – present)
• Co-director, Facility for Isotope Ratio Mass Spectrometry (2008 – present)

Service to the University of California, Riverside Campus and the UC System
• Member, Job Search Committee, Citrus Agricultural Economist (2016)
• Member, Job Search Committee, Dean of School of Public Policy (2013)
• Faculty Team Member, Site Evaluator for UC Natural Reserve System (2010)
• Member, Job Search Committee, Director of UC Mexus (2008)
• Member, Chancellor’s Postdoctoral Fellowship Selection Committee (2007, 2008)
• Co-organizer, UCR-ECOSUR-Mexico Symposium (2007)
• Panelist, Graduate Diversity Summit (2007)

Teaching
• Botany and Plant Sciences 166/243, Plant Physiological Ecology (2007 – present)
• Botany and Plant Sciences 143, Plant Physiology (2013, 2016)
• Botany and Plant Sciences 240, Current Topics, Graduate Seminar (2008, 2010)

Advising and Mentoring
• Major professor for 3 current PhD students, 1 graduated in 2015
• Qualifying Exam Committee member for 45 students (2006 – 2016)
• PhD Dissertation Committee member for 21 students (2006 – 2016)
• External/International PhD Dissertation Committee member/mentor for 7 students
• Mentor for >20 UCR undergraduate students (2006 – present)

Professional Affiliations

American Geophysical Union
Association for Tropical Biology and Conservation
Ecological Society of America
Society for Tropical Ecology (gtö)
BWF PATH BIOGRAPHICAL SKETCH

NAME: Song, Jikui
(Last, First, Middle)

POSITION TITLE: Assistant Professor of Biochemistry

CURRENT INSTITUTIONAL ADDRESS:
5485 Boyce Hall
Department of Biochemistry
University of California, Riverside
Riverside, CA 92521

Email Address: jikui.song@ucr.edu

Phone Number: 951-827-4221

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>YEAR(S)</th>
<th>FIELD OF STUDY</th>
</tr>
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<tbody>
<tr>
<td>University of Science and Technology of China, Hefei, Anhui</td>
<td>BS</td>
<td>07/1994</td>
<td>Chemical Physics</td>
</tr>
<tr>
<td>Institute of Biophysics, Chinese Academy of Sciences, Beijing</td>
<td>MS</td>
<td>07/1997</td>
<td>Molecular Biology</td>
</tr>
<tr>
<td>University of Wisconsin, Madison, WI</td>
<td>MS</td>
<td>12/2001</td>
<td>Computer Sciences</td>
</tr>
<tr>
<td>University of Wisconsin, Madison, WI</td>
<td>PHD</td>
<td>12/2002</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Memorial Sloan-Kettering Cancer Center, New York, NY</td>
<td>Postdoctoral</td>
<td>12/2011</td>
<td>Structural Biology and Epigenetics</td>
</tr>
</tbody>
</table>

NOTE: NO PAGE LIMITATIONS

A. Positions and Honors
List in chronological order previous positions, concluding with the present position. List any honors.

**Positions and Employment**
2002 - 2007  Assistant Researcher, Center for Eukaryotic Structural Genomics, University of Wisconsin, Madison, WI
2007 - 2011  Research Associate/Senior Research Scientist, Memorial Sloan-Kettering Cancer Center, New York, NY
2012 -       Assistant Professor, Department of Biochemistry, University of California, Riverside, CA

**Other Experience and Professional Memberships**
Biophysical Society (2015-)
Protein Science Society (2016-)

**Honors**
2013  Basil O’Connor Starter Scholar Research Award, March of Dimes Foundation
2013  Robert T. Poe Faculty Development Grant, Chinese American Faculty Association of Southern California
2013  Regents’ Faculty Fellowship, University of California, Riverside
2014  Hellman Fellowship, Hellman Family Foundation
2015  Kimmel Scholar Award, Sidney Kimmel Foundation for Cancer Research

B. Peer-reviewed Publications
List publications by career stages in chronological order.
[*Equally Contributing Authors; #Corresponding author(s)]

**Graduate school and earlier publications**

483


**Post-doctoral publications**


12. Zhao Q, **Song J**, Jin Z, Danilova V, Hellekant G, Markley JL. Probing the sweet determinants of brazzein: wild-type brazzein and a tasteless variant, brazzein-ins(R18a-I18b), exhibit different pH-dependent NMR chemical shifts. *Biochemical and biophysical research communications*. 2005; 335(1):256-63. PMID: 16105551


**Assistant professor publications**


C. Research Support

List ongoing and completed research projects (Federal or non-Federally supported). Begin with the projects that are most relevant to the research proposed in the application. Briefly indicate the overall goals of the projects and responsibilities of the key person identified on the Biographical Sketch.

Ongoing Research Support

8/1/2016 – 7/31/2021
1R35GM119721
NIH/MIGMS
Mechanistic Insights into Mammalian DNA Methylation
The major goals of this project are to investigate the mechanistic basis of mammalian DNA methylation. Role: PI

6/1/2015 – 5/31/2018
#1-FY15-345
Structural insights into the origin recognition complex and Meier-Gorlin syndrome, March of Dimes
Song, Jikui (PI)
The major goals of this project are to investigate how impairment of chromatin loading or molecular assembly of origin recognition complex plays an etiologic role in Meier-Gorlin syndrome pathogenesis. Role: PI

7/1/2015 – 6/30/2017
Kimmel Scholar Award
Sidney Kimmel Foundation for Cancer Research
Song, Jikui (PI)
Structure and mechanism of mammalian DNA methylation machineries in health and cancer
The major goal of this project is to study the regulatory mechanisms of DNMT1 and DNMT3A. Role: PI

Completed Research Support

3/1/2013 – 2/28/2015
#1-FY13-29
Structural insights into the origin recognition complex and Meier-Gorlin syndrome, March of Dimes
Song, Jikui (PI)
The major goal of this project is to define structural principles of chromatin association and architectural assembly of Origin Recognition Complex and their functional implications in Meier-Gorlin Syndrome. Role: PI

7/1/2015 – 6/30/2016
CRC-15-380558
UC Cancer Research Coordinating Committee
Inhibition of the EBNA2-mediated transcription activation by BS69: structure and mechanism
Song, Jikui (PI)
The major goals of this project are to provide the molecular basis for the specific BS69-EBNA2 recognition, and to identify how the BS69-EBNA2 interaction affects the transactivation potential of EBNA2. Role: PI
Curriculum vitae

Yinsheng Wang

Vital Statistics:
Year of Birth: 1971; Place of Birth: Anhui, China
Married, 1996. Two children, Michael and Michelle.

Business Address:
Department of Chemistry-027, University of California at Riverside, Riverside, CA 92521-0403.
E-mail: Yinsheng.Wang@ucr.edu. Telephone: (951)827-2700. Fax: (951)827-4713.

Home Address:
8371 Manhasset Street, Riverside, CA 92508. Telephone: (951)653-5106.

Education & Positions:
B. S. 1989-1993, Shandong University, China;
M. S. 1993-1996, Dalian Institute of Chemical Physics, Chinese Academy of Sciences (Advisor: Professor Runsheng Zhai);
Ph. D. 1997-2001, Department of Chemistry, Washington University in St. Louis (Advisors: Professors Michael L. Gross and John-Stephen A. Taylor);
Assistant Professor in Chemistry, 2001-2005, University of California Riverside;
Associate Professor in Chemistry, 2005-2008, University of California Riverside;
Professor in Chemistry, 2008-present, University of California Riverside;
Donald T. Sawyer Endowed Founder's Chair in Chemistry, 2016-present, University of California Riverside;
Director, Environmental Toxicology Graduate Program, 2008-present, University of California Riverside

Courses Taught:
CHEM 1A: General Chemistry (2003, 2004)
CHEM 1HB: Honors General Chemistry (2007-2010)
CHEM 221B: Advanced Analytical Chemistry: Optical Spectroscopy (2005-2013)

Activities with Professional Societies:
American Chemical Society
American Society for Mass Spectrometry
American Association for the Advancement of Sciences
Treasurer-Elect, Division of Chemical Toxicology, American Chemical Society (11/2011-10/2013)
Treasurer, Division of Chemical Toxicology, American Chemical Society (11/2013-present)
**List of Contract and Grant Support:**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Title</th>
<th>Dates</th>
<th>Amount</th>
<th>PI Status</th>
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<tbody>
<tr>
<td>NIH (completed, R01 CA 96906)</td>
<td>ROS-induced Nucleic Acid Damage</td>
<td>07/01/02-06/30/07</td>
<td>$894,917</td>
<td>PI</td>
</tr>
<tr>
<td>ASMS (Completed, 2005 Research Award)</td>
<td>Pinpointing the Nature of Glycosylation in HMGN2 Protein</td>
<td>07/01/05-06/30/06</td>
<td>$25,000</td>
<td>PI</td>
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<td>Ceres Corporation (Completed)</td>
<td>DNA Damage Induced by Psoralen and its Analogs</td>
<td>07/01/06-06/30/08</td>
<td>$178,374</td>
<td>PI</td>
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<td>JDRF (completed)</td>
<td>Methylglyoxal-modified Hemoglobin as Biomarkers for Diabetic Nephropathy</td>
<td>07/01/07-06/30/08</td>
<td>$110,000</td>
<td>PI</td>
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<tr>
<td>NIH (completed, R01 CA101864)</td>
<td>Oxidative Crosslink Lesions and CpG Mutagenesis</td>
<td>07/01/04-04/30/09</td>
<td>$1,169,626</td>
<td>PI</td>
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<tr>
<td>NIH (completed, R56 CA96906-06)</td>
<td>ROS-induced Nucleic Acid Damage</td>
<td>09/30/09-09/29/10</td>
<td>$181,544</td>
<td>PI</td>
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<tr>
<td>NIH (completed, R01 CA116522)</td>
<td>Post-translational Modifications of High-mobility Group proteins</td>
<td>08/01/07-07/31/10</td>
<td>$910,066</td>
<td>PI</td>
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<td>NIH (completed, R01 DK082779, Diversity Supp.)</td>
<td>Chemistry and Biology of DNA Carboxyalkylation</td>
<td>07/01/09-06/30/11</td>
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<td>TRDRP (completed, 18XT-0073)</td>
<td>DNA Adducts Arising from Tobacco-derived N-nitrosamines</td>
<td>07/01/09-06/30/11</td>
<td>$250,000</td>
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<td>NIH (Completed, S10 RR022331)</td>
<td>A TSQ Vantage Mass Spectrometer for the ACIF</td>
<td>05/06/10-05/05/11</td>
<td>$469,334</td>
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<td>NIH (Completed, P01 GM068087)</td>
<td>Functional Analysis and Systems Biology of Filamentous Fungi</td>
<td>04/01/09-03/31/14</td>
<td>$100,545</td>
<td>Subcontract (PI, Dunlap)</td>
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<td>NIH (Completed, R01 DK082779)</td>
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<td>NIH (Completed, S10 OD010669-01)</td>
<td>An LTQ-Orbitrap Elite with ETD for the Keck Proteomics Facility</td>
<td>06/01/13-05/31/14</td>
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<td>NIH (Completed, T32 ES018827)</td>
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<td>07/01/10-06/30/15</td>
<td>$1,091,527</td>
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<td>NIH (Completed, R13 ES024658)</td>
<td>Mechanisms and Biomarkers of Environmental Stress</td>
<td>07/01/14-06/30/15</td>
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<td>NIH (Active, R01 CA101864)</td>
<td>Oxidative DNA Damage and CpG Mutagenesis</td>
<td>07/01/04-02/29/16</td>
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<td>NIH (Active, R01 ES019873)</td>
<td>Repair of Radiation-Induced Crosslink Lesions of DNA</td>
<td>05/01/12-01/31/17</td>
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<td>NIH (Active, R01 ES021007)</td>
<td>Cross-links at Abasic Sites in Duplex DNA</td>
<td>08/15/12-04/30/17</td>
<td>$1,612,016 ($646,000 to Wang)</td>
<td>Multi-PI (Gates and Wang)</td>
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<td>NIH (Active, P01 AG043376)</td>
<td>Cell Autonomous and Non-Autonomous Mechanisms of Aging</td>
<td>07/01/13-06/30/18</td>
<td>$10,618,577 ($731,743 to Wang)</td>
<td>Co-Investigator (PI: Paul Robbins)</td>
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<td>NIH (Active, R01 DK082779)</td>
<td>Chemistry and Biology of DNA Carboxyalkylation</td>
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<td>NIH (Active, R01 ES025121)</td>
<td>Repair and Biological Consequences of Alkylated Thymidine Lesions</td>
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<td>NIH (Active, T32 ES018827)</td>
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<td>NIH (Active, R21 ES025392)</td>
<td>Enzymatic Conversions of Tet-mediated Oxidation Products of 5-Methylcytosine</td>
<td>07/01/15-06/30/17</td>
<td>$448,000</td>
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<td>NIH (Active, R13 ES026043)</td>
<td>New Developments in Assessing Environmental Exposure and Environmental Mutagenesis</td>
<td>07/01/15-06/30/16</td>
<td>$10,000</td>
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<td>NIH (Pending, R01 ES027215-01)</td>
<td>Molecular Mechanisms of Arsenic Carcinogenesis</td>
<td>07/01/16-06/30/21</td>
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<td>NIH (Pending, R01 CA210445-01)</td>
<td>Occurrence and Biological Consequences of Epimeric 2-Deoxyribose Lesions</td>
<td>07/01/16-06/30/21</td>
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<td>NIH (Pending, R01 CA210445-01)</td>
<td>Quantitative Adductomics Approaches for Assessing the Occurrence and Repair of DNA Adducts</td>
<td>07/01/16-06/30/21</td>
<td>$1,941,250</td>
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</table>

**Awards:**

2013  Biemann Medal, for “innovative application of mass spectrometry in the field of modified nucleic acids”, the American Society for Mass Spectrometry

2012  Inaugural *Chemical Research in Toxicology* Young Investigator Award, for “applying innovative chemical technologies to the solution of important toxicological problems”, co-sponsored by the Division of Chemical Toxicology of American Chemical Society and the ACS journal *Chemical Research in Toxicology*

2012  Fellow, American Association for the Advancement of Sciences (2012-present), for “distinguished contributions to the field of bioanalytical chemistry, particularly in the development of novel analytical methods enabling understanding of the biological consequences of DNA damage”

2005  Research Award, the American Society for Mass Spectrometry

1996  President Scholarship of Chinese Academy of Sciences
**Campus Services:**
Graduate Studies Committee, Department of Chemistry, University of California at Riverside (2002-2007);
Curricula and Student Affairs Committee, Environmental Toxicology Graduate Program, University of California at Riverside (2002-2010)
Seminar Committee: Environmental Toxicology Graduate Program, University of California at Riverside (Chair, 2004-2006; member 2006-present); Cellular, Molecular and Developmental Biology Graduate Program (member, 2008-2009).
Faculty Search Committee: Junior Physical Chemistry (member, 2003); Junior Analytical Chemistry (member, 2004); Junior Analytical Chemistry (chair, 2005 & 2008); Junior Organic Chemistry (member, 2006); Junior Epigenetics (member, 2012, 2013); Junior Analytical Chemistry (chair, 2014); Vice Provost for International Affairs (member, 2014).
Search Committee, Academic Administrator for the UCR Institute of Integrated Genome Biology, 2007.
Committee on Committees, Academic Senate, UC Riverside, 2010-2013.
Director, interdepartmental graduate program in Environmental Toxicology, 2008-present.
Faculty Director, Analytical Chemistry Instrumentation Facility, 2010-2014.

**Reviewer of Journals:**

**Other Advisory Experience:**
12/06/02-12/07/02 National Research Program for Genomic Medicine of the National Science Council (Taiwan) and the Program Project on Genomics and Proteomics of Academia Sinica.
3/8/06-3/10/06 NIH Post-doctoral Fellowship Panel on Chemical and Bioanalytical Sciences
11/19/08-11/20/08 NIH Panel on Shared Instrumentation Program
06/08/10-06/09/10 NIH/NIEHS Nanotoxicology Special Emphasis Panel (ZES1 SET-V 03)
06/14/10-06/15/10 NIH Cancer Etiology Study Section
07/22/10 NIH Special Emphasis Panel on Fellowship (ZRG1 F04B-B 20 L)
02/28/11-02/28/11 NIH Cancer Etiology Study Section
11/09/11-11/10/11 NIH Environmental Health Sciences Review Committee
02/28/13-03/01/13 Member, NCI P01 Special Emphasis Panel IV
08/14/14-08/15/14 NIEHS Review Committee for the P30 Centers Program
Affiliation: Dalian Institute of Chemical Physics, Chinese Academy of Sciences

Publications:

Refereed Journals:


Affiliation: Washington University in St. Louis


Affiliation: University of California at Riverside


(26) Zeng, Y. and Wang, Y.* Facile formation of an intrastrand crosslink lesion between cytosine and guanine upon Pyrex-filtered UV light irradiation of dB(CG) and duplex DNA containing 5-bromocytosine. J. Am. Chem. Soc. 2004, 126, 6552-6553.


(35) Hong, H. and Wang, Y.* Formation of intrastrand crosslink products between cytosine and adenine from UV irradiation of d(BrCA) and duplex DNA containing a 5-bromocytosine. *J. Am. Chem. Soc., 2005, 127, 13969-13977.*


(49) Gao, Y. and Wang, Y.* Site-selective modifications of arginine residues in human hemoglobin induced by methylglyoxal. *Biochemistry, 2006, 45, 15654-15660.*


(64) Hong, H.; Cao, H. and Wang, Y.* Formation and genotoxicity of a guanine-cytosine intrastrand cross-link lesion in vivo. *Nucleic Acids Res.*, 2007, 35, 7118-7127.

(65) Zhang, Q. and Wang, Y.* Homeodomain-interacting protein kinase-2 (HIPK2) phosphorylates HMGA1a at Ser-35, Thr-52, and Thr-77 and modulates its DNA binding affinity. *J. Proteome Res.*, 2007, 6, 4711-4719.


(81) Xiong, L.; Ping, L.; Yuan, B. and Wang, Y.* Methyl group migration during the fragmentation of singly charged ions of trimethyllysine-containing peptides: Precaution of


(109) Zhang, J.; Yuan, B.; Zhang, F.; Xiong, L.; Wu, J.; Pradhan, S. and Wang, Y.*
Cyclophosphamide perturbs cytosine methylation in Jurkat-T cells through LSD1-

Pfeifer, G.P.* 5-Hydroxymethylcytosine is strongly depleted in human cancers but its

Wang, Y.; Fitzgerald, K. A.; Underhill, D. M.; Town, T.; Arditi, M.* Oxidized
mitochondrial DNA activates the NLRP3 inflammasome during apoptosis. *Immunity*,
**2012**, 36, 401-414.

(112) Prins, J.; Wang, Y.* Quantitative proteomic analysis revealed 4-(methylnitrosamino)-1-(3-
pyridinyl)-1-butanone-induced up-regulation of 20S proteasome in cultured human

Sabatini, R.* JBP1 and 2 are Fe²⁺/2-OG dependent dioxygenases and oxygen sensors
regulating the hydroxylation of thymine residues in trypanosome Pol II promoters. *J. Biol.

(114) Zhang, F.; Dai, X. and Wang, Y.* 5-Aza-2’-deoxycytidine induced growth inhibition of

(115) Wang, J.; Clauson, C. L.; Robbins, P. D.; Niedernhofer, L. J. and Wang, Y.* Accumulation

Brooks, P. J.; and Wang, Y.* Endogenous formation and repair of oxidatively induced

(117) Tilstra, J. S.; Robinson, A. R.; Wang, J.; Gregg, S. Q.; Clauson, C. L.; Reay, D. P.; Nasto,
L. A.; St Croix, C. M.; Usas, A.; Vo, N.; Huard, J.; Clemens, P. R.; Stolz, D. B.; Guttridge,
Inhibition of IKK/NF-κB delays the onset of senescence and aging-related degenerative

Williams, R. T.; Wang, Y. and Ablao, K. P. Statin treatment increases lifespan and

(119) You, C.; Dai, X.; Yuan, B.; Wang, J.; Wang, J.S.; Brooks, P. J.; Niedernhofer, L. J.; Wang,
Y.* A quantitative assay for assessing the effects of DNA lesions on transcription. *Nat.

(120) Swanson, A; Wang, J.; Wang, Y.* The evolutionarily conserved role of DNA polymerase

(121) Williams, R. T. and Wang, Y.* A density functional theory study on glycosidic bond
cleavage in 5-substituted 2’-deoxycytidines: Implications in active cytosine demethylation.


Non-peer-reviewed Book Chapters:
Affiliation: Washington University in St. Louis

Affiliation: University of California at Riverside:


Seminars Given at Universities:

1) “Mass spectrometry for the study of oxidative DNA damage”, Department of Chemistry and Biochemistry, California State University, Fullerton, Sep. 19, 2002.

2) “DNA damage induced by oxidative stress or UV irradiation --- A mass spectrometry approach”, The City of Hope, Sep. 23, 2002.

3) “Top-down and bottom-up approaches for the study of oxidative DNA damage by mass spectrometry”, Department of Chemistry, California State University, San Bernardino, Oct. 31, 2002.


7) “Identification of novel intrastrand crosslink lesions of DNA induced by ionizing radiation and oxidative stress”, Division of Basic Sciences, School of Medicine, Loma Linda University, Oct. 16, 2003.


14) “Chemistry and biology of novel oxidative crosslink lesions of DNA”, Department of Chemistry and Biochemistry, California State University Los Angeles, Nov. 09, 2004.
16) “Chemistry and biology of novel oxidative crosslink lesions of DNA”, Department of Chemistry and Biochemistry, the University of Oklahoma, Apr. 5, 2005.
18) “Chemistry and biology of novel oxidative intrastrand crosslink lesions of DNA”, Department of Chemistry, Graduate School of Science, Kyoto University, Japan, Oct. 20, 2006.
19) “Mass spectrometry for the study of oxidative DNA damage”, Center for Eco-Environmental Sciences, Chinese Academy of Sciences, China, Oct. 22, 2006.
22) “Chemistry and biology of novel oxidative intrastrand crosslink lesions of DNA”, Department of Chemistry, Texas A&M University, May 1, 2007.
23) “Chemistry and biology of novel oxidative intrastrand crosslink lesions of DNA”, Department of Chemistry and Biochemistry, University of Texas at Austin, May 3, 2007.
28) “Oxidative Intrastrand Crosslink Lesions: From Speculation to Reality”, Department of Chemistry and Biochemistry, University of Missouri, St. Louis, December 5, 2007.
31) “Chemistry and Biology of DNA Damage Induced by Reactive Oxygen and Reactive Carbonyl Species”, Department of Chemistry, Johns Hopkins University, April 29, 2008.
32) “Chemistry and Biology of DNA Damage Induced by Reactive Oxygen and Reactive Carbonyl Species”, Distinguished Lecture Series, Department of Chemistry, Hong Kong Baptist University, May 20, 2008.

34) “Chemistry and Biology of DNA Damage Induced by Reactive Oxygen and Reactive Carbonyl Species”, Department of Chemistry, University of Connecticut, October 08, 2008.

35) “Chemistry and Biology of DNA Damage Induced by Reactive Oxygen and Reactive Carbonyl Species”, Department of Chemistry and Biochemistry, University of Ohio, November 10, 2008.

36) “Mass Spectrometry for the Examination of Oxidative Intrastrand Crosslink Lesions of DNA: Structure Elucidation, Quantification and Replication Studies”, Department of Chemistry, Wuhan University, China, August 02, 2010.


38) “LC-MS/MS for Assessing the Replication of Hyperglycemia-induced DNA Lesions in Cells”, College of Chemistry and Molecular Engineering, Peking University, China, August 12, 2010.


41) “Chemistry and Biology of Oxidatively Induced DNA Lesions”, Department of Chemistry and Biochemistry, University of Delaware, November 1, 2010.


44) “Mass spectrometry for the quantification, replication, transcription, and repair studies of bulky DNA lesions induced by reactive oxygen species”, Department of Chemistry, University of California Davis, March 29, 2011.

45) “Detection and in-vivo replication and repair studies of bulky DNA lesions induced by reactive oxygen species”, Department of Chemistry, University of the Pacific, March 30, 2011.

46) “Chemistry and Biology of DNA Carboxyalkylation”, Department of Chemistry, Zhejiang University, China, April 14, 2011.

47) “Post-translational modifications of acid-soluble proteins”, Department of Chemistry, Nanjing University, China, April 18, 2011.

48) “Chemistry and Biology of Ionizing Radiation-induced Bulky DNA Lesions”, Institute of Technological Biology and Agricultural Engineering, Chinese Academy of Sciences, October 10, 2011.

49) “Mass Spectrometry for the Study of Repair and Transcription Mutagenesis of DNA Lesions”, Wuhan University, China, October 13, 2011.

51) “Chemistry and Biology of DNA Damage Induced by Reactive Oxygen and Carbonyl Species”, Department of Chemistry, Washington University, St. Louis, October 27, 2011.

52) “Mass Spectrometry for the Assessment of the Formation, Replication, Repair and Transcription Mutagenesis of DNA Lesions”, Center for Molecular Toxicology, Vanderbilt University, Nashville, TN, October 28, 2011.

53) “Chemistry and Biology of DNA Damage Induced by Reactive Oxygen Species”, Cedars Sinai Medical Center, Los Angeles, February 16, 2012.

54) “Quantitative Proteomics for Unraveling the Mechanisms of Action of Antitumor Agents”, School of Pharmacy, University of New Mexico, Albuquerque, April 9, 2012.

55) “Chemistry and Biology of Oxidatively Induced Bulky DNA Lesions”, Elkin Lecture, Winship Cancer Institute, Emory University, Atlanta, April 27, 2012.

56) “Chemical Biology of Oxidatively Induced Bulky DNA Lesions”, Department of Biochemistry and Molecular Biology, University of Louisville, Louisville, April 30, 2012.

57) “Quantitative Proteomics for Unraveling the Mechanisms of Action of Antitumor Drugs and Environmental Toxicants”, State Key Laboratory of Marine Environmental Science, Xiamen University, China, June 26, 2012.

58) “Chemical Biology of Oxidatively Induced DNA Lesions”, Department of Biochemistry and Molecular Biology, George Washington University, July 17, 2012.

59) “Chemical Biology of Oxidatively Induced DNA Lesions”, Department of Chemistry, Purdue University, September 4, 2012.

60) “Chemical Biology of Oxidatively Induced Bulky DNA Lesions”, Department of Chemistry and Biochemistry, University of Wisconsin-Milwaukee, September 14, 2012.


62) “Chemistry and Biology of Oxidatively Induced Bulky DNA Lesions”, Department of Chemistry and Biochemistry, University of California, San Diego, March 11, 2013.


67) “Post-translational Regulation of DNA Repair”, Institute of Chemistry, Academic Sinica, Taiwan, October 31, 2013.

68) “Chemical Biology of Oxidatively Induced Bulky DNA Lesions”, Genome Research Center, Academic Sinica, Taiwan, October 31, 2013.
69) “Quantitative Proteomics for the Discovery of Targets for Anti-cancer Therapy”, University of California Davis Cancer Center, November 21, 2013.

70) “Quantitative Proteomics for the Unraveling the Molecular Mechanisms of Action of Anticancer Drugs and Environmental Toxicants”, Department of Chemistry and Biochemistry, University of California Los Angeles, January 17, 2014.


72) “Quantitative Proteomics for the Unraveling the Molecular Mechanisms of Action of Anticancer Drugs and Environmental Toxicants”, High Magnetic Field Laboratory, Chinese Academy of Sciences, April 15, 2014.

73) “Quantitative Proteomics for the Unraveling the Molecular Mechanisms of Action of Anticancer Drugs and Environmental Toxicants”, School of Life Sciences, University of Science and Technology of China, April 16, 2014.

74) “Quantitative Proteomics for the Unraveling the Molecular Mechanisms of Action of Anticancer Drugs and Environmental Toxicants”, School of Medicine, Loma Linda University, May 29, 2014.

75) “Quantitative Proteomics for Research in Cancer Biology and Environmental Toxicology”, Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China, June 25, 2014.

76) “Quantitative Proteomics for Proteome-wide Studies of Nucleotide-binding Proteins”, High Magnetic Field Laboratory, Chinese Academy of Sciences, Hefei, China, June 27, 2014.

77) “Quantitative Proteomics for Research in Cancer Biology and Environmental Toxicology”, Department of Biochemistry, University at Buffalo, August 26, 2014.

78) “Chemistry and Biology of DNA Repair”, Medical Research Council Laboratory of Molecular Biology, Cambridge, United Kingdom, September 4, 2014.


81) “Chemistry and Biology of DNA Repair”, Department of Pharmacology and Toxicology, University of Texas Medical Branch at Galveston, November 6, 2014.

82) “Quantitative Proteomics for Research in Cancer Biology and Environmental Toxicology”, Department of Chemistry and Biochemistry, University of Texas Arlington, November 7, 2014.

83) “Chemistry and Biology of DNA Repair”, Department of Environmental Medicine, New York University, December 15, 2014.

84) “Cyclopurine Lesions as Robust Biomarkers of Oxidative Stress”, Department of Medicine, Albert Einstein College of Medicine, December 16, 2014.

85) “Chemistry and Biology of Tet-mediated Oxidation of 5-Methylcytosine”, Department of Chemistry, Wuhan University, China, June 8, 2015.

86) “Chemistry and Biology of DNA Repair”, Department of Chemistry, University of Science and Technology of China, June 9, 2015.
87) “Chemistry and Biology of Oxidatively Induced Bulky DNA Lesions”, Department of Chemistry, Hong Kong University of Science and Technology, June 11, 2015.

88) “Quantitative Proteomics for Assessing the Molecular Mechanisms of Action of Anti-cancer Drugs and Environmental Toxicants”, Department of Applied Biology and Chemical Technology, Hong Kong Polytechnic University, June 12, 2015.

89) “Chemistry and Biology of Oxidatively Induced DNA Lesions”, MGH/Harvard Cutaneous Biology Research Center, Massachusetts General Hospital and Harvard School of Medicine, August 17, 2015.


91) “Occurrence, Repair and Biological Consequences of Oxidatively Induced DNA Lesions”, Department of Medicinal Chemistry, University of Toledo, October 1, 2015.

92) “Chemistry and Biology of the Occurrence and Biological Consequences of DNA Damage”, Department of Chemistry and Biochemistry, Wayne State University, October 2, 2015.

93) “Chemistry and Biology of DNA Damage and Repair”, Institute of Biomedical Sciences, Fudan University, October 30, 2015.

94) “Chemistry and Biology of DNA Damage and Repair”, Department of Chemistry, Brown University, November 13, 2015.

95) “Chemistry and Biology of DNA Repair”, School of Pharmacy, University of Arizona, December 15, 2015.

96) “Chemistry and Biology of DNA Repair”, Department of Chemistry and Biochemistry, University of Texas, El Paso, January 29, 2016.

97) “Occurrence, Biological Consequences and Repair of DNA Lesions”, Department of Chemistry, University of South Florida, March 31, 2016.


99) “Occurrence, Repair and Biological Consequences of DNA Damage”, Department of Chemistry, Nanjing University, China, May 23, 2016.

100) “Chemistry and Biological Consequences of DNA Modifications”, Department of Chemistry, Wuhan University, China, May 24, 2016.


102) “Chemistry and Biology of DNA Repair”, Department of Chemistry, Shandong University, China, May 26, 2016.

Invited Oral Presentations Made at Conferences:

Affiliation: University of California at Riverside:


4. **Wang, Y.; Zhang, Q.;** and **Zeng, Y.** Mass spectrometry as a major technique for the discovery of novel oxidative crosslink lesions of DNA *2004 Lake Arrowhead conference on ion chemistry and mass spectrometry*, Jan. 16-18, 2004, Lake Arrowhead, CA.


(22) Wang, Y. Formation and in-vivo replication studies of bulky DNA lesions induced by reactive oxygen species. *240th ACS National Meeting*, Boston, MA, August 22-26, 2010.


(44) Wang, Y. Occurrence, Biological Consequences and Repair of Oxidatively Induced 8,5′-Cyclopurine Lesions, *Zing Conference on Genomic Integrity*, Cairns, Australia, August 1-5, 2015.


Trainees: 
*Graduate Students*

<table>
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<tr>
<th>Name</th>
<th>Ph. D.</th>
<th>Time</th>
<th>Current Position</th>
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<tr>
<td>Xinzhao Jiang</td>
<td>X</td>
<td>09/01-04/06</td>
<td>Senior Manager, Amgen Inc.</td>
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<tr>
<td>Qibin Zhang</td>
<td>X</td>
<td>03/02-05/05</td>
<td>Associate Professor, UNC Greensboro</td>
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<tr>
<td>Yuesong Wang</td>
<td>X</td>
<td>09/01-06/06</td>
<td>Chemist, Food and Drug Administration</td>
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<tr>
<td>Yan Zou</td>
<td>X</td>
<td>08/02-03/07</td>
<td>Manager, Collaboration Projects, iCMC-NPP, Sanofi US</td>
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<tr>
<td>Yu Zeng</td>
<td>X</td>
<td>08/02-03/07</td>
<td>Scientist, Alnylam Pharmaceuticals</td>
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<td>Chunang Gu</td>
<td>X</td>
<td>08/02-03/07</td>
<td>Scientist, Genentech Inc.</td>
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<td>Lijie Men</td>
<td>X</td>
<td>08/02-03/07</td>
<td>Scientist, Johnson &amp; Johnson</td>
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<td>Yuan Gao</td>
<td>X</td>
<td>05/03-02/08</td>
<td>Scientist, Novo Nordisk, Beijing</td>
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<td>Haizheng Hong</td>
<td>X</td>
<td>08/03-12/07</td>
<td>Associate Professor, Xiamen University</td>
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<td>Qingchun Zhang</td>
<td>X</td>
<td>08/03-02/08</td>
<td>Scientist, Amgen Inc.</td>
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<tr>
<td>Haibo Qiu</td>
<td>X</td>
<td>08/04-03/09</td>
<td>Scientist, Regeneron Pharmaceuticals Inc.</td>
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<tr>
<td>Yong Jiang</td>
<td>X</td>
<td>08/04-11/09</td>
<td>Post-doc, Emory University</td>
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<tr>
<td>Mario Vargas</td>
<td>X</td>
<td>08/05-03/12</td>
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<td>Hongxia Wang</td>
<td>X</td>
<td>08/05-08/10</td>
<td>Application Chemist, Thermo Fisher Scientific</td>
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<tr>
<td>Lei Xiong</td>
<td>X</td>
<td>08/06-02/11</td>
<td>Applied Biosystems</td>
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<td>Jianshuang Wang</td>
<td>X</td>
<td>01/08-03/11</td>
<td>Associate Scientist, Genentech Inc.</td>
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<tr>
<td>Nisana Andersen</td>
<td>X</td>
<td>09/07-09/13</td>
<td>Associate Scientist, Genentech Inc.</td>
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<td>Renee Williams</td>
<td>X</td>
<td>09/07-12/12</td>
<td>Johnson &amp; Johnson</td>
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<tr>
<td>Fan Zhang</td>
<td>X</td>
<td>09/08-09/13</td>
<td>Scientist, Amgen Inc.</td>
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<tr>
<td>Candace Guerrero</td>
<td>X</td>
<td>09/08-06/14</td>
<td>Postdoc, University of Minnesota</td>
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<td>Yongsheng Xiao</td>
<td>X</td>
<td>07/09-03/14</td>
<td>Scientist, Biogen</td>
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<td>Ashley Swanson</td>
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<td>Postdoc, NIH</td>
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<td>Qian Cai</td>
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<td>Covance, Inc.</td>
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<td>Shuo Liu</td>
<td>X</td>
<td>08/10-11/15</td>
<td>Postdoc at Stanford Univ.</td>
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<tr>
<td>Lei Guo</td>
<td>X</td>
<td>08/10-03/15</td>
<td>Biochemistry and Bioanalytics Group, Translational Science, Sanofi US</td>
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<tr>
<td>Preston Williams</td>
<td>X</td>
<td>08/11-present</td>
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<tr>
<td>Zi Wang</td>
<td>MS</td>
<td>08/11-08/16</td>
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<td>Pengcheng Wang</td>
<td>X</td>
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<tr>
<td>Yang Yu</td>
<td>X</td>
<td>08/12-present</td>
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<tr>
<td>Ji Jiang</td>
<td>X</td>
<td>09/12-present</td>
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<tr>
<td>Ming Huang</td>
<td>X</td>
<td>09/13-present</td>
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<td>Nicole Williams</td>
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<td>08/13-present</td>
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<tr>
<td>Yuxiang Cui</td>
<td>X</td>
<td>08/14-present</td>
<td></td>
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<tr>
<td>Jiabin Wu</td>
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<tr>
<td>Weili Miao</td>
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<tr>
<td>Lok Ming Tam</td>
<td>X</td>
<td>08/14-present</td>
<td></td>
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<tr>
<td>Gwendolyn Gonzalez</td>
<td>X</td>
<td>06/15-present</td>
<td></td>
</tr>
<tr>
<td>David Bade</td>
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<td>07/15-present</td>
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**Post-doctoral Fellows**

<table>
<thead>
<tr>
<th>Name</th>
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<th>Current Position</th>
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<table>
<thead>
<tr>
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<th>Current Position</th>
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<tbody>
<tr>
<td>Shetty Vivekananda</td>
<td>08/01-09/02</td>
<td>Assistant Professor, Baylor College of Medicine</td>
</tr>
<tr>
<td>Zhenjiu Liu</td>
<td>12/01-06/03</td>
<td>Scientist, Pfizer</td>
</tr>
<tr>
<td>Liyan Ping</td>
<td>09/07-02/08</td>
<td>Junior Group Leader at Max Plank Institute of Chemical Ecology</td>
</tr>
<tr>
<td>Huachuan Cao</td>
<td>02/04-12/08</td>
<td>Scientist, Eli Lily</td>
</tr>
<tr>
<td>Bifeng Yuan</td>
<td>07/07-02/11</td>
<td>Professor of Chemistry, Wuhan University, China</td>
</tr>
<tr>
<td>Jiang Wu</td>
<td>09/09-08/10</td>
<td>Assistant Professor, Nanjing University, China</td>
</tr>
<tr>
<td>Xiaoli Dong</td>
<td>08/09-07/11</td>
<td>Agilent</td>
</tr>
<tr>
<td>Jin Wang</td>
<td>08/09-07/12</td>
<td>Postdoc at National University of Singapore</td>
</tr>
<tr>
<td>Changjun You</td>
<td>10/09-present</td>
<td></td>
</tr>
<tr>
<td>John Prins</td>
<td>08/10-09/13</td>
<td>Analytical Chemist, Tyco International</td>
</tr>
<tr>
<td>Xiaoxia Dai</td>
<td>03/11-present</td>
<td></td>
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<tr>
<td>Debin Ji</td>
<td>06/12-05/14</td>
<td>Postdoc, Stanford University</td>
</tr>
<tr>
<td>Qianqian Zhai</td>
<td>07/12-09/14</td>
<td>Lecturer, Huazhong Agricultural University, China</td>
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<tr>
<td>Nicholas Amato</td>
<td>07/13-12/15</td>
<td>Scientist, Moderna Therapeutics</td>
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<tr>
<td>Tao Bing</td>
<td>03/14-02/15</td>
<td>Associate Professor, Institute of Chemistry, Chinese Academy of Sciences</td>
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<tr>
<td>Jun Wu</td>
<td>07/14-present</td>
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<tr>
<td>Xiaogang Jiang</td>
<td>12/14-11/15</td>
<td>Associate Professor, Suzhou University</td>
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<tr>
<td>Nathan Price</td>
<td>01/15-present</td>
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<tr>
<td>Lin Li</td>
<td>01/15-present</td>
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<tr>
<td>Lijuan Fu</td>
<td>06/15-08/15</td>
<td>Covans, Inc.</td>
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<tr>
<td>Jiapeng Leng</td>
<td>02/16-present</td>
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<tr>
<td>Tianlu Wang</td>
<td>04/16-present</td>
<td></td>
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<tr>
<td>Rong Cai</td>
<td>07/16-present</td>
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**Undergraduate Students**

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Judith Padilla</td>
<td>08/01-12/01</td>
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<tr>
<td>Erica Winter</td>
<td>09/01-06/02</td>
</tr>
<tr>
<td>Dahn Chi</td>
<td>09/02-06/03</td>
</tr>
<tr>
<td>Kaleb Dixon</td>
<td>09/02-06/03</td>
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<tr>
<td>Dena Witthaus</td>
<td>03/02-06/03</td>
</tr>
<tr>
<td>Jina Wang</td>
<td>06/03-03/04</td>
</tr>
<tr>
<td>Kieu Nguyen</td>
<td>09/03-12/03</td>
</tr>
<tr>
<td>Chelsea Gustafson</td>
<td>06/05-09/05</td>
</tr>
<tr>
<td>Avi Perma</td>
<td>06/05-08/06</td>
</tr>
<tr>
<td>Tan-li Hsu</td>
<td>02/07-06/10</td>
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<tr>
<td>Andrew Lin</td>
<td>02/07-12/08</td>
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<tr>
<td>Felicia Pranata</td>
<td>02/07-06/09</td>
</tr>
<tr>
<td>Karen Zhong</td>
<td>09/11-06/12</td>
</tr>
<tr>
<td>Audrey Tu</td>
<td>09/11-06/12</td>
</tr>
<tr>
<td>Stephen Torres</td>
<td>03/11-12/11</td>
</tr>
</tbody>
</table>
Min Xue, Ph.D.
Assistant Professor of Chemistry
Department of Chemistry
University of California, Riverside
900 University Ave. Riverside, CA 92521
Website: [http://xuelab.ucr.edu](http://xuelab.ucr.edu)
E-mail: min.xue@ucr.edu

Educational Background

*University of California, Los Angeles* 2008-2013
Ph.D. in Chemistry, Advisor: Prof. Jeffrey I. Zink

*California Institute of Technology* 2013-2015
Postdoctoral Scholar, Advisor: Prof. James R. Heath

Personal Statement

My research experience covers a broad spectrum of fields, including supramolecular chemistry, nanoparticle engineering, applied spectroscopy, bioanalytical chemistry, systems biology and nanomedicine. Currently, the premise of my research is to study the supramolecular properties of peptides, and to explore their biomedical applications. Specific research interests are: 1) Designing supramolecular peptides that are capable of binding to specific proteins. The goal is to seek inhibitors for previously undruggable protein targets and establish new therapeutics; 2) Develop functional peptides as the basis of novel bioanalytical methods, and implement these methods to map the dynamics of cell signaling pathways. This will help us to decode the mechanisms behind disease progression and drug resistance; and 3) Constructing nanoparticles for biological applications. This includes, and is not limited to, developing nanoparticles for cancer immunotherapy, cardiovascular disease therapies and bio-imaging probes.

Contributions to Science and Selected Publications

1. **Supramolecular Nanovalves for Controlled Release and Chemical Sensing**

   Upon stimulation, many supramolecular structures undergo large-amplitude motions, such as isomerization, structural reorganization, and components disassociation. When these supramolecular complex are grafted at the opening of nanopores, they are able to control the access to the pore, and therefore control the release of cargo molecules from the pore. This type of structure is termed nanovalve. I have developed several types of stimuli-responsive nanovalves. These nanovalves are shown to be useful building blocks for smart drug delivery systems as well as chemical sensors.


2. Silica-Based Versatile Drug Delivery Platforms

A key challenge for improving the efficacy of passive drug delivery to tumor sites by a nanocarrier is to limit reticuloendothelial system uptake and to maximize the enhanced permeability and retention effect. Traditional silica-based nanoparticles have a size around 120 nm, which often times is too large for effective in vivo drug delivery. With my expertise in nanoparticle synthesis and surface chemical modification, I have developed much smaller silica nanoparticles (30-50 nm) that lead to greatly improved biodistribution profiles and better therapeutic outcome. Meanwhile, my efforts in combining supramolecular nanovalves with silica nanoparticles have yielded in many different types of stimuli-responsive drug delivery systems that have demonstrated unprecedented efficacies in treating varies diseases, including cancer, infectious disease and respiratory system diseases.


3. Spectroscopic Methods for Probing Microenvironment at Nanoscale

Aside from the control release applications, supramolecular nanovalves also provide unique opportunities to probe nanoscale microenvironments. One this basis, I have employed spectroscopic methods that when combined with the nanovalves, are capable of providing detailed information on the molecular mobility as well as local environment rigidity inside a nanopore. This technology provides the basis of kinetically studying protein properties, which is one of my current research directions.


4. Chemical Methods for Integrated Single Cell Analysis

One of the challenges for single cell studies is to simultaneously quantify analytes of different categories, for instance, proteins and metabolites. To overcome this challenge, I have devoted into developing integrated single cell assays using surface chemistry and supramolecular chemistry. I have established several orthogonal chemical probes that can quantify different metabolites. Combined with BioMEMS platforms for protein measurements, these probes lead to integrated single cell metabolic/proteomic assays that provide unprecedentedly rich information on cellular heterogeneity.


5. Contribution to Other Nanotechnology Fields

In addition to biomedical-oriented research, I have also made significant contributions to other nanotechnology fields, especially in nanomaterial fabrication and photocatalysis. I have developed novel nanocomposites that exhibit great photocatalytic properties under visible light. These studies have led to 2 patents, on which I am the main inventor. I have also contributed in the development of inorganic/organic hybrid nanomaterials for chemical sensing and environmental detoxing purposes.


**Complete List of Published Work in MyBibliography:**

Biographical Sketches
Roya Zandi

Professional Preparation:

Ph. D. Physics, December 2001
University of California, Los Angeles (UCLA).

B.S. Physics, summa cum laude, December 1992
California State University, Northridge (CSUN).

Appointments:

July 2014 – present
Professor of Physics, University of California, Riverside.

July 2010 – June 2014
Associate Professor of Physics, University of California, Riverside.

July 2005 – June 2010
Assistant Professor of Physics, University of California, Riverside.

January 2002-September 2005
Postdoctoral scholar, Department of Chemistry and Biochemistry, (UCLA).

September 2002 – July 2005
Postdoctoral visitor, Department of Physics, Massachusetts Institute of Technology (MIT).

Summer 1997
Research Assistant in developing the UCLA physics department web site on “Contributions of 20th Century Women to Physics,”

Publications:

Five publications most relevant to proposed project:

Five other significant publications:
1. Dong Gui, Sharad Gupta, Jun Xu, Roya Zandi, Sarjeet Gill, I-Chueh Huang, A.L.N. Rao,

Awards and Honors:
– UC Regents’ Faculty Fellowship Award 2013-2014.
– UC President’s Postdoctoral Fellowship 2002-2004.
– UC Regents’ Faculty Fellowship Award 2008-2009.
– Outstanding Teaching Award, Physics Department, UCLA 1997-1998.
– Outstanding Scholarly and Research Work Award, Physics Department, UCLA Fall 1996-1997.
– Physics Department Fellowship, UCLA 1995-1996.
– Outstanding Senior Award, Physics Department, CSUN FALL 1992.
– Outstanding Junior Award, School of Science and Mathematics, CSUN, Spring 1991.

Synergistic Activities:
– Co-organizer of the workshop on “The Theory and Practice of Fluctuation-Induced Interactions” at the Kavli Institute for Theoretical Physics at the University of California, Santa Barbara, in the period 18 August - 21 November, 2008
– Co-organizer of “An Interdisciplinary Workshop on Physical Aspects of Viral Assembly and Infectivity” to be held at UCLA, in May 7-9 2009.
– Co-organizer of the topical session “Self-assembly at the Nanoscale” at the 87th ACS Colloid and Surface Science Symposium held at UCR, June 24-26 2013.
– Co-organizer of the workshop on “Physics and Mathematics of Viral Assembly,” held in Aspen Center for Physics, June 14-July 5 2014.
– Creation of the first graduate level biological physics course at UCR, Phys. 246.
– Creation of a series of undergraduate biological physics courses at UCR, Phys. 145A, 145B and 145C.

Research Support:
Wenwan Zhong, Ph.D.

Department of Chemistry, University of California, Riverside, CA 92521
Phone: 951-827-4925; Fax: 951-827-4713; Email: wenwan.zhong@ucr.edu
Group Homepage: http://faculty.ucr.edu/~wenwanz

A. Education/Training

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE /TRAINING</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
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<tr>
<td>University of Science &amp; Technology of China</td>
<td>B.S.</td>
<td>07/98</td>
<td>Chemistry</td>
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<tr>
<td>Iowa State University</td>
<td>Ph.D.</td>
<td>07/03</td>
<td>Analytical Chemistry</td>
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<tr>
<td>Los Alamos National Laboratory</td>
<td>Postdoctoral</td>
<td>06/06</td>
<td>Bioanalytical Chemistry</td>
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B. Positions and Honors

**Positions and Employment**

- 2003-2006 Post-doctoral Research Associate, Chemistry Division, Los Alamos National Lab
- 2006-2012 Assistant Professor, Department of Chemistry, University of California, Riverside
- 2012-2016 Associate Professor, Department of Chemistry, University of California, Riverside
- 2016-present Professor, Department of Chemistry, University of California, Riverside

**Honors and Awards**

- 2005 Los Alamos Achievement Award
- 2011 National Science Foundation CAREER Award

C. Peer-Reviewed Publications

**Brief Summary of Research Areas**

Our work focuses on two main research topics: 1) Discovery of valuable biomarkers and development of new techniques and devices for rapid, on-site detection of target molecules; and 2) Study of nano-bio interface to guide better design and applications of biofunctional nanomaterials. The biomarkers we are interested in include post-translationally
modified proteins and peptides, non-coding RNAs, extracellular vesicles, as well as environmental contaminants. Separation-enabled sensing is the main theme for our research work. Diverse separation techniques, like nanomaterial-based solid-phase extraction, flow-field flow fractionation, and capillary electrophoresis, are used and modified to improve marker detection and to discover new markers. Moreover, we develop diverse signal amplification strategies for enhancement of biomarker detection, taking advantage of nanomaterials and isothermal nucleic acid amplification.

At the University of California, Riverside (*Corresponding Author)


C-25. J. Yao, K. Flack, L. Ding, W. Zhong*. Tagging the rolling circle products with nanocrystals clusters for cascade signal increase in the detection of miRNA. *Analyst*, 2013, 138, 3121-3125.


Before Coming to the University of California, Riverside


D. Patents and Invention Disclosures


E. Research Support

<table>
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<tr>
<th>Project Title (Role)</th>
<th>Agency</th>
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<th>Start Date/End Date</th>
<th>Amount</th>
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<tr>
<td>Synthetic Receptor-Based Arrays for Sensing Post-Translationally Modified Proteins and Peptides (PI)</td>
<td>NSF</td>
<td>07/01/2017-06/30/2020</td>
<td>$495,000</td>
<td>Recommend for funding</td>
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<td>Nano-response: Immune stimulation, microbiome perturbation and impacts from protein corona (PI)</td>
<td>NIH/NIEHS</td>
<td>09/31/16 – 08/31/21</td>
<td>$750,000</td>
<td>Ongoing</td>
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<td>3-Dimensional profile of circulating miRNA for early cancer detection (PI)</td>
<td>National Institutes of Health (NCI)</td>
<td>04/23/15 – 03/31/19</td>
<td>$1,250,000</td>
<td>Ongoing</td>
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<td>Development of the prototype of the microRNA Differential Isolation Platform (PI)</td>
<td>UC Riverside</td>
<td>07/01/16-06/30/17</td>
<td>$35,000</td>
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<td>CAREER: Signal Amplification by Cation Exchange in Ionic Nanocrystals (PI)</td>
<td>National Science Foundation</td>
<td>02/01/11 - 01/31/16</td>
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<td>Discovery of virus-binding aptamers (PI)</td>
<td>UC Riverside</td>
<td>07/01/15-06/20/16</td>
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<td>Direct Recruitment of Ribosomes by RNA Polymerase might guide the Evolution of Bacterial Pathogens (Co-I)</td>
<td>UC Riverside</td>
<td>07/01/14-06/30/15</td>
<td>$70,000</td>
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<td>Nanomaterials coated with antigenic proteins as immunostimulatory complexes (PI)</td>
<td>UC Riverside</td>
<td>07/01/14-06/30/15</td>
<td>$50,000</td>
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<td>Impact of Protein Corona on Nanotube-Conjugated CpG Immunotherapy for Glioma (Co-PI)</td>
<td>City of Hope and UC Riverside</td>
<td>02/01/13-01/31/15</td>
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<td>Discovery of Virus-Binding Aptamers (PI)</td>
<td>UCR IIGB Core Instrument Facility</td>
<td>12/14-05/15</td>
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<td>Study Protein-Nanomaterial Interactions and Their Impacts on Protein Activity (PI)</td>
<td>National Institutes of Health</td>
<td>09/01/10-08/30/12</td>
<td>$415,775</td>
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One-step miRNA Analysis for Study of Cancer Development (PI)  Cancer Research Coordinating Committee, UC  07/01/11-06/30/12  $50,000  Completed

High-Throughput Screening of siRNA Expression Using Rolling Circle Amplification (PI)  The Institute for Integrative Genome Biology (IIGB) of UCR  11/01/07-06/30/08  $50,000  Completed

Separation of Protein Complex by Micro-Asymmetrical Flow-Field Flow Fractionation (PI)  The Academic Senate Committee on Research of UCR  07/01/07-06/30/08  $4,000  Completed

F. Professional Services

Service on Professional Board
Analytical Chemistry Feature Panel, 2015-2018
Analytical and Bioanalytical Chemistry, International Advisory Board, 2017-present

Teaching and service at UCR
Graduate advisor for Environmental Toxicology Program, 2012-present
Undergraduate advisor for Chemistry, 2016-present
Instructor for Advanced Analytical Separation, Advanced Bioanalytical Chemistry, Quantitative Analysis, Instrumental Methods and Analysis, General Chemistry

Organized Symposia at Conferences
“Innovation in Chemical Sensing and Separation Systems toward Advanced Chemical Analysis”.


F-9. (Co-Chair; lead organization of all four electrophoresis symposia) Federation of Analytical Chemistry and Spectroscopy Societies Annual Conference (SCIX 2012), Kansas City, Missouri, October 2012.


F-13. The Pittsburgh Conference (PittCon), Orlando, Florida, March 2010. Analytical Chemistry for the Study of Nanotoxicity. (Accepted symposium proposal, and reported as a cover story in Chemical & Engineering News)


**Reviewed Proposals**

*National Science Foundation*: Ad-hoc reviewer, 2008-2012; Panelist for CBET and Chemistry Division, 2011-2015.


NASA, Panelist, 2016.

Ad-hoc reviewer for Hongkong research council 2012-2017; Korean National Science Foundation 2015; Deutsche Forschungsgemeinschaft (DFG) 2016.

**Reviewed Journal Articles**

*ACS Applied Materials & Interfaces*  
*Analyst*
Analytical and Bioanalytical Chemistry
Analytical Biochemistry
Analytical Chemistry
Analytical Method
Angewandte Chemie, International Edition
Bioanalysis
Biomedical Chromatography
Chemical Communications
Chemical Science
Chemistry & Biology
Colloids and Surfaces A: Physicochemical and Engineering Aspects
Electrophoresis
Environmental Chemistry
European Journal of Cancer
Journal of American Chemical Society
Journal of Chromatography A
Journal of Chromatography B
Journal of Material Science
Journal of Separation Science
Langmuir
Nanoscale
Nature Protocol
Patents in Nanomedicine
Particle & Particle Systems Characterization
PLOS One
RSC Advances
Scientific Report
Sensors
Sensors & Actuators B. Chemica
Talanta

G. Invited Presentations

At Conferences


G-17. 241st ACS National Meeting & Exhibition, Anaheim, California, March 2011. Study Nanoparticle-Protein Interaction with Capillary Electrophoresis and Beyond.


**At Universities**


G-23. University of Iowa, Iowa City, IA, December 2017.


G-25. Sun Yat-Sen University, Guangzhou, China, October 2016.


G-29. Hong Kong University of Science and Technology, Hong Kong, China. August 2014.

G-30. Hong Kong Baptist University, Hong Kong, China. August 2014.


G-34. Xiamen University, Xiamen, China. August 2013. *Analytical Chemistry at the Nano-Bio Interface.*


**H. Advisees**

**Graduate Students**

Ni Li, Ph.D. Research Scientist, Abbott Laboratories 09/2006-06/2011, Chemistry

Lei Ren, Ph.D. Research Scientist, Bokai Pharma 09/2007-08/2012, Environmental Toxicology Program 2011-2012 Dissertation Year Program Fellowship

Jingjing Yao, Ph.D. Biopharma, Inc. 09/2007-08/2013, Chemistry

Samantha Schachermeyer, Ph.D. Chlorox, Inc. 01/2008-12/2013, Chemistry

Shang Zeng, Ph.D. Amgen, Inc. 09/2009-08/2014, Chemistry

Jonathan Ashby, Ph.D. Postdoctoral researcher, UC Davis 01/2010-08/2014, Chemistry NSF Graduate Research Fellowship, 06/11-05/14

Kenneth Flack Hewlett Packard, Inc.
CV, Wenwan Zhong, University of California, Riverside

01/2011-12/2015, Chemistry

Yang Liu 09/2012-present, Environmental Toxicology Program
Luis Jimenez 09/2012-present, Program of Biomedical Sciences
Yaokai Duan 09/2013-present, Chemistry
Song Zhe 09/2014-present, Environmental Toxicology Program
Jiwon Lee 09/2014-present, Chemistry
Gary Brent Adkins 07/2015-present, Chemistry
Michael Trihn 07/2015-present, Chemistry
Kaizhu Guo 07/2016-present, Chemistry
Roxana Coreas 07/2016-present, Environmental Toxicology Program

Postdocs

Jishan Li 12/2006-02/2010; Professor, College of Chemistry and Chemical Engineering, Hunan University, China
Xiaogang Han 09/2010-08/2011; Postdoc, University of Maryland, College Park
Runtao Zhong 07/2010-02/2012
Hui Wang 05/2012-08/2013
Ju-Yong Lee 08/2015-present
Wen Shen 01/2016-present
Xiaoni Fang 07/2016-present

Visiting Scholars/Students

Liang Ding 08/2011-02/2012; Professor, School of Medicine, Hebei University
Chao Shi 05/2012-02/2013; Professor, Qingdao University of Science and Technology
Zhigang Wang 08/2012-04/2013; Professor, Yang Zhou University
Xiaofeng Chen 09/2014-02/2015; Professor, Yang Zhou University
Fang Chen 09/2014-08/2015; Professor, Hua Zhong University of Science & Technology
Ting Deng 03/2015-present; Associate Professor, Hunan University
Fang Si 12/2013-02/2015; Visiting Student, Dong Hua University
Yumin Wang 09/2016-09/2017; Visiting Student, Hunan University
Hua Wang 10/2016-10/2017; Professor, Yansheng University
Undergraduate Students

Long-term Participants in Group Research:

Anh Nguyen 07/2007-06/2009; co-author in C-18
Hong Kim 07/2007-06/2009; co-author in C-17
Sonja Kress NSF International REU Program, summer 2007
Carolyn Jablonowski NSF REU Program, summer 2008; co-author in C-14
Jimmy Vo Analytical Assistant Chemist, Mitsui Chemical Group 07/2009-08/2012
Kuwana-Sawyer award for undergraduate research in Analytical Chemistry, 2011
Undergraduate Research Grant of UCR, 07/2010-05/2011
Michael Pham 07/2011-06/2013 (Honor student thesis program)
Erik Ligans 04/2013-12/2014 (Honor student thesis program)
Merissa Gonzales 08/2013-present (MARC*U program)
Michael Tamsi 08/2013-07/2014
Abdel-Kareem Khatib 05/2014-09/2014
Nancy Ortega 05/2014-05/2015
Joshua Berlarde 05/2014-present
Sabrina Sedano 05/2015-present
Yomara Mendez 05/2015-present
Erica Sun 04/2017-present

I. Professional Affiliations

American Chemical Society; American Association for the Advancement of Science
Appendix II. Faculty letters of intent to participate

Huiwang Ai (Assistant Professor, Chemistry, Ph.D.)
Mark Alber (Distinguished Professor, Physics, Ph.D.)
John Barton (Assistant Professor, Ph.D., Physics, arriving 1/1/18)
Gregor Blaha (Assistant Professor, Biochemistry, Ph.D.)
Chia-en Chang (Associate Professor, Chemistry, Ph.D.)
Richard Cardullo (Professor, Biology, Ph.D.)
Richard Debus (Professor, Biochemistry, Ph.D.)
Li Fan (Associate Professor, Ph.D.)
Theodore Garland (Distinguished Professor, Biology, Ph.D.)
Joseph Genereux (Assistant Professor, Chemistry, Ph.D.)
Russ Hille (Distinguished Professor, Biochemistry, Ph.D.)
Richard Hooley (Associate Professor, Chemistry, Ph.D.)
Darrel Jenerette (Associate Professor, Botany and Plant Sciences, Ph.D.)
Ryan Julian (Professor, Chemistry, Ph.D.)
Umar Mohideen (Professor, Physics, Ph.D.)
Len Mueller (Professor, Chemistry, Ph.D.)
Dawn Nagel (Assistant Professor, Botany and Plant Sciences, Ph.D.)
Seán O’Leary (Assistant Professor, Biochemistry, Ph.D.)
Jeff Perry (Assistant Professor, Biochemistry, Ph.D.)
Nicole Rafferty (assistant Professor, Biology, Ph.D)
Carolyn Rasmussen (Assistant Professor, Botany and Plant Sciences, Ph.D.)
Louis Santiago (Associate Professor, Botany and Plant Sciences, Ph.D.)
Jikui Song (Assistant Professor, Biochemistry, Ph.D.)
Yinsheng Wang (Professor, Chemistry, Ph.D.)
Min Xue (Assistant Professor, Chemistry, Ph.D.)
Wenwang Zhong (Professor, Chemistry, Ph.D.)
Roya Zandi (Professor, Physics, Ph.D.)
June 15, 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of protein engineering and chemical biology. In particular, my research group is engineering novel molecular probes to peer into cells and brains to understand their communications. We use a collection of innovative techniques, such as protein engineering, fluorescence and bioluminescence imaging, synthetic chemistry and mass spectrometry, to dissect signaling pathways involving redox-active molecules, neurotransmitters, and protein post-translational modifications (PTMs). Our research direction is well aligned with the proposed graduate program in Biophysics. I will enthusiastically support the Program.

Sincerely,

Huiwang Ai
Assistant Professor of Chemistry
Professor Russ Hille
Department of Biochemistry
University of California, Riverside
CAMPUS

August 31, 2016

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of computational biophysics and mathematical and computational biology.

Sincerely,

Mark Alber
Distinguished Professor
Department of Mathematics
Office: Surge 246
University of California, Riverside
Tel: (951) 827-3113
Fax: (951) 827-7314
e-mail: malber@ucr.edu

Fellow of the American Association for the Advancement of Science (AAAS)
Deputy Editor, PLoS Computational Biology
Associate Editor, Bulletin of Mathematical Biology (Springer)

Professor Emeritus (Early retirement)
University of Notre Dame
Adjunct Professor of Medicine
Indiana University School of Medicine
May 21, 2017

Russ Hille  
Distinguished Professor of Biochemistry  
1643 Boyce Hall  
University of California  
Riverside, CA 92521

Dear Prof. Hille,

Following your invitation, I am writing to indicate my interest in participating in the interdepartmental graduate program in Biophysics at the University of California, Riverside. I would be excited to take part in this interdisciplinary program.

Together with this letter I am including a copy of my CV. Please do not hesitate to contact me for any further information that may be helpful.

Sincerely,

[Signature]

John P Barton
August 19, 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. I believe that my expertise in X-ray crystallography and my interest in biophysical methods for characterizing of protein ribonucleic acid particles matches well with the stated goals the proposed program.

Sincerely,

Gregor Blaha
Assistant Professor
Department of Biochemistry
16, August 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of membrane biophysics, advanced imaging technologies, and modeling dynamic signaling events in living cells. Our recent research involves looking at the molecular mechanisms for sperm activation and relating it to changes in flagellar behavior in insects, especially mosquitoes. Although mainly cellular in focus, our work bridges many disciplines including biochemistry, bioengineering, developmental biology, and molecular genetics.

I am truly excited about this program and feel that the time is right for a biophysics program at UCR. I look forward to moving ahead with this initiative and will actively participate in all aspects of the program.

Sincerely,

Richard A. Cardullo, PhD
Howard H Hays Jr. Chair, University Honors
Professor of Biology
Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of molecular recognition. My group is particularly interested in understanding non-covalent protein-ligand binding kinetics and thermodynamics using molecular mechanics methods such as molecular dynamics simulations, Brownian dynamics simulations, and molecular docking, just to name a few.

Sincerely yours,

Chia-en A. Chang, Ph.D.
Association Professor of Chemistry
University of California, Riverside
August 19, 2016

Russ Hille, Distinguished Professor of Biochemistry
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm at participating in the graduate program in Biophysics that is being proposed. My own expertise is in the area of spectroscopic analysis of the oxygen-evolving process in photosynthesis, particularly vibrational spectroscopy. Specifically, my laboratory employs FTIR difference spectroscopy to characterize mutant core complexes of Photosystem II containing single amino acid substitutions of residues identified crystallographically or computationally as potentially participating in networks of hydrogen bonds near the catalytic Mn$_4$CaO$_5$ cluster. Identifying these residues will improve our understanding of the dynamic mechanism of O$_2$ production by the Mn$_4$CaO$_5$ cluster and will provide insight into the design of new generations of synthetic catalysts that convert sunlight into useful forms of storable energy. Attached please find a current cv.

Sincerely,

Richard J. Debus
July 10, 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of protein X-ray crystallography, protein chemistry and DNA repair.

Sincerely,

Li Fan
Associate Professor &
Director of Macromolecular X-ray Crystallography Core Facility
Russ Hille  
Department of Biochemistry  
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own relevant expertise is in the systems biology of locomotor behavior and exercise physiology, approached from both genetic and modeling perspectives. I also have a great deal of experience in statistical analyses of complex systems and experimental designs. In addition, as Director of UCR’s Institute for the Development of Educational Applications (IDEA), I would be interested in developing online curricula for the program, should that seem appropriate.

Please let me know if you need any further information, and best luck with the proposal.

Sincerely,

Theodore Garland, Jr., Distinguished Professor  
Office Phone: (951) 827-3524  
Facsimile: (951) 827-4286 (not confidential)  
Email: tgarland@ucr.edu  
http://www.biology.ucr.edu/people/faculty/Garland.html  
http://scholar.google.com/citations?hl=en&user=iSSbrhwAAAAJ

Director, UCR Institute for the Development of Educational Applications  
Editor in Chief, Physiological and Biochemical Zoology  
Fail Lab: Episode One  
http://testtube.com/faillab/zoochosis-episode-one-evolution  
http://www.youtube.com/watch?v=c0msBWyTzU0
September 5, 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of protein homeostasis, the balance between protein conformation and fate. Specifically, my group develops tools to determine the molecular consequences of cellular networks that regulate protein homeostasis. The physical and chemical underpinnings of these biological processes are poorly understood, and cross-disciplinary students who understand both biological systems, and the physical basis for the methods that we are developing to probe them, will be a natural fit for my research program. A biophysics graduate program would be an ideal source to attract these graduate students, while at the same time offering them an educational program that is tailored to the interdisciplinary background necessary to tackle these research projects.

As a participant, I commit to recruit students into the program, to serve on related committees, and to contribute to the associated seminar series.

Sincerely,

Joseph Genereux
Department of Chemistry
951-827-3759
August 4, 2016

To Whom It may Concern:

I write to convey my strong interest in creating and participating in a new graduate program in Biophysics at UC Riverside, as reflected in my involvement in the preparation of the present proposal.

With best regards,

Russ Hille, Ph.D.
Distinguished Professor of Biochemistry
August 4th, 2016

Dear Russ:

This letter is to confirm my intent to participate in the UC Riverside Biophysics program. I believe this is an important new direction for the UCR science faculty, and will be a valuable addition for the campus as it seeks to expand and improve.

If you require any more information, please feel free to contact me.

Richard Hooley
June 15, 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of landscape patterns of ecosystem functioning. Much of this work depends strongly on an understanding of biophysics and frequently such understanding is a limiting reagent for my students' research. My research depends on biophysical concepts related to energy balance, light absorption, and fluid transport. These processes all rely at the biophysics interface. For example, energy balance dynamics are affected by many leaf structural and evaporative characteristics. These plant-based dynamics strongly interact with energy availability and transport between the vegetation and atmosphere. These dynamics are only understandable only in the context of biological processes interaction with physics based dynamics.

Sincerely,

Darrel Jenerette
Associate Professor
Department of Botany and Plant Sciences
August 19, 2016

Russ Hille  
Department of Biochemistry  
UCR

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of biomolecular structure determination, noncovalent interactions, spectroscopy, and mass spectrometry.

Sincerely,

Ryan R. Julian  
Department of Chemistry  
University of California, Riverside  
Riverside, CA 92521-0403  

PHONE: (951) 827-3958  
FAX: (951) 827-2435  
e-mail: ryan.julian@ucr.edu
Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of single molecule force spectroscopy, nanoscale imaging of cells and mechanical elasticity of cell parts. The realization of the Biophysics program at UCR would be valuable to the whole campus by providing a pool of talented students who can interact with the ongoing multidisciplinary biophysics research.

Sincerely,

Umar Mohideen
June 15, 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of solid-state NMR spectroscopy and biological chemistry. The major goal of my research is to understand the transformation of substrate to product in enzyme active sites at the atomic level – that is to define the position of all atoms, including protons. To accomplish this, we are pioneering the development and application of NMR-assisted crystallography – the synergistic combination of solid-state NMR, X-ray crystallography, first-principles (ab initio) and molecular dynamics computational approaches, and synthetic organic chemistry – to enzyme systems. Specifically, my group is establishing the atomic-level details in the enzymatic transformation of substrate to product in pyridoxal-5'-phosphate-requiring enzymes. By doing so, we are advancing an understanding of the relationship between chemical structure, conformational dynamics, and enzyme mechanism.

I look forward to being a strong, contributing member of the Biophysics graduate program at UCR.

Sincerely,

Leonard J. Mueller
Professor and Vice-Chair
Department of Chemistry
May 22, 2017

RE: Biophysics Graduate Program at UCR

Dear Russ,

I am writing this letter to inform you of my interest in participating in the Biophysics Graduate Program if created. My CV is attached, and please let me know if you have any questions.

Sincerely,

--
Dawn Nagel, Ph.D.
Assistant Professor
Department of Botany and Plant Sciences
1129 Batchelor Hall
University of California
Riverside, CA 92507
dawnn@ucr.edu
Office: (951) 827-4425
August 5th, 2016

Russ Hille,
Distinguished Professor of Biochemistry,
University of California, Riverside,
2404 Boyce Hall,
Riverside, CA 92521-0122.

Re: Interdepartmental Graduate Program in Biophysics

Dear Russ,

I would like to express my enthusiastic support for the proposed Interdepartmental Graduate Program in Biophysics at the University of California, Riverside.

During my past six years as a postdoctoral researcher at Stanford University School of Medicine, I was involved both in performing and in mentoring trainees in Biophysics research, focusing on applications of single-molecule fluorescence microscopy to study complex biochemical systems. Our research was a natural fit for, and benefitted enormously from students in the Biophysics program. The potential of a similar program at UCR is therefore really exciting. I will be delighted to participate in the program as it is established.

If I can assist in any way, please do not hesitate to contact me.

Sincerely,

Seán O’Leary
August 1st, 2016

RE: Interest in participating in the Biophysics Program at UCR

Dear Russ,

I am most keen to participate in the interdepartmental graduate program in the field of Biophysics, which is under consideration at UCR. I think this is a truly excellent idea, leveraging the molecular and spectroscopic biophysics based expertise of existing Faculty at UCR, as well as being highly complimentary to existing graduate programs.

Best regards,

Jeff
May 16, 2017

Russ Hille
Distinguished Professor of Biochemistry
1643 Boyce Hall
University of California
Riverside, CA 92521

Dear Dr. Hille,

I am writing to express interest in the initiative to create a graduate program in Biophysics at the University of California, Riverside. I am an Assistant Professor in the Department of Biology, and my research focuses on the community ecology of plants and pollinators under global change. Systems biophysics is particularly relevant to my research area. I am happy to offer my participation in this initiative.

Sincerely,

Nicole Rafferty, Ph.D.
Assistant Professor
nicole.rafferty@ucr.edu
951-827-3800
May 18, 2017

Dear Professor Russ Hille,

Thank you for asking me to join the graduate program in biophysics. This is indeed one of the future research directions of my lab. For example, finding a student interested in using atomic force microscopy to measure cell wall properties or examining protein dynamics using single molecule imaging or other biophysical experiments would be valuable. In addition, establishing collaboration with colleagues with this type of expertise (and equipment) would be useful.

I would be happy to join the biophysics graduate program and contribute live-cell imaging expertise. Attached please find a recent CV. Please contact me if you have any questions.

Sincerely,

Carolyn G. Rasmussen, Ph.D.
Department of Botany and Plant Sciences
carolyn.rasmussen@ucr.edu
June 15, 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of plant physiological ecology, which incorporates a vast amount of biophysics within our study of the physics of water transport in plants, the conversion of light energy to carbon-based compounds, and the energy exchange between the vegetated surfaces and the atmosphere. The maintenance of plant tissues within biological temperature ranges and the responses of plants to climate change also fall within the discipline of biophysics.

Several of my courses taught at UCR also incorporate components of biophysics, including BIOL 05B (Introduction to Organismal Biology), BPSC 143 (Plant Physiology), but likely most importantly, my graduate course, BPSC 243 (Plant Physiological Ecology) could be an important potential component of the graduate curriculum for this program.

Sincerely,

Louis S. Santiago
Associate Professor of Botany & Plant Sciences

and

Research Associate, Smithsonian Institution
June 15, 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of structural biology and epigenetics. We study molecular mechanisms that underlie epigenetic regulation using structural approaches (X-ray crystallography and NMR spectroscopy). In the past, we have revealed the structure-function relationships of several crucial enzymes involved in chromatin modification or pathogen-host interaction (Cell 2010, 141:1183-94; Science 2011, 331:1036-40; Science 2012, 335:709-712; Nature 2012 484:115-9; Cell Rep 2015, 12:1400-6; Cell Rep. 2016, 14:493-505; Nat. Struct. & Mol. Bol. 2016).

Sincerely,

Jikui Song
Assistant Professor
Department of Biochemistry
Phone: 951-827-4221
Email: jikui.song@ucr.edu
Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of using mass spectrometry for studying the covalent modifications of biological molecules, including DNA, RNA and proteins.

Sincerely,

Yinsheng Wang
Professor of Chemistry
Aug 20, 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I write to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. My own expertise is in the area of bioanalytical chemistry and my group aims to develop novel chemical probes for detecting and imaging large biomolecules. A large part of my research falls into the realm of Biophysics, and I will be able to contribute to the teaching of related courses in the program.

I believe that the proposed Biophysics graduate program will largely aid in the interaction of related research groups and the integration of campus resources. In addition, it will be a great program where students can obtain interdisciplinary knowledge and develop a promising career track.

I look forward to hearing about the updates on the proposal progress.

Sincerely,

Min Xue
Assistant Professor
Department of Chemistry
University of California, Riverside
Department of Physics and Astronomy

August 29, 2016

Russ Hille
Department of Biochemistry
CAMPUS

Dear Russ:

I would like to express my enthusiasm to participate in the graduate program in Biophysics that is being proposed. As you know, I have been working on the physics of virus assembly and have created several biophysics courses offered in the Physics Department at UCR. In particular, I have created and taught the undergraduate Physics courses 145A, B, C and the graduate level Biophysics 246. Physics 145A was offered a couple years ago and I had 15 students in the course. This number is quite high for an upper division Physics course. We also have several students in the Physics Department who are completing their BS in the Biophysics track. We have been attracting very good undergraduate students to this program. Our graduate students working on Biophysics projects are also very strong. As a matter of fact, this year the award for the best Ph.D. graduating student was given to one of my students who had completed several Biophysics projects. I am very excited about the Biophysics graduate program and am eager to participate in and assist you in implementing the program.

Sincerely,

Roya Zandi
Professor of Physics
University of California
Riverside, CA 92521

Tel: (951) 827-2096
Dear Dr. Russ Hille,

It is really a good news to me that you are proposing a new graduate program in Biophysics at UCR. I think it is a much needed program for our campus to meet the needs of recruiting students with good background in biology and physics who can be trained and conduct interdisciplinary research at the areas related to biophysics. Since the research work in my group is centered on bioanalytical chemistry and biophysics is critical for us to develop new techniques and study new biological problems, it will be my great pleasure to participate in this program. If approved, I will be happy to recruit students from this program to my group and collaborate with other faculty members in the program. Hope with the collective efforts from us, this program will be approved and run well on our campus.

Thank you very much for your kind invitation.

Sincerely,

Wenwan Zhong, Professor;
Department of Chemistry;
University of California;
Riverside, CA
Appendix III. Letters from UCR Department Chairs and UC Biophysics Program Directors

UCR Department Chairs

Richard Debus, Chair, Department of Biochemistry, UC Riverside
Michael Allen, Chair, Department of Biology
Patricia Springer, Chair, Department of Botany and Plant Sciences, UC Riverside
Jingsong Zhang, Chair, Department of Chemistry, UC Riverside
Kenneth Barish, Department of Physics and Astronomy, UC Riverside

Directors of other interdepartmental graduate programs in Biophysics at UC campuses

Template request letter

Dr. James Hurley
Graduate Program Chair
Biophysics Graduate Group
574 Stanley Hall, MC 3220
Berkeley, CA 94720
In care of: katechase@berkeley.edu

John Voss, PhD
Director, Biophysics Graduate Group
227 Life Sciences
One Shields Avenue
Davis, CA 95616
cvoss@ucdavis.edu

A letter was also requested from Tanja Kortemme, PhD, Director, Biophysics Graduate Program University of California, San Francisco (UCSF), but no response was received.
August 29, 2016

Russ Hille
Distinguished Professor of Biochemistry
1463 Boyce Hall

Dear Russ,

I am writing to express enthusiastic support for the development of a Biophysics Graduate Program at UC Riverside. As you point out in the proposal, substantial expertise in biophysics already exists on campus and the Departments of Biochemistry, Chemistry and Bioengineering have hired numerous biophysically-trained faculty in recent years. Currently, these faculty are spread over multiple departments and colleges and lack a cohesive training environment. An interdepartmental Graduate Program in Biophysics will complement the Department of Biochemistry’s expanding critical mass in structural biochemistry [e.g., X-ray crystallography, NMR, small angle X-ray scattering (SAXS), single-molecule fluorescence measurements (FRET), and various forms of spectroscopy] and link it with the growing expertise in biophysics in the Departments of Chemistry, Bioengineering, Physics & Astronomy, Mathematics, and other departments. This program will have a very positive impact on the research programs of several faculty in the Department of Biochemistry and promote numerous collaborative ventures between faculty all over campus, will complement existing graduate programs in Biochemistry, Chemistry Bioengineering, and Physics & Astronomy, and will increase the campus’s research portfolio, particularly in areas of research of interest to the NIH and faculty in UC Riverside’s School of Medicine. I thus anticipate highly positive interactions with the proposed program.

The development of an interdepartmental graduate program in biophysics has been discussed periodically for many years. I am grateful for your work in developing a specific proposal that takes advantage of the recent hiring of many biophysically-trained faculty throughout campus in recent years.

Sincerely,

Richard J Debus
13 September 2016

To: Russ Hille
    Distinguished Professor of Biochemistry
    1463 Boyce Hall

From: Michael F. Allen, Chair

Re: Biophysics Graduate Program at UC Riverside

Dear Russ,

I am writing to also express support for the development of a Biophysics Graduate Program at UC Riverside. Expertise in biophysics already exists on campus and several Departments, including Biology. We have hired faculty focused in biophysics at higher scales, from biophysical ecology of Professor Ruibal, a founding faculty, to current faculty using biophysical processes to study physiology and ecology. The program will also simultaneously complement the expanding program in adaptive processes directing evolution and understanding environmental stressors from the environment (ecology) affecting survival and reproduction of organisms. It will also link biologists with the growing expertise in the Departments of Chemistry, Bioengineering, Physics & Astronomy, Mathematics, and other departments. Currently, faculty members working in the broader area of biophysics are spread over multiple departments and colleges and lack a cohesive training environment. An interdepartmental Graduate Program in Biophysics will provide a connecting strand for all faculty and will positively impact the research programs of several faculty in the Evolution, Ecology and Organismal Biology (EEOB) graduate program. It will also increase the campus’s research portfolio, particularly in areas of research of interest to the NIH and NSF.

I anticipate highly positive interactions with the proposed program. The development of an interdepartmental graduate program in biophysics has been discussed across the Biology Department for many years, and I appreciate your work in developing this proposal. Please do not hesitate to contact me if you have additional needs or questions.
September 30, 2016

Russ Hille
Distinguished Professor
Department of Biochemistry
University of California
Riverside, CA 92521

Dear Russ,

I am writing in support of your proposal to develop a Biophysics Graduate program at UCR. An increasing number of faculty in Botany and Plant Sciences have research programs that intersect with biophysics. These include faculty who study cell division, cell shape, plant architecture, and plant physiological processes such as photosynthesis. In addition to our departmental graduate program in Plant Biology, many of our faculty participate in the graduate programs in Cell, Molecular, and Developmental Biology (CMDB), Genetics, Genomics, and Bioinformatics (GGB), Biochemistry and Molecular Biology (BMB), and Ecology, Evolution, and Organismal Biology (EEOB). These programs don't typically attract students interested in using biophysical approaches to address questions. Therefore, I see your proposed Biophysics graduate program as highly complementary to existing programs in the life sciences. It will be a welcome addition to our campus.

Good luck with the proposal.

Sincerely,

Patricia Springer
September 16, 2016

Russ Hille  
Distinguished Professor of Biochemistry  
1463 Boyce Hall

Dear Russ,

I am writing to express a strong support for the development of a Biophysics Graduate Program at UC Riverside. As discussed in your proposal, a substantial number of faculty in the areas related to biophysics are already present on the UCR campus, while these faculty are spread over multiple departments and colleges and would benefit from a cohesive graduate training environment in biophysics. The proposed interdepartmental Graduate Program in Biophysics will complement the current expertise in bioanalytical chemistry and biophysics in the Department of Chemistry. The proposed Biophysics program will have a very positive impact on the research programs of several faculty in the Department of Chemistry, promote extensive collaborative research activities between faculty all over the campus, and increase the campus’s research portfolio. I believe that the proposed Biophysics program complements and will have positive interactions with the Chemistry Graduate Program.

Sincerely yours,

Jingsong Zhang
September 16, 2016

Russ Hille
Distinguished Professor
Department of Biochemistry
240B Boyce Hall

Dear Russ,

I am delighted to support the development of an interdepartmental Biophysics Graduate Program at UC Riverside. The program will leverage the expertise in biophysics that already exists on campus from the Departments of Biochemistry, Bioengineering, Chemistry and Physics & Astronomy, and promises to attract top applicants. A Biophysics graduate program will complement the Department of Physics & Astronomy’s biophysics research, which includes sensitive force measurement techniques to study the interaction between single molecules involved in signal transmission in the human brain. Expanding biophysics as a top priority of the department, as reflected in recent hiring plans. The program will also utilize existing Physics classes.

Biophysics is an expanding and vibrant field. I fully support the establishment of an interdepartmental biophysics graduate program. Thank you for working to establish this program.

Sincerely,

Kenneth N. Barish
Chair and Professor
Physics and Astronomy Department
July 30, 2016

Dear Dr. XXXX:

We are in the process at UC Riverside of proposing an interdepartmental graduate program in Biophysics, leading to the degree of Ph.D. In accordance with the review policy established by the systemwide Coordinating Committee of Graduate Affairs (CCGA), I write to provide you, as Director of an existing comparable program, with a copy of the current draft of our proposal. We would be very grateful for any feedback you may wish to offer, so that the proposal may be made as strong as possible prior to submission.

AA background, please understand that the format and contents of the proposal follow the required outline found in the CCGA Handbook, and that internal and external reviewers will later be asked to address the following four points when examining our final submission:

- Quality and academic rigor of the program
- Adequacy of the size and expertise of faculty to administer the program
- Adequacy of the facilities and budget
- Applicant pool and placement prospects for the graduate students

If you wish to provide feedback, we would appreciate receiving it within four weeks of the date of this letter, as we intend to submit the proposal for campus review at that time. We very much appreciate your taking the time to do so.

With best regards,

Russ Hille, Ph.D.
Distinguished Professor of Biochemistry
September 26, 2016

Professor Russ Hille
Distinguished Professor of Biochemistry
University of California Riverside

Re: Proposed Biophysics Program at UCR

Dear Dr. Hille,

Biophysics has an outsized role to play at the interface between the methods and approaches of physics on the one hand, and, on the other, problems in biology that are of central importance to society, medicine, and fundamental understanding of life. At UC Berkeley, we have had a Biophysics Graduate Program in some form since 1942. Interest from prospective students continues to grow. We had an entering class of 12 this year, a record in recent years. We have sustained interest from faculty, and the presence of the program is an attractor in recruitment. It was certainly important to me when I joined UC Berkeley 3 years ago, and I believe it was a factor in our recent recruitment of Nobelist Eric Betzig. Many of our graduates have gone on to distinguished academic careers, while others have been snapped up upon graduation by Bay Area industry employers. I believe it makes sense for every UC campus to have a Biophysics program, track, or department in some form, and certainly it makes sense for UC Riverside to pursue this.

The structure of your proposed program closely resembles the one at Berkeley in most respects. The core curriculum and duration of the program are similar, as are the plans for funding students and administration. It appears to me that the critical mass of faculty is already present at Riverside. Your plan strikes me as realistic and well thought out. At this time, I have no improvements or changes to suggest, since you seem to have thought of everything. Should your program be approved, as it deserves to be, I would be happy to consult in the future if there is any input I could provide that would be useful.

In conclusion, I strongly support your proposal and wish you the best of luck with it.

Yours,

James H. Hurley
Judy C. Webb Chair
Professor of Biochemistry, Biophysics and Structural Biology
Chair, Graduate Group in Biophysics
PROFESSOR Russ Hille  
Distinguished Professor of Biochemistry  
University of California Riverside

RE: PROPOSED BIOPHYSICS PROGRAM AT UCR

Dear Dr. Hille,

I congratulate you on assembling a motivated group of faculty to organize and participate in a new graduate program in Biophysics. As described in your proposal, there is a growing demand for life science investigators that have a strong quantitative foundation in math, chemistry and physics. Your proposed program in Biophysics meets this need by assembling an interdisciplinary team of faculty that offer students training on the cutting-edge developments in biophysical tools and theory.

Since its inception in 1961, the Biophysics program has at UC Davis has enjoyed a long run of graduating outstanding students, the vast majority with the PhD degree. We are now considering adding a M.S. plan similar to your Plan II. Having a well-defined Masters option from the outset is an excellent idea and will help justify and motivate faculty to develop new courses.

Although the interdisciplinary nature of biophysics brings together an exciting mix of faculty and students from across the campus, it can present a challenge in terms of institutional support compared to programs that align with a single department or college. Thus depending on the structure for graduate student support at UCR, formulating some commitments of support from the home colleges/schools of participating faculty would be very helpful by solidifying a shared ownership of the program. For example, the lack of a home department/college for Biophysics at UCD severely limits our student access to TA positions within the undergraduate curriculum. This challenge has pushed us to be conservative in our number of admits each year, as without TA positions we do not have mechanisms to support students in cases where the major advisor has a gap in funding.

Your proposed curriculum comprehensively covers the major and emerging areas of biophysics with rigor and quality faculty. In addition, your identified course list with example tracks is especially important for recruiting students.
The size and expertise of the faculty is adequate to administer the program. I expect the program to grow in faculty numbers with increased recognition of the unique students within the program.

Yours sincerely,

John Voss, Professor and Chair
Biophysics Graduate Group
University of California Davis
jcvoss@ucdavis.edu
Appendix IV. Letters from CNAS Dean’s office

Kathryn Uhrich, Dean, College of Natural and Agricultural Sciences   (10/7/2016)

Kathryn Uhrich, Dean, College of Natural and Agricultural Sciences   (8/3/2017)
Umar Mohideen, Divisional Dean for Physical Sciences and Mathematics
Frances Sladek, Divisional Dean for the Life Sciences
To: Kevin Esterling, Interim Dean, Graduate Division

From: Kathryn Uhrich, Dean, CNAS

Date: October 7, 2016

Re: Interdepartmental Graduate Program in Biophysics.

I write to endorse the proposal for an interdepartmental graduate program in Biophysics. This proposal is fully aligned with the College’s and campus’s strategic goals of increasing its research portfolio, particularly in biomedically relevant areas. UCR is unique in having all the applied and fundamental sciences under a single administrative umbrella, but owing to the various departmental missions, disciplinary strengths in the biological sciences has been scattered among many separate departments, most of which operate their own graduate programs. As a consequence, we have often lacked a unified approach to graduate education in fundamental areas of biological sciences that fully utilizes all of our faculty strengths.

The program envisioned in this proposal will provide much need unity and integration in the vital area of biophysics, and I enthusiastically endorse its creation.
August 3, 2017

Distinguished Professor Russ Hille
Department of Biochemistry
University of California
Riverside CA, 92521

RE: UCR Senate comments on the proposed Interdepartmental Graduate Program in Biophysics

Dear Russ,

We have reviewed the comments and recommendations on the proposed Graduate Program in Biophysics from the UCR Senate committees on Planning & Budget, Library and Information, and Graduate Council.

We note the extremely positive endorsement that each committee provided for the new Biophysics Graduate Program. Nonetheless, two of these committees raised some concerns about issues related to budget, course schedule, TA allocations, and diversity which we address here:

**Director stipend:** Stipends for directors of CNAS Interdepartmental Graduate Programs are provided by CNAS. As we do for departmental chair positions, we are intent on providing, within our budgetary constraints, stipends that at least partially compensate our college leaders for their effort and time.

**Program funding:** We recognize that our interdepartmental graduate programs need to be placed on more substantial financial footing: this has been the subject of discussions between ourselves and former Dean Childers for several years. These discussions are ongoing and now, with the new campus-wide funding plan in place, we are in a more informed position to work with Graduate Division to formulate a plan for their stability and growth. That being said, we do not believe that this new interdepartmental graduate program should be delayed pending these discussions. Graduate training in biophysics on our campus is long overdue, especially as the field is undergoing something of a renaissance. Furthermore, the establishment of yet another interdepartmental graduate program in CNAS will act as a catalyst for the new financial planning that all our interdepartmental graduate programs require.

**TA allocations:** The question of TA allocations to this new program is an inevitable part of the planning process. We note that CNAS already has extensive experience in assigning TAs from both departmentally based and interdepartmental graduate programs in the life sciences through the TA Allocation Committee (TAAC) established by Divisional Dean Walling in the 2000s. TAAC has functioned extraordinarily well for more than a decade and so offers a model for how TAs may be assigned to graduate students in the Biophysics program.

**Faculty diversity:** We completely agree with Graduate Council’s recommendation that more attention be paid to diversity among the faculty and cooperating faculty of the program. At the same time, we appreciate the efforts that you have made to diversify the faculty and the challenges that one faces in the field of biophysics. Faculty diversity is something that the graduate program and the college will maintain as a top priority.
Please let us know how we can be of further assistance in establishing this important graduate program on campus. We thank you for your leadership and care in shepherding this proposal through the various campus and Senate committees.

Sincerely,

Kathryn E. Uhrich
Dean
College of Natural & Agricultural Sciences

Frances M. Sladek
Divisional Dean of Life Sciences

Umar Mohideen
Divisional Dean of Physical & Mathematical Sciences
October 26, 2016

To: Kevin Esterling
Interim Dean of the Graduate Division

From: Ward Beyermann, Executive Committee
College of Natural and Agricultural Science

Re: Review of the Proposal for Interdepartmental Program for Graduate Studies in Biophysics

The CNAS Executive Committee discussed the Proposal for an Interdepartmental Program for Graduate Studies in Biophysics at their October 25th meeting and approved of the program.

Yours sincerely,
Ward Beyermann, Chair
CNAS Executive Committee
Appendix VI. Syllabi for Core Courses

Course catalog descriptions of proposed core courses

**BCH 184** Topics in Physical Biochemistry (4 units) Lecture, 3 hr; discussion, 1 hr. Prerequisite(s): BCH 100 with a grade of "C-" or better or BCH 110A with a grade of "c-" or better; BIEN 135 with a grade of "C-" or better, or CHEM 109 with a grade of "C-" or better or CHEM 110A with a grade of "C-" or better; or consent of instructor. Explores modern biophysical method determining the structures of biological macromolecules and relating structure to function. Covers X-ray crystallography, NMR, and cryoelectron microscopy. Addresses imaging and mass spectrometry for determining structure and ultraviolet, visible, infrared Raman, fluorescence, NMR, EPR and other forms of spectroscopy for relating macromolecular structure to function.

**BIOL 203** Cellular Biophysics (3 units) Lecture, 3 hrs. Prerequisite(s): BIOL 200/MCDB 200; BIOL 201/CMDB 201; CHEM 109 or equivalent; or consent of instructor. Biophysical principles that determine cellular structure and function, including diffusion, electrochemical gradients, transport, macromolecular interactions, and genetic recombination. Illustrative examples are used to highlight the importance of these principles in modern cell biology and physiology.

**PHYS 246** Biological Physics (4 units) Lecture, 3 hr; Discussion, 1 hr. Prerequisite(s): PHYS 134 or consent of instructor. Introduces topics at the interface of physics and biology: cell physiology, probability and information, diffusion, random walks, electrostatics, elasticity of biopolymers and membranes, DNA topology, friction in fluids, and low Reynolds numbers. May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor.
Professors: Richard Debus, Jikui Song, and Li Fan
TA; Matthew Harter (mhart005@ucr.edu)
(Office Hours: Thursdays, 10:00 AM to noon in Boyce Hall 5487)
Discussion Sections: Meets on Mondays or Tuesdays

Section 1  Instructor: Prof. Richard Debus (richard.debus@ucr.edu)
Office Hours: Monday, 1:30 to 3:30 PM in room 2446A Boyce Hall

January 4  Quantum Chemistry
January 6  Atoms & Molecules
January 8  Centrifugation
January 11  Mass Spectrometry
January 13  Introduction to Spectroscopy; Vibrational Spectroscopy 1
January 15  Vibrational Spectroscopy 2
January 18  Holiday (no lecture)
January 20  UV/Vis spectroscopy; CD spectroscopy
January 22  Fluorescence Spectroscopy 1
January 25  Fluorescence Spectroscopy 2
January 27  EPR spectroscopy 1
January 29  EPR spectroscopy 2; Double Resonance methods
February 1  Exam 1 (in classroom): 150 points

Section 2  Instructor: Prof. Jikui Song
Office hours: TBA

Feb.3  Introduction and Basic Concepts
Feb.5  Basic Concepts and 1D NMR Spectroscopy
Feb.8  Spin-Spin Coupling and Nuclear Overhauser Effect
Feb.10  Pulse Sequences, NMR Relaxation
Feb.12  2D 1H NMRSpectroscopy
Feb.15  holiday
Feb.17  Multi-dimensional Heteronuclear NMR
Feb.19  Chemical Shift and Protein Structure Analysis
Feb.22  NMR Structure Determination and Course Overview
Feb.24  Exam 2 (in classroom): 100 points covering section 2

Section 3  Instructor: Prof. Li Fan
Office Hours: TBA

February 26  X-ray Crystallography #1 – Overview and Protein Crystals
(Assigned Reading: Rhodes, Chapters 1-3)
Feb. 29  X-ray Crystallography #2 – Principles of X-ray Diffraction I
(Assigned Reading: Rhodes, Chapter 4)
March 2  X-ray Crystallography #3 – Principles of X-ray Diffraction II
(Assigned Reading: Rhodes, Chapter 4)
March 4  X-ray Crystallography #4 – From diffraction to electron density
(Assigned Reading: Rhodes, Chapters 2 & 5)
March 7  X-ray Crystallography #5 – Estimation of Phases – Molecular Replacement
(Assigned Reading: Rhodes, Chapter 6)
March 9  X-ray Crystallography #6 – Estimation of Phases – Experimental Methods
(Assigned Reading: Rhodes, Chapter 4 & 6)
March 11  X-ray Crystallography #7 – Structural Refinement & Judging the Molecular Model
(Assigned Reading: Rhodes, Chapter 7-8)
March 17  Final Exam (11:30-1:00): 100 points covering Section 3
# Biology 203

**Cellular Biophysics and Physiology**  
*Rich Cardullo, Department of Biology*

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Assignment Due</th>
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<tbody>
<tr>
<td>9/27 – 10/1</td>
<td>Probability Theory/Sex Distribution in Families</td>
<td></td>
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<tr>
<td>10/4 – 10/8</td>
<td>Average charge on a macromolecule</td>
<td>HW 1 due 10/8</td>
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<tr>
<td>10/11 – 10/15</td>
<td>The random walk/protein folding</td>
<td></td>
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<tr>
<td>10/18 – 10/22</td>
<td>Diffusion modeling</td>
<td>HW 2 due 10/22</td>
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<tr>
<td>10/25 – 10/29</td>
<td>Transport across membranes</td>
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<tr>
<td>11/1-11/5</td>
<td>Filtration</td>
<td>HW 3 due 11/5</td>
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<tr>
<td>11/8 – 11/12</td>
<td>Poisson Processes</td>
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<tr>
<td>11/15 – 11/19</td>
<td>The Luria-Delbrück Experiment</td>
<td>HW 5 due 11/19</td>
</tr>
<tr>
<td>11/22 – 11/26</td>
<td>The photon detection limit of the eye</td>
<td></td>
</tr>
<tr>
<td>11/29 – 12/3</td>
<td>Special Topics</td>
<td>HW due 12/3</td>
</tr>
</tbody>
</table>

**Final Exam:** December 6, 2004 from 8 a.m. – 11 a.m. in Spieth 1239.

**Grading:** Homework is worth 75%, Final is worth 25%.
Physics 246
Biological Physics

Instructor
Roya Zandi
Office: 3026 Physics Building
Office hours: 2:00-3:00 Thursdays, or by appointment.
Email:roya.zandi@ucr.edu

Class meetings
Tuesdays /Thursdays, 9:40-11:00 pm
Location: ENGR2 141

Course Description
Single-molecule studies of macromolecules now allow tests of the conceptual foundations of statistical mechanics. The class provides a review of the physical and mathematical foundations of equilibrium and non-equilibrium statistical mechanics with emphasis on selected "hot topics" that lie at the interface of physics and biology.

Prerequisites
Statistical Mechanics (134)

Textbook

We are using Nelson as the basic structure, but I will probably expand on some topics and introduce some other new ones.

There are many excellent resources on the web. Here are a few examples;
ITP Program on Bioinformatics: http://matisse.ucsd.edu/itp-bioinfo/
A course by Prof. Goldenfeld on Statistical Physics of Biological Information and Complexity:http://guava.physics.uiuc.edu/%7Enigel/courses/498BIO/
A course at Berkeley on Molecular Biophysics: http://alice.berkeley.edu/biophysics/
Tentative outline

1) Probability and Information
2) RNA, DNA, and proteins
3) Random Walks, Friction, and Diffusion
4) Brownian Motion, the Einstein relation, and the Fokker-Planck Equation
5) Langevin Equation and the Fluctuation Dissipation Theorems.
6) Non-equilibrium Thermodynamics, the Onsager Reciprocity Relations and Entropy Production.
7) Polymer Theory: Softening of rigidity by fluctuations, Entropy and Markov chains, Flory theory, Worm-like chain model
8) Electrostatics: Macro-ions, counter-ions, pH, Poisson-Boltzmann equation, Debye equation
9) DNA Topology (Link, Twist, and Writhe).

Assignments

The homework assignments are an important part of this course, and the overall average homework score will count for 60% of the final grade. You may consult with classmates in "study groups," as long as you write out your own answers.

Problem sets should be turned in at the beginning of class on the due date. No problem sets will be accepted after the solutions have been posted. Problem sets handed in after the deadline but before the solutions have been posted are subject to a 50% grade penalty.

A Final Project will count for 40% of the final grade.

Final project: An in-class presentation on a topic of your choice. The presentation will be about 30 minutes and can cover any topic at the interface of biology and physics. You’ll need to discuss your topic with me in advance.
APPENDIX VII. Catalog Descriptions of Elective Courses

**BCH 186** Topics in Molecular Bioenergetics (3) Lecture, 3 hours. Prerequisite(s): BCH 100 with a grade of "C-" or better or BCH 110B with a grade of "C-" or better; BCH 184 with a grade of “C-” or better; or consent of instructor. Introduction to biological energy transduction. Describes the coupling of oxidative phosphorylation and photosynthesis to adenosine triphosphate (ATP) synthesis and the coupling of ATP hydrolysis to ion transport, chemotaxis, molecular motors, biomimetics, and other biological processes on the basis of recent structural and mechanistic studies of the protein complexes involved.

**BCH 187** Fundamentals of Enzymology, 3 units, Lecture, 3 hours. Prerequisite(s): BCH 100 or BCH 110A with a grade of C- or better. An introduction to the fundamental principles of enzymology. Specific topics include, acid-base catalysis, strain effects, transition state theory, enzyme kinetics (including isotope effects), enzyme dynamics and enzyme regulation. Considers in detail the reactions of several representative enzymes.

**BCH 210** Biochemistry of Macromolecules, 4 units, Lecture, 4 hours. Prerequisite(s): BCH 110A, BCH 110B, BCH 110C or equivalents; BCH 184 (may be taken concurrently); CHEM 109; graduate standing or consent of instructor. Discussion of recent advances in the knowledge of the molecular architecture of proteins and nucleic acids, especially with respect to new experimental approaches for analyzing their structure and function. Chemistry of the active site of enzymes.

**BCH 230F** Advanced Topics in Biochemistry (2) Lecture, 1 hour; discussion, 1 hour. Prerequisite(s): BCH 100 or both BCH 110A and BCH 110B or consent of instructor. Addresses advances in enzymology by analysis of the recent literature.

**BIEN 135** Biophysics and Biothermodynamics, 4 units, Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): BIEN 101, MATH 10B, MATH 046, PHYS 040C. An introduction to the application of thermodynamic principles to understanding the behavior of biological systems. Discusses biophysical properties of biomacromolecules such as proteins, polynucleotides, carbohydrates, and lipids, as well as the methods of characterizing their properties and interactions.

**BIEN 142** Introductory Biomedical Optical Imaging, 4 units, Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): PHYS 040C and MATH 010B; or consent of instructor. Examines fundamental theory and basic design of biomedical optical imaging systems. Topics include a basic understanding of the working principles of optical components, diagnostic light-tissue interaction, and design of imaging systems to exploit the interaction of light with biological phenomena.

**BIEN 160** Biomedical Imaging, 4 units, Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): BIEN 120. An introduction to the fundamental physics and engineering principles for medical imaging systems. Covers X-ray, ultrasound, radionuclide, magnetic resonance imaging, positron emission tomography, optical coherent tomography, and other optical methods. Includes image formation and reconstruction, image characteristics, and quality and image processing.

**BIEN 165** Biomolecular Engineering, 4 units, Lecture, 2 hours; discussion, 1 hour; term paper, 3 hours. Prerequisite(s): BIEN 135, or consent of instructor. Emphasizes engineering, biochemical, and biophysical concepts and technologies intrinsic to specific topics of biomolecular engineering. Introduces the history of genetic and protein engineering. Topics include biological thermodynamics, molecular kinetics, biochemical and biophysical approaches, protein engineering, high-throughput screening technologies, and protein engineering with unnatural amino acids.

**BIEN 242** Advanced Biomedical Optical Imaging, 4 units, Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): BIEN 142 or equivalent; graduate standing or consent of instructor. Examines advanced theory and optimized design of biomedical optical imaging systems. Topics include a full understanding of the working principles of optical components, diagnostic light-tissue interaction, and design of imaging systems.\[590]
systems to exploit the interaction of light with biological phenomena. May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor.

**BIEN 245** Optical Methods in Biology, Chemistry, and Engineering, 4 units, Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): CHEM 109 or equivalent; graduate standing; consent of instructor. Covers the origin of fluorescence and other emission processes that modulate the characteristics of molecular emissions. Presents emission-based analytical and bioanalytical methods and techniques. Reviews state-of-the-art instrumentation, including their applicability, limitations, and source. Also provides interpretation and meaning of the measured signals as applied to biological systems. May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor. Course is repeatable as content changes. Cross-listed with MSE 226.

**BIEN 249** Integration of Computational and Experimental Biology, 4 units, Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): BIOL 005B; MATH 010B, MATH 046, PHYS 040C; graduate standing. A multidisciplinary introduction to computational methods used to analyze experimental biological data. Introduction to mathematical concepts needed to understand protein structure and dynamics, protein-protein interactions (structures and networks), gene regulatory networks, signal transduction networks, metabolic networks, and kinetic modeling of cellular processes. Also covers techniques used to derive experimental data. May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor. Cross-listed with CEE 249.

**BIEN 251** Biophotonics: Optical Microscopy and Its Biological Applications, 3 units, Lecture, 2 hours; discussion, 1 hour. Prerequisite(s): graduate standing or consent of instructor. Examines the fundamentals of optical system design and system integration in light microscopy. Covers design components, including light sources, lenses, mirrors, dispersion elements, optical fibers, and detectors. Also covers optical system analysis, transfer functions, magnification, resolution, contrast, and molecular, cellular, organ, and organism applications.

**CHEM 201A** Advanced Physical Chemistry: Quantum Mechanics (3) Lecture, 3 hours. Prerequisite(s): CHEM 113 with a grade of “C” or better. Covers concepts in quantum mechanics including wavepackets, uncertainty, single particles in multiple dimensions, and approximate methods for solving the Schroedinger equation.

**CHEM 201B** Advanced Physical Chemistry: Quantum Mechanics and Spectroscopy (3) Lecture, 3 hours. Prerequisite(s): CHEM 113 with a grade of “C” or better. Covers concepts in quantum mechanics with particular applications to spectroscopy.

**CHEM 201C** Advanced Physical Chemistry: Elementary Statistical Mechanics (3) Lecture, 3 hours. Prerequisite(s): CHEM 110A and CHEM 110B with grades of “C” or better. Covers concepts in elementary statistical mechanics including ensembles, interpretations of thermodynamic functions, and quantum statistics.

**CHEM 201D** Advanced Physical Chemistry: Thermodynamics (3) Lecture, 3 hours. Prerequisite(s): CHEM 110A and CHEM 110B with grades of “C” or better. Covers concepts in thermodynamics including fundamental equations, potentials, Maxwell relations, and stability criteria. Cross-listed with MSE 205.

**CHEM 201E** Advanced Physical Chemistry: Kinetics (3) Lecture, 3 hours. Prerequisite(s): CHEM 110A and CHEM 110B with grades of “C” or better. Covers concepts in kinetics including reaction mechanisms and the molecular interpretation of reaction dynamics.

**CHEM 206A** Introduction to Computational Quantum Chemistry (3) Lecture, 3 hours. Prerequisite(s): CHEM 113 or equivalent, graduate standing; or consent of instructor. Introduces computational techniques in quantum chemistry. Includes Hartree-Fock theory, Density Functional Theory, and
electron correlation methods. Emphasizes practical applications in a research setting. Cross-listed with MSE 225C.

**CHEM 206B** Modeling Chemical and Biochemical Molecules (3) Lecture, 3 hours. Prerequisite(s): graduate standing in Chemistry or a related field or consent of instructor. Introduces students to the principles, concepts, and techniques for modeling chemical and biological systems. Covers the various methods and techniques for molecular simulations, energy calculations, obtaining initial data, accessing data reliably, visualization and analysis of molecules, and screening and designing chemicals for proteins.

**CHEM 209** (E-Z) Advanced Topics in Physical Chemistry (2-3) lecture, 2 hours (2 units) or 3 hours (3 units). Prerequisite(s): consent of instructor. Additional prerequisites are required for some segments of this course; see department. Selected advanced topics from modern physical chemistry.

**CHEM 211D** Spectrometry in Organic Structure Analysis (3) Lecture, 3 hours. Prerequisite(s): graduate standing or consent of instructor. Utilizes modern spectroscopic techniques such as IR, mass spectrometry, and 1H and 13C NMR to determine the structure of complex organic molecules. Topics include advanced NMR techniques such as 2D NMR, NMR pulse sequences, diffusion NMR, and MRI. Cross-listed with MSE 225A.

**CHEM 229G** Advanced Topics in Analytical Chemistry (2 or 3) Lecture, 2-3 hours. Prerequisite(s): consent of instructor. Additional prerequisites may be required for segments of this course; see department. Selected advanced topics from modern analytical chemistry. Course content will vary.

**PHYS 145A** Biophysics, 4 units, Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): CHEM 001C or CHEM 01HC; MATH 010B; MATH 046; one of the following: PHYS 002C with B- or better, PHYS 041C with a C- or better, PHYS 040E with a C- or better. Covers physical modeling of the structure of proteins; protein folding; structure of nucleic acids; electrostatic potential of DNA; dynamics of biomolecules; structure of a biological cell; osmotic pressures of cells; non-equilibrium thermodynamics; and biochemical reactions.

**PHYS 145B** Biophysics (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): PHYS 145A; BCH 100 or BCH 110B; or consent of instructor. Covers conformation of biopolymers, intermolecular forces, dynamics of biopolymers, Brownian motion, biopolymers as polyelectrolytes, electrolytic solutions, and the Debye-Huckel theory.

**PHYS 145C** Biophysics (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): PHYS 145B or consent of instructor. Examines stochastic thermodynamics; the Fluctuation Theorems and the Jarzynski relation; protein and RNA denaturation; tests of the Jarzynski relation; chemical forces and selfassembly; enzymes and molecular machines; survey of molecular devices found in cells; and kinetics of real enzymes and machines.

**PHYS 212A** Thermodynamics and Statistical Mechanics, 4 units, Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): graduate standing; consent of instructor. Covers thermodynamics, statistical mechanics, ideal Bose systems, ideal Fermi systems, and bulk motion. Cross-listed with MSE 204.

**PHYS 212B** Thermodynamics and Statistical Mechanics, 4 units, Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): MSE 204/PHYS 212A; graduate standing; consent of instructor. Addresses functional integrals and approximation techniques. Provides an introduction to phase transitions and the renormalization group.
PROPOSAL FOR A JOINT

Entomology BS / Entomology MS
Five-Year Combined-Degree Program

November 2017

Proposed by the Faculty of
the Entomology Department
College of Natural and Agricultural Sciences
University of California, Riverside
Riverside, CA 92521

1 Introduction

The Department of Entomology is proposing a new degree program that allows students
to obtain a joint BS/MS degree through an integrated 5-year plan of study. The
proposed program is within the framework established by UCR's Committee on
Educational Policy and the UCR Graduate Council in 2007. This program prepares
students for careers that require knowledge of entomology and for pursuing subsequent
medical or doctoral degrees. The Joint BS/MS Program is open to UCR Entomology
undergraduates only.

Participation in the joint degree program is initiated through an application for admission
prior to the students’ senior year. Students interested in this program should begin
identifying potential research labs by the end of their junior year. This would allow
students to begin thesis research early in their senior year by applying for entomology
research credit (ENTM 197/199). The Graduate Division and the Department of
Entomology do not provide financial support for students enrolled in this program.

Motivation: Quoting from the document “Establishment of Combined Programs at
UCR”¹ “Combined programs can better attract top high school graduates, transfer
students, and returning students, especially those interested in advanced
degrees. Thus, UCR departments can expect a higher proportion of good
undergraduates. Combined program students will be more inclined to stay at
UCR for their Masters studies instead of applying to other institutions. Thus, UCR
departments can better retain these students." UC has placed an increased
emphasis on attracting transfer students from community colleges and the joint
BS+MS program provides a unique opportunity for these students.

In sum, the program should attract top students into both the BS and MS
programs.

¹Online at http://senate.ucr.edu/about/policies/establishment_of_combined_programs_at_ucr.pdf.
Method: To make it possible to complete both degrees in five years, the combined programs can allow double-counting of up to twelve credits of coursework done for the undergraduate degree towards the MS degree. The justification is that many UCR MS programs require up to twelve units of preparatory undergraduate coursework that may be necessary for undergraduates from other institutions but redundant for undergraduates coming from an appropriate UCR program. In the case of Entomology, all graduate students are required to take a 15 unit graduate core in lieu of taking the preparatory undergraduate courses. Students in the combined program will receive the requisite background in their undergraduate curriculum.

Relation to existing programs. The program consists of the regular Entomology BS program, with MS research initiated during the fourth year and completed in year five. Up to twelve units of undergraduate technical-elective coursework can be counted towards the MS elective requirements, so that the (Plan I) MS requirements can be met in a single additional year.

As the primary motivation for the program is simply recruitment of top students, the program involves no new courses or requirements.

Interrelation with other UC institutions. The proposed program would be unique among Entomology programs nationally. Consequently, beyond making the respective BS and MS programs more attractive, the program does not directly compete or interrelate with other UCR or UC programs or institutions. It may indirectly recruit top students into the UCR (or other UC) life science PhD programs via the MS program.

Department that will administer the program. The BS and MS portions of the program will be administered by the Department of Entomology in the College of Natural and Agricultural Sciences.

Timetable for development. Based on current levels of participation in the Entomology BS program over the 2012-2017 period, we expect from 3-6 students to participate at the MS level per year.

Historical development of the field. There is a consistent strong demand for individuals with BS and MS degrees in Entomology in private industry, government and institutional service, and in research. Individuals with research experience are highly suited for these positions and are highly sought after for their ability to adapt to rapidly changing work environments. However, many of these positions do not require the extensive training provided by the Ph.D. In a recent survey of entomological non-academic jobs, we found that 65% explicitly required or preferred a Master's degree and 20% did not specify and only 15% required a PhD. Furthermore, a recent USDA report estimates are that the only 61% of the expected openings in agriculture, food, renewable natural resources, or the environment will be filled due to a paucity of
students graduating with degrees in these areas (Goecker et al 2015). Students with BS and MS in Entomology would be excellent candidates to fill these positions. Thus, demand for, and awareness of, graduate-level training is increasing, making it a good time to leverage interest in the MS program and to facilitate entry into it.

**Plan for evaluation of the program.** The effectiveness of the program will be evaluated by monitoring the extent to which it increases the quality of students in the BS and MS programs. The metrics of evaluation will include GPA, graduation rates, job placement, and acceptance to advanced degree programs.

2. **Program**

**Admission Criteria.** The proposed 5-year joint BS/MS degree in Entomology will have two timeframes for admission, one of which is for conditional admission: 1) preliminary conditional admission as an incoming lower division student, and 2) admission as a junior meeting admission criteria. The Department of Entomology proposes to offer outstanding freshman the opportunity to apply for preliminary (conditional) admission into the joint BS/MS program in Entomology based on their undergraduate admission qualifications. This can serve as a recruiting tool as well as increase participation in the program. Official admittance would still require meeting the course and GPA criteria and satisfactory progress in the undergraduate major.

**Preliminary Conditional Admission Criteria**
- Intent to enroll in the UCR Entomology Program
- High School GPA > 3.6
- SAT I combined score > 1950

**Official Admission Criteria**
- Enrolled in the UCR Entomology Program
- 3.3 GPA in major (upper division classes only)
- 3.0 GPA overall
- The GRE requirement would be waived for admission to the BS/MS

Prospective BS/MS students are responsible for selecting an eligible faculty member to serve as their thesis advisor. The thesis research should entail at least 24 units of research over 6 consecutive quarters with one advisor. Alternatively, students may petition to work for no more than 2 quarters in another lab to either develop essential methodological skills or work on a related mini-project, followed by the remaining 4-5 consecutive quarters spent in the laboratory of their major advisor. At the time of application, students must provide written confirmation that the selected thesis advisor will not be on sabbatical leave during any quarter of the scheduled BS/MS project.

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Eligible faculty mentors include any faculty within the Department of Entomology (Professor Emeritus, Distinguished Professor, Professor, Associate Professor, Assistant Professor, Cooperative Extension Specialist) or faculty with cooperating faculty status in the Entomology Department. If the proposed research member does not fall into one of these categories, the student will need to have a PI from Entomology serve as co-chair. The co-chair’s responsibility is to assess the proposed and ongoing research and ensure that the research is relevant to the field of Entomology.

**Joint BS / MS Degree Requirements.** The BS program course requirements remain as currently outlined in the general catalog. Additional research unit requirements are outlined below and a sample program is provided.

The joint BS/MS requires a total of 36 units. A minimum of 24 research units (a combination of ENTM 197/199/199H and ENTM 297/299) over 6 consecutive quarters is required. Students receive credit towards this requirement by completing ENTM 199/199H as an undergraduate senior and ENTM 297/299 as a graduate student. A maximum of 3 quarters of ENTM 199/199H and a minimum of 3 quarters of ENTM 297/299 can be applied towards the BS/MS program. As is the case for all Entomology graduate programs, the departmental seminar, ENTM 250, is required during all quarters of the MS portion of the program, however it does not count toward the 36-unit requirement. Remaining course requirements can be fulfilled by taking a minimum of 6 units of graduate courses and graded 2-unit graduate seminars in ENTM or relevant departments (e.g. EEOB, STAT). Up to 6 units of upper division 100 level ENTM courses may be taken during the MS portion of the program. No more than 12 units earned prior to matriculation to graduate status (including ENTM 199/199H) can be applied toward the MS degree requirements.

During the MS portion of this program, students must maintain a grade-point average (both overall and in the major) of at least 3.0 for all course work, both cumulatively and for each quarter of enrollment. If the student's GPA falls below 3.0 (for either the overall or major), he/she may be dropped from the program.

Additional requirements include participation in Graduate Student Seminar Day and the completion of a thesis, with an oral presentation to, and approval of, a 3-member MS Thesis Committee. Students must meet with their committee prior to and throughout the master’s year to discuss the project and its progress. The written thesis must be submitted to the MS Thesis Committee by Week 7 of the student’s sixth quarter in the joint BS/MS program. Any deviation from this plan, such as a disruption in enrollment for 1 or more quarters, may cause the student to be dropped from the program.

**Sample BS/MS Degree Program.** The following table outlines a sample program for a student in the proposed joint BS/MS in Entomology. Students would average 15.3 units per quarter in the BS portion of this proposed joint degree program.
## PROPOSED JOINT BS/MS

### Freshman Courses

<table>
<thead>
<tr>
<th>Courses</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 005A, BIOL 05LA or BIOL 020; BIOL 005B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC</td>
<td>4,1</td>
<td>4,1</td>
<td>4,1</td>
</tr>
<tr>
<td>ENGL 001A, ENGL 001B</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MATH 007A or MATH 009A, MATH 007B or MATH 009B</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Humanities/Social Sciences</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Freshman Total Units</strong></td>
<td><strong>17</strong></td>
<td><strong>17</strong></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

### Sophomore Courses

<table>
<thead>
<tr>
<th>Courses</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 005C</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biology/Entomology Electives</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHEM 008A and 008LA, CHEM 008B and 008LB, CHEM 008C and 008LC</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 02A, PHYS 02LA, PHYS 02B, PHYS 02LB, PHYS 02C, PHYS 02LC</td>
<td>4,1</td>
<td>4,1</td>
<td>4,1</td>
</tr>
<tr>
<td>Humanities/Social Sciences</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Sophomore Total Units</strong></td>
<td><strong>17</strong></td>
<td><strong>17</strong></td>
<td><strong>14</strong></td>
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</table>

### Junior Courses

<table>
<thead>
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<th>Courses</th>
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</tr>
</thead>
<tbody>
<tr>
<td>BIOL 102</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 107A, ENTM 173/BIOL 173</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ENTM 100/BIOL 100</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENTM 107</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Biology/Entomology Electives</td>
<td></td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>BCH 100, ENTM 19X</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Humanities/Social Sciences</td>
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<td></td>
</tr>
<tr>
<td><strong>Junior Total Units</strong></td>
<td><strong>16</strong></td>
<td><strong>17</strong></td>
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</table>

### Senior Courses

<table>
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<th>Courses</th>
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</thead>
<tbody>
<tr>
<td>ENTM 180</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>ENTM 199/199H*</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Biology/Entomology Electives</td>
<td>8</td>
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<td>8</td>
</tr>
<tr>
<td>Humanities/Social Sciences, ENGL 001C</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Senior Total Units</strong></td>
<td><strong>14</strong></td>
<td><strong>14</strong></td>
<td><strong>12</strong></td>
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</table>

### 5th Yr/MS Courses

<table>
<thead>
<tr>
<th>Courses</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTM 29X*</td>
<td>5</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Entomology Electives (200 level, includes ENTM 2-unit seminars)</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entomology Electives (100 or 200 level)</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENTM 250</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>5th Yr Total Units</strong></td>
<td><strong>12</strong></td>
<td><strong>12</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

* Only 24 total research credits (199/199H + 29X) will count toward the MS degree
* Up to 12 units of 100 level ENTM electives and 199/199H research credits will double count towards the BS and the MS degree requirements. This 12 credit limit is similar to BCOE BS/MS program.
Application Details. Interested students must submit a Statement of Interest and Eligibility (SIE) before the start of their final undergraduate year but are encouraged to apply as early as possible. This SIE would provide documentation of meeting the eligibility criteria, identify the thesis advisor and include a very brief description of the proposed research topic.

Projected Flowchart of Student Applicants. The following flowchart illustrates how ENTM students may move into and out of the joint BS/MS program in ENTM. Students must maintain academic standards (i.e. GPA > 3.3 in major and 3.0 overall) or they will not be permitted to remain in the program.

Catalog entry

Joint Entomology BS + Entomology MS Program. The College of Natural and Agricultural Science offers a combined five-year BS / MS program in Entomology, designed to allow successful UCR Entomology BS graduates to complete the Master of Science degree in Entomology in one year. Applicants to the Entomology Joint BS/ MS program should apply by the end of their junior year, provided that the student was a UCR Entomology BS student with cumulative GPA at least 3.0 overall and 3.3 in the
Entomology major. The application to the Joint BS/MS program must include at least two recommendation letters from UCR Academic Senate faculty members, one of which should include the prospective thesis advisor and at least one of which must be Entomology faculty. Matriculation into the graduate portion of the joint degree program occurs in the Fall term following senior year, provided: (a) the MS application is accepted, (b) throughout senior year, the student is an Entomology BS major with cumulative GPA 3.0 or higher, (c) by the end of senior year, the student completes the Entomology BS degree requirements.

Incoming freshman students who are applying to the Entomology BS program may simultaneously apply for preliminary admission into the joint degree program provided their high-school GPA is at least 3.6, their SAT-I combined score is at least 1950, they satisfy the Entry-Level Writing requirement prior to matriculation, and they have sufficient math preparation to enroll in MATH 7A (Calculus for the Life Sciences) or 9A (First-Year Calculus Part 1) upon arrival. Preliminary conditional admission status is maintained as long as the student is an Entomology BS student in good standing with a cumulative GPA of at least 3.0. Preliminarily admitted students would still need to apply for full admission by the end of their junior year as described above.

Up to 12 units of 100 level coursework taken as a UCR undergraduate to be counted towards the 36-unit requirements of the MS Courses that may be double-counted are only those that are eligible to be counted as ENTM 199/199H research credits or 100 level electives in the BS requirements (e.g. ENTM 106, course between ENTM 109 up to ENTM 162).

3. Projected need, resource requirements, student support

As noted in the introduction, in keeping with the framework established by CEP and Graduate Council, this combined program is primarily a recruitment tool, intended to leverage the increasing interest in graduate education to attract top freshmen into the BS program, and to attract top UC Riverside BS students into the MS program.

In the BS program, the prospect of entering the program at year three and completing both the BS and MS in a total of five years should attract students that are highly motivated and more likely than average to make it through the program. While we do have a number of students who choose to study Entomology as entering freshmen, a larger proportion of our undergraduates discover the field after their first year at UC Riverside. The combined BS/MS program will increase the visibility of the undergraduate major to entering students. It will also raise the visibility of the major to life science students who are already enrolled but might have been unaware of the prospects offered by the discipline. We expect that the opportunity of earning a joint BS/MS in three years will be highly attractive to community college transfer students as well. Enrollment of community college students has recently become an urgent priority for the University of California. Combined with ongoing increases in admissions standards, this should increase both retention and the overall quality of the students.
In the MS program, we anticipate growth in combined-program enrollment initially of only a few students per year. However, a similar program in life sciences at UC San Diego has more than 100 students enrolled. Rapid growth in the proposed program would be welcome and would significantly increase overall enrollment in the Entomology MS program. Although we consistently receive a small number of applicants for our Plan 1 MS program, potential major professors accept a very small number of students because of the lack of support available to them. There would be no expectation of support for the participants in the combined BS/MS program. Major professors could provide support funding in the fifth year if they chose to do so. In addition, if at some point in the future, funding opportunities emerge from campus, college, or Graduate Division sources for MS students, then fifth-year BS/MS students would be eligible. If a student decided to continue on for a Ph.D., then full support packages would be provided. Each student accepted into the combined program is likely to be near the top of the applicant pool and would be welcomed into the laboratories, particularly if there was a likely prospect of timely completion of the degree and continuation through the Ph.D.

In short, the main effect of the program should be to increase the quality of students in the BS and MS programs, and achieve a modest increase in enrollment levels. Similarly, it should increase the employability of students produced by the BS and MS programs, and help meet the increasing demand for Entomology students with graduate degrees.

**Resources.** Note that each student in the combined program is essentially just a regular student (in the BS program, or, in fifth year, in the MS program), and requires the same resources as a regular student at the same level. Also, because of the highly selective nature of the admissions requirements, BS and MS enrollments will be modestly affected, at least initially. Currently, all of the undergraduate entomology majors are required to complete at least four and up to six units of undergraduate research in Entomology. This requires them to become associated with faculty and their laboratories. Thus, the program requires no change in faculty, courses, or resources such as library, computing, equipment, space, etc. Likewise, the program requires no change in levels or mechanisms for student funding.

The program does require minor administrative support. During the BS portion of this program, students will be advised by the CNAS Undergraduate Academic Advising Center as normal for pursuance of a BS in Entomology. The administration of the program at the undergraduate level requires processing applications for preliminary acceptance, tracking preliminarily enrolled students, and identifying and informing students who will be eligible to apply at the end of their junior year. The administrative functions for admission to the Entomology Graduate program are already performed by the department Instruction and Student Affairs Committee; this committee will also be responsible for administering the BS/MS program with continued support from the CNAS Graduate Student Affairs Center, which will have to track which MS students are in the combined program and account for the double-counting allowance.
Finally, only to the extent that existing resources allow, BS students with “preliminary conditional admission” status will be given additional advising appropriate for MS-bound students. The department faculty advisors for undergraduate students and for graduate students are also members of the Instruction and Student Affairs Committee, which will serve to coordinate advising needs.

4. Changes in Senate regulations

No changes in Senate regulations are required.
To: CNAS Executive Committee

From: Kathryn Uhrich
Dean, CNAS

Date: October 2, 2017

RE: Five-year BS/MS degree program in Entomology

The Department of Entomology has proposed a valuable degree program that allows students to obtain a joint BS/MS degree through an integrated 5-year plan of study. The joint degree program will provide an efficient and cost-effective academic path offering a high level of technical proficiency for students interested in careers within a variety of areas involving insects and insect pest control. This program is expected to serve as a potential model for other programs within the college to efficiently provide academic training and preparation for non-academic careers in technical fields. Moreover, the program offers unique opportunities for qualified students from community colleges to transfer into the program, complete the BS/MS degree and efficiently move into their professional careers.

I fully support this proposed BS/MS degree program.
DATE: 25 September 2017

TO:    Dr. Kathryn Urich, Dean
        College of Natural and Agricultural Sciences

FROM:  Dr. Richard A. Redak, Chair
        Department of Entomology

SUBJECT: Proposed new BS/MS program in Entomology

The faculty of the Department of Entomology have developed a proposal to offer a joint BS/MS degree program in Entomology. The details are provided in the accompanying attachment. The proposed program would enable students to earn a BS and a research MS (Plan 1) degree in five years. Highly qualified undergraduates would be conditionally admitted as incoming students and formally admitted at their junior year based on formal graduate admissions criteria. In addition, the program would be available to community college transfer students who apply and meet the admissions criteria. We believe, based on surveys of our current undergraduate majors, that the joint degree program will be highly attractive to life science undergraduate students and could be a very important to attracting high quality and motivated community college transfer students.

Although there are only two joint degree programs (both in the Bourns College of Engineering), the appropriate Academic Senate Committees have criteria and processes in place for approval of new proposals. The process for approval of new graduate programs requires a letter of support from the College Dean before the proposal goes to the College Executive Committee and then on to the appropriate Academic Senate Committees. Consequently, we ask that you evaluate the potential benefits of the proposed joint degree and provide a letter of support for our efforts. That letter and the attached document would then be forwarded by your office to the CNAS Executive Committee.

Thank you very much for your support.
Unanimously in favor (20 yes, 0 no, 0 abstain, 9 unavailable [1 Div Dean, 1 Sabbatical, 5 travel, 2 MIA]). Meeting was held June 23, 2017.

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On Tue, Oct 3, 2017 at 4:25 PM, Rachel Alvarez <rachel.alvarez@ucr.edu> wrote:

Rick,

Kathryn has completed the letter of support. I’ve been advised that we need something to indicate the department has voted on and recommends this program (“x were present, x voted, x approved”). Once we receive that info, I can forward to CNAS Executive Committee.

Rachel

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All please see attached documents.
March 9, 2018

To: Dylan Rodríguez, Chair
    Riverside Division

From: Ruhi Khan, Vice Chair
    Committee on Educational Policy

Re: Proposed Entomology M.S. Five Year Combined Degree Program

The Committee on Educational Policy reviewed the proposal for an Entomology M.S. Five Year Combined Degree Program at their March 2, 2018 meeting and were generally supportive of the proposal.

The Committee did question if graduates of the program would have to wait a year before applying to the Ph.D. program in Entomology, as this practice applies to graduates of other master’s degrees on campus. The Committee recommends that the proposal be revised to include this clarification as the proposal does mention the intent that some students will apply for the Ph.D. program.

The Committee also noted concern that admissions criteria for transfer students was not included in the proposal. The Committee recommends that the proposal be updated to include admissions requirements for transfer students and a pathway for transfer students into the program.

Lastly, the Committee recommends that a letter of support from Graduate Division be included in the proposal.
Graduate Council

March 23, 2018

To: Dylan Rodriguez, Chair
Riverside Division

From: Hyle Park, Vice Chair
Graduate Council

Re: [Campus Review] Proposed Degree Program: Joint Entomology BS/Entomology MS Five-Year Combined-Degree Program

Graduate Council discussed the proposal for the Five-Year Combined-Degree Program “Entomology BS/Entomology MS”. Although comments were overall positive, several areas require clarification:

- It was unclear to the Council if the course-work, research credits, and thesis carried out under the proposed BS/MS program are equivalent to a “full” 2-year Master of Science in Entomology or if they rather constitute a 5-year baccalaureate program (closer to an honors program than a MSc program). If the latter, the program should consider renaming this degree track, e.g., to “baccalaureate program in Entomology”. If this program is intended to replace a 2-year MSc program, it should be discussed more explicitly how course-work, research credits, and thesis expectations of the proposed BS/MS and the 2-year MSc are equivalent. Moreover, the Council was concerned that the transcript will not show a MS degree (as is common with most other BS/MS programs) even though the name of the program has “MS” in it. Thus, there is the potential for significant confusion among students.

- Should this program be intended as a baccalaureate program and students be accepted into a 2-year MSc program after graduating from it, will some of the credits earned during the 5-year program count towards a 2-year MSc (at UCR or elsewhere)?

- Should this new program be intended to replace a 2-year MSc program, a rational should be provided for why a 2-year MSc program in Entomology would still be offered at UCR in parallel to the proposed program.

- Official admission criteria: in contrast to admission to the graduate program in Entomology (both MS and PhD) that requires for a faculty mentor ("major
professor”) to sign for a student before they are admitted to the program (although this is not stated as such in the current catalog copy, it appears), wording for “official admission criteria” to the BS/MS implies that this is not the case for this program. The paragraph below states that students are responsible for selecting a faculty mentor, but it is unclear what happens to students who do not succeed in finding a mentor. If commitment of a faculty member to supervise a student’s thesis is required before admission, this should be clarified.
April 13, 2018

To: Dylan Rodriguez, Chair
Riverside Division

From: Lisa Raphals, Vice Chair
Committee on Library and Information Technology

Re: [Campus Review] Proposed Degree Program: Joint Entomology BS/Entomology MS Five-Year Combined-Degree Program

The Committee on Library and Information Technology reviewed the Proposed Degree Program: Joint Entomology BS/Entomology MS Five-Year Combined-Degree Program at their March 6, 2018 meeting. The Committee sees no significant increase on library and IT resources, thus the committee approves the proposal. However, the committee did note that the proposal does not state how transfer students can apply to the program.
PLANNING & BUDGET

March 13, 2018

To: Dylan Rodriguez, Chair
Riverside Division

From: Christian Shelton, Chair
Committee on Planning and Budget

RE: Proposed Degree Program: Joint Entomology BS/Entomology MS Five-Year Combined-Degree Program

The Committee on Planning & Budget discussed the proposal for a joint Entomology BS/Entomology MS five-year combined-degree program at their March 13, 2018 meeting and found no budgetary concerns. The committee voted +11-0-0 in favor of the new program proposal.
March 14, 2018

To: Dylan Rodríguez, Chair
    Riverside Division

From: Pete Sadler, Chair
      Committee on Undergraduate Admissions

Re: Review of Proposed Joint Entomology B.S./M.S. Five-year Combined Degree Program

The Committee on Undergraduate Admissions reviewed the proposal for a joint Entomology B.S./M.S. five-year combined degree program at their March 13, 2018 meeting. The Committee voted to support the proposal as it did not impose a burden on the admissions process. The Committee does recommend that the Department consult with the Office of Undergraduate Admissions about the implementation date for the program. The admissions staff could then plan appropriately to include the new program in their outreach campaigns, as soon as it is approved.
Response to Senate Committees

We thank the Academic Senate Committees for their review and consideration of our proposed program. These reviews are included on the following pages. While the reviews were very positive, there were a few points of confusion that we have clarified in the revised proposal.

The committees offered some excellent suggestions. We now include a letter of support from Graduate Division. We will consult with the Office of Undergraduate Admissions regarding the implementation date of the program if approved. We have revised the program proposal to ensure that a variety of points raised in these reviews are more explicitly explained. Several of the most important responses are briefly described below.

We have clarified that the proposed program is a complement to our existing Plan 1 MS program and not a replacement. We have revised the wording to emphasize that students graduating from this program will receive 2 degrees in Entomology: (1) a BS at the end of their senior standing year once degree requirements have been met, and (2) an MS at the end of their MS-standing year once degree requirements have been met. This option would only be open to students obtaining the BS degree from UC Riverside, while outside or returning applicants to the MS program would complete the standard 2 year, Plan 1 MS program. We have also added an explicit statement that, in accordance with departmental convention, students will only be accepted into the program if they have identified and received approval from a major professor. We have also clarified the admission criteria for transfer students and added this pathway into the Projected Flowchart of Student Applicants.
1 Introduction

The Department of Entomology is proposing a new degree program that allows students to obtain a joint both a BS and MS degrees through an integrated 5-year plan of study. The proposed program is within the framework established by UCR’s Committee on Educational Policy and the UCR Graduate Council in 2007. This program prepares students for careers that require knowledge of entomology and for pursuing subsequent medical or doctoral degrees. The Joint BS+MS Program is open to UCR Entomology undergraduates only.

Participation in the joint degree program is initiated through an application for admission prior to the students’ senior year. Students interested in this program should begin identifying potential research labs by the end of their junior year. This would allow students to begin thesis research early in their senior year by applying for entomology research credit (ENTM 197/199). The Graduate Division and the Department of Entomology do not provide financial support for students enrolled in this program.

Motivation: Quoting from the document “Establishment of Combined Programs at UCR”1 “Combined programs can better attract top high school graduates, transfer students, and returning students, especially those interested in advanced degrees. Thus, UCR departments can expect a higher proportion of good undergraduates. Combined program students will be more inclined to stay at UCR for their Masters studies instead of applying to other institutions. Thus, UCR departments can better retain these students.” UC has placed an increased emphasis on attracting transfer students from community colleges and the joint BS+MS program provides a unique opportunity for these students.

In sum, the program should attract top students into both the BS and MS programs.

1Online at http://senate.ucr.edu/about/policies/establishment_of_combined_programs_at_ucr.pdf.
Method: To make it possible to complete both degrees in five years, the combined programs can allow double-counting of up to twelve credits of coursework done for the undergraduate degree towards the MS degree. The justification is that many UCR MS programs require up to twelve units of preparatory undergraduate coursework that may be necessary for undergraduates from other institutions but redundant for undergraduates coming from an appropriate UCR program. In the case of Entomology, all graduate students are required to take a 15 unit graduate core in lieu of taking the preparatory undergraduate courses. Students in the combined program will receive the requisite background in their undergraduate curriculum.

Relation to existing programs. The program consists of the regular Entomology BS program, with MS research initiated during the fourth year and completed in year five. Up to twelve units of undergraduate technical-elective coursework can be counted towards the MS elective requirements, so that the (Plan I) MS requirements can be met in a single additional year. [This is a complement to the existing two-year MS program in the Department of Entomology, whose applicant pool is almost entirely comprised of students who received their undergraduate degrees elsewhere.]

As the primary motivation for the program is simply recruitment of top students, the program involves no new courses or requirements.

Interrelation with other UC institutions. The proposed program would be unique among Entomology programs nationally. Consequently, beyond making the respective BS and MS programs more attractive, the program does not directly compete or interrelate with other UCR or UC programs or institutions. It may indirectly recruit top students into the UCR (or other UC) life science PhD programs via the MS program.

Department that will administer the program. The BS and MS portions of the program will be administered by the Department of Entomology in the College of Natural and Agricultural Sciences.

Timetable for development. Based on current levels of participation in the Entomology BS program over the 2012-2017 period, we expect from 3-6 students to participate at the MS level per year.

Historical development of the field. There is a consistent strong demand for individuals with BS and MS degrees in Entomology in private industry, government and institutional service, and in research. Individuals with research experience are highly suited for these positions and are highly sought after for their ability to adapt to rapidly changing work environments. However, many of these positions do not require the extensive training provided by the Ph.D. In a recent survey of entomological non-academic jobs, we found that 65% explicitly required or preferred a Master's degree and 20% did not specify and only 15% required a PhD. Furthermore, a recent USDA report estimates are that the only 61% of the expected openings in agriculture, food, renewable natural resources, or the environment will be filled due to a paucity of...
students graduating with degrees in these areas (Goecker et al 2015)\(^1\). Students with BS and MS in Entomology would be excellent candidates to fill these positions. Thus, demand for, and awareness of, graduate-level training is increasing, making it a good time to leverage interest in the MS program and to facilitate entry into it.

**Plan for evaluation of the program.** The effectiveness of the program will be evaluated by monitoring the extent to which it increases the quality of students in the BS and MS programs. The metrics of evaluation will include GPA, graduation rates, job placement, and acceptance to advanced degree programs.

**2. Program**

**Admission Criteria.** The proposed 5-year joint BS+MS degree program in Entomology will have two timeframes for admission, one of which is for conditional admission: 1) preliminary conditional admission as an incoming lower division student, and 2) admission as a junior meeting admission criteria. The Department of Entomology proposes to offer outstanding freshman the opportunity to apply for preliminary (conditional) admission into the joint BS+MS program in Entomology based on their undergraduate admission qualifications. This can serve as a recruiting tool as well as increase participation in the program. Official admittance would still require meeting the course and GPA criteria and satisfactory progress in the undergraduate major.

*Preliminary Conditional Admission Criteria*
- Intent to enroll in the UCR Entomology Program
- High School GPA > 3.6
- SAT I combined score > 1950

*Official Admission Criteria*
- Enrolled in the UCR Entomology Program
- 3.3 GPA in major (upper division classes only, minimum of 12 units to be completed by the end of junior year)
- 3.0 GPA overall\(^2\)
- The GRE requirement would be waived for admission to the BS+MS

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\(^2\) Transfer students would need to have a combined overall GPA (UCR and prior institution) of 3.0.
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**Joint BS +/ MS Degree Program Requirements.** The BS program course requirements remain as currently outlined in the general catalog. Additional research unit requirements are outlined below and a sample program is provided.

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Sample BS+MS Degree Program. The following table outlines a sample program for a student in the proposed joint BS+MS program in Entomology. Students would average 15.3 units per quarter in the BS portion of this proposed program.

### PROPOSED JOINT BS+/MS PROGRAM

<table>
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* Only 24 total research credits (199/199H + 29X) will count toward the MS degree

³ Up to 12 units of 100 level ENTM electives and 199/199H research credits will double count towards the BS and the MS degree requirements. This 12 credit limit is similar to BCOE BS/MS program.
Application Details. Interested students must submit a Statement of Interest and Eligibility (SIE) before the start of their final undergraduate year but are encouraged to apply as early as possible. This SIE would provide documentation of meeting the eligibility criteria, identify the thesis advisor and include a very brief description of the proposed research topic, and be signed by the identified thesis advisor.

Projected Flowchart of Student Applicants. The following flowchart illustrates how ENTM students may move into and out of the joint BS+MS program in ENTM. Students must maintain academic standards (i.e. GPA > 3.3 in major and 3.0 overall) or they will not be permitted to remain in the program. Students would graduate with a BS in Entomology after their senior year and would graduate with MS in Entomology after their year at MS standing.

Catalog entry

Joint Entomology BS + Entomology MS Program. The College of Natural and Agricultural Science offers a combined five-year BS / MS program in Entomology, designed to allow successful UCR Entomology BS graduates to complete the Master of Science degree in Entomology in one additional year. Applicants to the Entomology Joint BS+MS program should apply by the end of their junior year, provided that the student was a UCR Entomology BS student with cumulative GPA at least 3.0 overall.
and 3.3 in the Entomology major. This must include a minimum of 12 units of upper division Entomology courses to be completed by the end of spring term of junior year (or the student's year of application). Similarly, transfer students must complete 12 units of upper division Entomology courses, however their combined GPA (minimum 3.0) will be calculated from their UCR and prior institution transcripts. The application to the Joint BS+MS program must include at least two recommendation letters from UCR Academic Senate faculty members, one of which should will include the prospective thesis advisor and at least one of which must be Entomology faculty. Matriculation into the graduate portion of the joint degree program occurs in the Fall term following senior year, provided: (a) the MS application is accepted, (b) throughout senior year, the student is an Entomology BS major with cumulative GPA 3.0 or higher, (c) by the end of senior year, the student completes the Entomology BS degree requirements and receives their BS in Entomology.

Incoming freshman students who are applying to the Entomology BS program may simultaneously apply for preliminary admission into the joint degree program provided their high-school GPA is at least 3.6, their SAT-I combined score is at least 1950, they satisfy the Entry-Level Writing requirement prior to matriculation, and they have sufficient math preparation to enroll in MATH 7A (Calculus for the Life Sciences) or 9A (First-Year Calculus Part 1) upon arrival. Preliminary conditional admission status is maintained as long as the student is an Entomology BS student in good standing with a cumulative GPA of at least 3.0. Prelimarily admitted students would still need to apply for full admission by the end of their junior year as described above.

Up to 12 units of 100 level coursework taken as a UCR undergraduate to be counted towards the 36-unit requirements of the MS Courses that may be double-counted are only those that are eligible to be counted as ENTM 199/199H research credits or 100 level electives in the BS requirements (e.g. ENTM 106, course between ENTM 109 up to ENTM 162).

3. Projected need, resource requirements, student support

As noted in the introduction, in keeping with the framework established by CEP and Graduate Council, this combined program is primarily a recruitment tool, intended to leverage the increasing interest in graduate education to attract top freshmen into the BS program, and to attract top UC Riverside BS students into the MS program.

In the BS program, the prospect of entering the program at year three and completing both the BS and MS in a total of five years should attract students that are highly motivated and more likely than average to make it through the program. While we do have a number of students who choose to study Entomology as entering freshmen, a larger proportion of our undergraduates discover the field after their first year at UC Riverside. The combined BS+MS program will increase the visibility of the undergraduate major to entering students. It will also raise the visibility of the major to
life science students who are already enrolled but might have been unaware of the prospects offered by the discipline. We expect that the opportunity of earning a joint BS+MS in three years will be highly attractive to community college transfer students as well. Enrollment of community college students has recently become an urgent priority for the University of California. Combined with ongoing increases in admissions standards, this should increase both retention and the overall quality of the students.

In the MS program, we anticipate growth in combined-program enrollment initially of only a few students per year. However, a similar program in life sciences at UC San Diego has more than 100 students enrolled annually. Rapid growth in the proposed program would be welcome and would significantly increase overall enrollment in the Entomology MS program. Although we consistently receive a small number of applicants for our Plan 1 MS program, potential major professors accept a very small number of students because of the lack of support available to them. The proposed combined BS+MS program would complement the existing Plan 1 MS program. There would be no expectation of support for the participants in the combined BS+MS program. Major professors could provide support funding in the fifth year if they chose to do so. In addition, if at some point in the future, funding opportunities emerge from campus, college, or Graduate Division sources for MS students, then fifth-year BS+MS students would be eligible. If a student decided to continue on for a Ph.D., then full support packages would be provided. Students could enter the department's Ph.D. program through the fall application process after receiving their MS in Entomology. Petitions to transfer from the MS to the Ph.D. program will be handled according to established departmental procedures. Each student accepted into the combined program is likely to be near the top of the applicant pool and would be welcomed into the laboratories, particularly if there was a likely prospect of timely completion of the degree and continuation through the Ph.D. at UCR or another research institution.

In short, the main effect of the program should be to increase the quality of students in the BS and MS programs, and achieve a modest increase in enrollment levels. Similarly, it should increase the employability of students produced by the BS and MS programs, and help meet the increasing demand for Entomology students with graduate degrees.

Resources. Note that each student in the combined program is essentially just a regular student (in the BS program, or, in fifth year, in the MS program), and requires the same resources as a regular student at the same level. Also, because of the highly selective nature of the admissions requirements, BS and MS enrollments will be modestly affected, at least initially. Currently, all of the undergraduate entomology majors are required to complete at least four and up to six units of undergraduate research in Entomology. This requires them to become associated with faculty and their laboratories. Undergraduate students are also highly encouraged both to attend and participate in Student Seminar Day, which is an excellent forum for learning about research labs in the department and meeting potential mentors. Thus, the program requires no change in faculty, courses, or resources such as library, computing,
equipment, space, etc. Likewise, the program requires no change in levels or mechanisms for student funding.

The program does require minor administrative support. During the BS portion of this program, students will be advised by the CNAS Undergraduate Academic Advising Center as normal for pursuance of a BS in Entomology. The administration of the program at the undergraduate level requires processing applications for preliminary acceptance, tracking preliminarily enrolled students, and identifying and informing students who will be eligible to apply at the end of their junior year. The administrative functions for admission to the Entomology Graduate program are already performed by the department Instruction and Student Affairs Committee; this committee will also be responsible for administering the BS+MS program with continued support from the CNAS Graduate Student Affairs Center, which will have to track which MS students are in the combined program and account for the double-counting allowance. Finally, only to the extent that existing resources allow, BS students with “preliminary conditional admission” status will be given additional advising appropriate for MS-bound students. The department faculty advisors for undergraduate students and for graduate students are also members of the Instruction and Student Affairs Committee, which will serve to coordinate advising needs.

4. Changes in Senate regulations

No changes in Senate regulations are required.
1 Introduction

The Department of Entomology is proposing a new degree program that allows students to obtain both a BS and MS degrees through an integrated 5-year plan of study. The proposed program is within the framework established by UCR's Committee on Educational Policy and the UCR Graduate Council in 2007. This program prepares students for careers that require knowledge of entomology and for pursuing subsequent medical or doctoral degrees. The Joint BS+MS Program is open to UCR Entomology undergraduates only.

Participation in the joint degree program is initiated through an application for admission prior to the students’ senior year. Students interested in this program should begin identifying potential research labs by the end of their junior year. This would allow students to begin thesis research early in their senior year by applying for entomology research credit (ENTM 197/199). The Graduate Division and the Department of Entomology do not provide financial support for students enrolled in this program.

Motivation: Quoting from the document “Establishment of Combined Programs at UCR”1 “Combined programs can better attract top high school graduates, transfer students, and returning students, especially those interested in advanced degrees. Thus, UCR departments can expect a higher proportion of good undergraduates. Combined program students will be more inclined to stay at UCR for their Masters studies instead of applying to other institutions. Thus, UCR departments can better retain these students.” UC has placed an increased emphasis on attracting transfer students from community colleges and the joint BS+MS program provides a unique opportunity for these students.

In sum, the program should attract top students into both the BS and MS programs.

1Online at http://senate.ucr.edu/about/policies/establishment_of_combined_programs_at_ucr.pdf.
Method: To make it possible to complete both degrees in five years, the combined programs can allow double-counting of up to twelve credits of coursework done for the undergraduate degree towards the MS degree. The justification is that many UCR MS programs require up to twelve units of preparatory undergraduate coursework that may be necessary for undergraduates from other institutions but redundant for undergraduates coming from an appropriate UCR program. In the case of Entomology, all graduate students are required to take a 15 unit graduate core in lieu of taking the preparatory undergraduate courses. Students in the combined program will receive the requisite background in their undergraduate curriculum.

Relation to existing programs. The program consists of the regular Entomology BS program, with MS research initiated during the fourth year and completed in year five. Up to twelve units of undergraduate technical-elective coursework can be counted towards the MS elective requirements, so that the (Plan I) MS requirements can be met in a single additional year. This is a complement to the existing two-year MS program in the Department of Entomology, whose applicant pool is almost entirely comprised of students who received their undergraduate degrees elsewhere.

As the primary motivation for the program is simply recruitment of top students, the program involves no new courses or requirements.

Interrelation with other UC institutions. The proposed program would be unique among Entomology programs nationally. Consequently, beyond making the respective BS and MS programs more attractive, the program does not directly compete or inter-relate with other UCR or UC programs or institutions. It may indirectly recruit top students into the UCR (or other UC) life science PhD programs via the MS program.

Department that will administer the program. The BS and MS portions of the program will be administered by the Department of Entomology in the College of Natural and Agricultural Sciences.

Timetable for development. Based on current levels of participation in the Entomology BS program over the 2012-2017 period, we expect from 3-6 students to participate at the MS level per year.

Historical development of the field. There is a consistent strong demand for individuals with BS and MS degrees in Entomology in private industry, government and institutional service, and in research. Individuals with research experience are highly suited for these positions and are highly sought after for their ability to adapt to rapidly changing work environments. However, many of these positions do not require the extensive training provided by the Ph.D. In a recent survey of entomological non-academic jobs, we found that 65% explicitly required or preferred a Master's degree and 20% did not specify and only 15% required a PhD. Furthermore, a recent USDA report estimates are that the only 61% of the expected openings in agriculture, food, renewable natural resources, or the environment will be filled due to a paucity of
students graduating with degrees in these areas (Goecker et al 2015). Students with BS and MS in Entomology would be excellent candidates to fill these positions. Thus, demand for, and awareness of, graduate-level training is increasing, making it a good time to leverage interest in the MS program and to facilitate entry into it.

Plan for evaluation of the program. The effectiveness of the program will be evaluated by monitoring the extent to which it increases the quality of students in the BS and MS programs. The metrics of evaluation will include GPA, graduation rates, job placement, and acceptance to advanced degree programs.

2. Program

Admission Criteria. The proposed 5-year joint BS+MS program in Entomology will have two timeframes for admission, one of which is for conditional admission: 1) preliminary conditional admission as an incoming lower division student, and 2) admission as a junior meeting admission criteria. The Department of Entomology proposes to offer outstanding freshman the opportunity to apply for preliminary (conditional) admission into the joint BS+MS program in Entomology based on their undergraduate admission qualifications. This can serve as a recruiting tool as well as increase participation in the program. Official admittance would still require meeting the course and GPA criteria and satisfactory progress in the undergraduate major.

Preliminary Conditional Admission Criteria
- Intent to enroll in the UCR Entomology Program
- High School GPA > 3.6
- SAT I combined score > 1950

Official Admission Criteria
- Enrolled in the UCR Entomology Program
- 3.3 GPA in major (upper division classes only, minimum of 12 units to be completed by the end of junior year)
- 3.0 GPA overall
- The GRE requirement would be waived for admission to the BS+MS

Prospective BS+MS students are responsible for selecting an eligible faculty member to serve as their thesis advisor. The thesis research should entail at least 24 units of research over 6 consecutive quarters with one advisor. Alternatively, students may petition to work for no more than 2 quarters in another lab to either develop essential methodological skills or work on a related mini-project, followed by the remaining 4-5 consecutive quarters spent in the laboratory of their major advisor. At the time of

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application, students must provide written confirmation that the selected thesis advisor will not be on sabbatical leave during any quarter of the scheduled BS+MS project.

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**Joint BS + MS Degree Program Requirements.** The BS program course requirements remain as currently outlined in the general catalog. Additional research unit requirements are outlined below and a sample program is provided.

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During the MS portion of this program, students must maintain a grade-point average (both overall and in the major) of at least 3.0 for all course work, both cumulatively and for each quarter of enrollment. If the student's GPA falls below 3.0 (for either the overall or major), he/she may be dropped from the program.

Additional requirements include participation in Graduate Student Seminar Day and the completion of a thesis, with an oral presentation to, and approval of, a 3-member MS Thesis Committee. Students must meet with their committee prior to and throughout the master's year to discuss the project and its progress. The written thesis must be submitted to the MS Thesis Committee by Week 7 of the student’s sixth quarter in the joint BS+MS program. Any deviation from this plan, such as a disruption in enrollment for 1 or more quarters, may cause the student to be dropped from the program.
Sample BS+MS Degree Program. The following table outlines a sample program for a student in the proposed joint BS+MS program in Entomology. Students would average 15.3 units per quarter in the BS portion of this proposed program.

**PROPOSED BS+MS PROGRAM**

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* Only 24 total research credits (199/199H + 29X) will count toward the MS degree

§ Up to 12 units of 100 level ENTM electives and 199/199H research credits will double count towards the BS and the MS degree requirements. This 12 credit limit is similar to BCOE BS/MS program.
Application Details. Interested students must submit a Statement of Interest and Eligibility (SIE) before the start of their final undergraduate year but are encouraged to apply as early as possible. This SIE would provide documentation of meeting the eligibility criteria, include a very brief description of the proposed research topic, and be signed by the identified thesis advisor.

Projected Flowchart of Student Applicants. The following flowchart illustrates how ENTM students may move into and out of the joint BS+MS program in ENTM. Students must maintain academic standards (i.e. GPA > 3.3 in major and 3.0 overall) or they will not be permitted to remain in the program. Students would graduate with a BS in Entomology after their senior year and would graduate with MS in Entomology after their year at MS standing.

Catalog entry

Joint Entomology BS + Entomology MS Program. The College of Natural and Agricultural Science offers a combined five-year BS / MS program in Entomology, designed to allow successful UCR Entomology BS graduates to complete the Master of Science degree in Entomology in one additional year. Applicants to the Entomology Joint BS+MS program should apply by the end of their junior year, provided that the student was a UCR Entomology BS student with cumulative GPA at least 3.0 overall and 3.3 in the Entomology major. This must include a minimum of 12 units of upper
division Entomology courses to be completed by the end of spring term of junior year (or
the student's year of application). This must include a minimum of 12 units of upper
division Entomology courses to be completed by the end of spring term of junior year (or
the student's year of application). Similarly, transfer students must complete 12 units of
upper division Entomology courses, however their combined GPA (minimum 3.0) will be
calculated from their UCR and prior institution transcripts. The application to the Joint
BS+MS program must include at least two recommendation letters from UCR Academic
Senate faculty members, one of which will include the prospective thesis advisor and at
least one of which must be Entomology faculty. Matriculation into the graduate portion
of the joint degree program occurs in the Fall term following senior year, provided: (a)
the MS application is accepted, (b) throughout senior year, the student is an
Entomology BS major with cumulative GPA 3.0 or higher, (c) by the end of senior year,
the student completes the Entomology BS degree requirements and receives their BS in
Entomology.

Incoming freshman students who are applying to the Entomology BS program may
simultaneously apply for preliminary admission into the joint degree program provided
their high-school GPA is at least 3.6, their SAT-I combined score is at least 1950, they
satisfy the Entry-Level Writing requirement prior to matriculation, and they have
sufficient math preparation to enroll in MATH 7A (Calculus for the Life Sciences) or 9A
(First-Year Calculus Part 1) upon arrival. Preliminary conditional admission status is
maintained as long as the student is an Entomology BS student in good standing with a
cumulative GPA of at least 3.0. Preliminarily admitted students would still need to apply
for full admission by the end of their junior year as described above.

Up to 12 units of 100 level coursework taken as a UCR undergraduate to be counted
towards the 36-unit requirements of the MS Courses that may be double-counted are
only those that are eligible to be counted as ENTM 199/199H research credits or 100
level electives in the BS requirements (e.g. ENTM 106, course between ENTM 109 up
to ENTM 162).

### 3. Projected need, resource requirements, student support

As noted in the introduction, in keeping with the framework established by CEP and
Graduate Council, this combined program is primarily a recruitment tool, intended to
leverage the increasing interest in graduate education to attract top freshmen into the
BS program, and to attract top UC Riverside BS students into the MS program.

In the BS program, the prospect of entering the program at year three and completing
both the BS and MS in a total of five years should attract students that are highly
motivated and more likely than average to make it through the program. While we do
have a number of students who choose to study Entomology as entering freshmen, a
larger proportion of our undergraduates discover the field after their first year at UC
Riverside. The combined BS+MS program will increase the visibility of the
undergraduate major to entering students. It will also raise the visibility of the major to life science students who are already enrolled but might have been unaware of the prospects offered by the discipline. We expect that the opportunity of earning a joint BS+MS in three years will be highly attractive to community college transfer students as well. Enrollment of community college students has recently become an urgent priority for the University of California. Combined with ongoing increases in admissions standards, this should increase both retention and the overall quality of the students.

In the MS program, we anticipate growth in combined-program enrollment initially of only a few students per year. However, a similar program in life sciences at UC San Diego has more than 100 students enrolled annually. Rapid growth in the proposed program would be welcome and would significantly increase overall enrollment in the Entomology MS program. Although we consistently receive a small number of applicants for our Plan 1 MS program, potential major professors accept a very small number of students because of the lack of support available to them. The proposed combined BS+MS program would complement the existing Plan 1 MS program. There would be no expectation of support for the participants in the combined BS+MS program. Major professors could provide support funding in the fifth year if they chose to do so. In addition, if at some point in the future, funding opportunities emerge from campus, college, or Graduate Division sources for MS students, then fifth-year BS+MS students would be eligible. If a student decided to continue on for a Ph.D., then full support packages would be provided. Students could enter the department's Ph.D. program through the fall application process after receiving their MS in Entomology. Petitions to transfer from the MS to the Ph.D. program will be handled according to established departmental procedures. Each student accepted into the combined program is likely to be near the top of the applicant pool and would be welcomed into the laboratories, particularly if there was a likely prospect of timely completion of the degree and continuation through the Ph.D. at UCR or another research institution.

In short, the main effect of the program should be to increase the quality of students in the BS and MS programs, and achieve a modest increase in enrollment levels. Similarly, it should increase the employability of students produced by the BS and MS programs, and help meet the increasing demand for Entomology students with graduate degrees.

**Resources.** Note that each student in the combined program is essentially just a regular student (in the BS program, or, in fifth year, in the MS program), and requires the same resources as a regular student at the same level. Also, because of the highly selective nature of the admissions requirements, BS and MS enrollments will be modestly affected, at least initially. Currently, all of the undergraduate entomology majors are required to complete at least four and up to six units of undergraduate research in Entomology. This requires them to become associated with faculty and their laboratories. Undergraduate students are also highly encouraged both to attend and participate in Student Seminar Day, which is an excellent forum for learning about research labs in the department and meeting potential mentors. Thus, the program requires no change in faculty, courses, or resources such as library, computing,
equipment, space, etc. Likewise, the program requires no change in levels or mechanisms for student funding.

The program does require minor administrative support. During the BS portion of this program, students will be advised by the CNAS Undergraduate Academic Advising Center as normal for pursuance of a BS in Entomology. The administration of the program at the undergraduate level requires processing applications for preliminary acceptance, tracking preliminarily enrolled students, and identifying and informing students who will be eligible to apply at the end of their junior year. The administrative functions for admission to the Entomology Graduate program are already performed by the department Instruction and Student Affairs Committee; this committee will also be responsible for administering the BS+MS program with continued support from the CNAS Graduate Student Affairs Center, which will have to track which MS students are in the combined program and account for the double-counting allowance. Finally, only to the extent that existing resources allow, BS students with “preliminary conditional admission” status will be given additional advising appropriate for MS-bound students. The department faculty advisors for undergraduate students and for graduate students are also members of the Instruction and Student Affairs Committee, which will serve to coordinate advising needs.

4. Changes in Senate regulations

No changes in Senate regulations are required.
PROPOSAL FOR A SELF-SUPPORTING MASTER OF SUPPLY CHAIN & LOGISTICS MANAGEMENT

January 2018

STATUS:

Approved by School of Business Administration Executive Committee: 10/12/2015

Approved by School of Business Administration Faculty: 10/23/2015, 01/12/2018

Submitted to Graduate Division for Feedback: 09/25/2015

Submitted to the Chair of the Senate of the Division: 11/05/2015

Re-approved by School of Business Administration Executive Committee: 02/24/2017

Re-submitted to the Chair of the Senate of the Division: 03/06/2017

Re-approved by School of Business Administration Faculty: 01/12/2018

Re-submitted to the Chair of the Senate of the Division: 01/16/2018
GRADUATE DEGREE PROGRAM PROPOSAL

Proposers:
- The faculty of the School of Business Administration and the A. Gary Anderson Graduate School of Management
- The faculty members in the area of Operations and Supply Chain Management (OSCM) and the faculty chair
- Mohsen Elhafsi, OSCM area coordinator
- Long Gao
- Elodie Goodman
- Peter Chung, Faculty Chair
- Adem Orsdemir

Contact Information:
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PROPOSAL FOR A MASTER OF SUPPLY CHAIN & LOGISTICS MANAGEMENT

§ 1.0 INTRODUCTION

The UCR School of Business Administration (SoBA) proposes to offer a new Master of Supply Chain & Logistics Management (MSCLM) degree program to address the substantial unmet demand for trained Supply Chain Management (SCM) and logistics professionals. The new degree program will require sixteen months (four academic quarters plus a summer internship) of full-time study or its equivalent on a part-time basis. The program will be a self-supporting program. While the program is structured as self-supporting, it is designed to leverage the existing capacity of the School’s current MBA and MS self-supporting programs and is expected to be cash-flow-positive from the first term it is offered.

SoBA offers a Bachelor of Science in Business Administration where an undergraduate student may choose to concentrate in a specialized area such as SCM. However, coursework culminating in a baccalaureate degree with a concentration in SCM is not usually sufficient for advanced SCM and logistics professionals. A student may also earn an MBA with a concentration in SCM; however, by design, an MBA is a generalist degree, and is perceived as such by employing firms.

The MSCLM program is designed to provide students with a rigorous understanding of and the ability to apply core principals within the field of Supply Chain Management and logistics using powerful quantitative and Business Analytics tools. Today’s supply chains are truly global. Effective supply chain management is crucial and solves many of the problems encountered by businesses today. A thorough knowledge of this discipline and the execution of a sound supply chain strategy are necessary in today’s global economy to be competitive, efficient and maximize a firm’s profitability. Supply chain and logistics professionals are sought after in all industries today, with new and growing opportunities in biotech, cyber-security – even disaster and famine logistics.

The proposed MSCLM degree will bring greater visibility to UCR, the Graduate School, and SoBA; contribute positively to the reputation of the school nationally and internationally; and serve the growing needs of the region for well-educated SCM and logistics professionals. The program is consistent with the UCR and SoBA strategic plans; will give us an important edge over our competition as we move to take advantage of the fact that our geographical area is underserved in this sphere; and will elevate our national and international visibility as we do our part to meet the growing demand for SCM professionals. The program maybe a possible pathway into a PhD program in supply chain management. Several former students who graduated from our MBA program, who either have pursued a Ph.D. degree in SCM or expressed the desire to do so, encountered difficulties due to the lack of foundation in the SCM concentration. Having a program focusing on Supply Chain and Logistics Management will likely improve the marketability of our students seeking to pursue a PhD specializing in supply chain management or the like.
This proposal describes the rationale for the degree program, outlines how the program advances our strategic plan, and provides background on the market for the degree. The proposal includes information comparing the proposed program to those offered by other schools nationally and internationally, and includes details of the curriculum of the sixteen-month degree program. The program requires only a small frontend investment because most of the courses in the curriculum are already offered routinely by SoBA.

1.1 Aims and Objectives
Business schools are undergoing a significant shift in the applicant pool for Master’s degree programs. Applications for traditional MBA programs that provide a general management focus have seen a sustained decline nationwide. Coincidentally, more students are seeking Master’s degrees that specialize in various business fields, including supply chain management and logistics.

In recent years, demand for professionals with supply chain credentials has skyrocketed. According to Fortune Magazine, Logistics alone accounted for 8.5% of Gross Domestic Product in 2014 with over $1.3 trillion in spending on transportation, inventory, and related logistics activities. According to the same Magazine, there is a need for 1.4 million additional supply chain workers by 2018. The U.S. Department of Labor Occupational Outlook Handbook (2014-2015), for five typical occupations within supply chain management, the projected growth rate through 2024 ranged from 25% to 30% with salaries ranging from $74,260 to $108,120. The average annual income for supply chain professionals in 2013 was over $100,000 a year, according to the Institute for Supply Chain Management. The Bureau of Labor Statistics has predicted a 26 percent increase in logistics jobs by 2020 and a 29 percent rise in the need for freight agents by the end of the decade. The Graduate Management Admission Council (GMAC) 2016 Corporate Recruiters Survey Report indicates that, overall, about a quarter or more of corporate recruiters are actively seeking graduates of Master in Supply Chain Management programs (27% of respondents). The same survey indicates that Graduates of Master in Supply Chain Management programs are in greatest demand among companies in the manufacturing (42% of respondents), technology (39%), and products and services (37%) sectors.

The development of professionally oriented masters programs in SCM and Logistics is in direct response to the recognition that students who aspire to work in the field of SCM need more specialized education than is available through standard undergraduate or masters-level degree programs. Advanced SCM education has developed along a general structure. Students normally take more quantitative courses such as Management Science, Operations, Logistics, Procurement, and Inventory Management, focused on supply chain and logistics applications. These programs are normally called Master’s in Supply Chain Management, Master’s in Global Supply Chain Management, or Master of Arts or Master of Science in Global Logistics. This line is the focus of the proposed Master of Supply Chain & Logistics Management program of UCR. Institutions such as University of Southern California (very recently), Ohio State University, Arizona State University, Washington University, MIT, Penn State University and Michigan State University have similarly launched Master’s degree programs in supply chain management within the last five years. The programs offered by Penn State and Arizona State are online.
programs. Numerous institutions nationwide are planning to enter this market and launch their own Master of Science in Supply Chain Management programs.

The SoBA Master of SCLM program will meet the needs of two types of students: international students who are seeking a master’s degree with an emphasis in SCLM and domestic students who generally have work experience and wish to strengthen their experience via attaining a master’s degree in SCLM for future professional growth in the work environment. Work experience is not required, nor is it essential to succeed in the SoBA MSCLM program. However, inclusion of some students with work experience in the supply chain and logistics sector can contribute to the quality of the experience of others, help connect the school to the SCM community, and enrich classroom discussion. Students with experience tend to come from the U.S. and may choose to pursue the degree on a part-time basis.

Supply chain management offers a wide variety of job options for entry-level managers and beyond. We expect that students will find employment as “Supply Chain Analyst”, “Purchasing Manager”, “Warehouse Operations Manager”, “Supply Chain Software Manager”, “Transportation Manager”, and “Vice President of SCM” among others.

Based on the experience of faculty involved with the proposed program, it is possible to develop a strong sense of esprit de corps among the students, even with substantial variations in prior experience, and to build lasting relationships with recent graduates that are useful to current students, other alums, and the School.

The following are among our main aims and objectives for the program:

- The program will enable supply chain management and logistics executives to gain the specialized expertise required for professional advancement.
- The regional market for supply chain and logistics professionals is underserved by institutions of higher education. The program will enable UCR to address the regional market need for professional education in supply chain & logistics management.
- The program will enable us to maintain and build critical mass of faculty in supply chain management and related fields.
- The program is expected, to advance the research mission of the School, and to fund well-qualified Ph.D. students with emphasis in supply chain management (to be launched in the future).
- The program is congruent with the UCR and SoBA strategic plans.
- Graduates of the program can be of immediate value in helping the School to place its graduates in attractive professional employment and supply chain and logistics alums can quickly become important prospects for campus development efforts.
- The particular strengths of UCR will enable the program to help bring greater socioeconomic diversity to the profession.

1.2 Historical Development of the Field and Department Strengths

Before the 1950s, logistics was thought of in military terms. It had to do with procurement, maintenance, and transportation of military facilities, materiel, and personnel. The study and practice of physical distribution and logistics emerged in the 1960s and 1970s. Logistics costs were high. On a national level, it was estimated that logistics cost in the U.S. accounted for 15
percent of the gross national product (Heskett et al., 1973). On an individual firm level, they could be as high as 32 percent of sales (LaLonde and Zinszer, 1976). Physical distribution with its outbound orientation was first to emerge, since it represents about two thirds of logistics costs and it was considered a component of the marketing mix (product, place or physical distribution, promotion, and price) of essential elements. Business logistics, with its broader scope that includes inbound movement, was soon to follow.

The first college course (Michigan State University) and textbook (Smykay et al., 1961) appeared around 1960. Within the context of the total cost approach, activities such as transportation, inventory control, warehousing, and facility location were discussed. The emphasis was on a firm’s outbound movement of goods and dealt little with inbound movements. In 1964, the scope of physical distribution was expanded to include physical supply and was called business logistics. Using the descriptive name of business logistics was not only an attempt to distinguish the name from military logistics but to focus on logistics activities that took place within the business firm.

Although physical distribution is usually associated with outbound product movements from a firm, this definition indicates a broader concept that includes both inbound and outbound movements. Heskett et al. (Heskett et al., 1964) described business logistics in terms of both physical supply and physical distribution, but they also recognized that logistics takes place throughout the supply channel, from producer to end consumer. They suggested that there needs to be coordination of the product flows throughout the entire channel. These concepts are similar to what is currently described as supply chain management and, at that time, physical distribution and logistics were somewhat synonymous terms.

In the 1990s, a new name emerges: Supply Chain Management. This name took the logistics area by storm since so many in various business fields seemed to embrace it and saw activities of their areas imbedded in it. The origin of the name seems a mystery and exactly what supply chain management is, compared with physical distribution and logistics, is being debated. Some are saying that it is a fulfillment of the activity integration promise implied in early definitions while others think it is a new and bold concept. Those believing that supply chain management is evolutionary claim that supply chain management is not new and they recognize that the logistics pioneers had many of the ideas promoted by current supply chain enthusiasts.

Recently, the Council of Supply Chain Management Professionals (CSCMP), which is the premier organization of supply chain practitioners, researchers, and academics, has defined supply chain management as: “Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies.” Whereas, CSCMP defines logistics to be: “Logistics Management is that part of SCM that plans, implements, and controls the efficient forward and reverse flow and storage of goods, services, and related information between the point of origin and point of consumption in order to meet customer requirements.” Therefore, SCM is viewed as managing product flows across multiple enterprises whereas logistics is seen as managing the product flow activities just
within the firm. This is a deviation from the view that the early visionaries had for logistics. A contemporary view of SCM is to think of it as managing a set of processes, where a process is a group of activities relevant to achieving a defined objective, such as filling orders.

The trend toward increased globalization, free trade, and outsourcing all contribute to a continued and growing interest in logistics/SCM. According to a McKinsey & Company study, “by the year 2020, 80% of the goods in the world will be manufactured in a country different from where they are consumed compared with 20% now.” There will be a tremendous shift in the movement and consumption of goods, all of which will require ever better management of the associated supply chain processes.

The contemporary view is that SCM is a new frontier for demand generation – a competitive weapon. Both views will be important, but the new emphasis will be on designing and operating the supply chain to enhance the revenues of the firm in such a way as to maximize contribution to profit. This view replaces the often-used strategic objective of minimizing supply chain costs, subject to meeting given customer service requirements, and it will elevate SCM in the eyes of top management. Collaboration and coordination will be the keys to achieving the benefits of SCM. When both parties in a supply chain relationship win equally due to their cooperative actions in the supply channel, the benefits are likely to be realized and the relationship remains intact.

In the last decade, business analytics has evolved significantly, and now offers decision support for critical tactical and strategic supply chain activities. The insights from these activities are helping companies optimize their supply chain functions and close the gaps to manage market pressures and contribute to financial performance. The increasing importance of analytics and planning to the success of a company’s business strategy cannot be ignored. A Gartner study shows that several companies gave analytics and planning a high importance score (8.3 out of 10), however the need was not being achieved in performance [6.3 out of 10] as was evident in the ensuing gap. According to Wikibon, the Business Analytics market will top $84B in 2026, attaining a 17% Compound Annual Growth Rate (CAGR) for the forecast period 2011 to 2026. The Big Data market reached $27.36B in 2014, up from $19.6B in 2013. Much of this growth targets the supply chain function because it holds the greatest potential for innovation and competitive advantage.

The SoBA faculty is well-positioned to meet the needs of students in the proposed Master of Supply Chain & Logistics Management program. Our Operations and Supply Chain Management (OSCM) faculty, while currently small, is intended to grow over the next few years, partly in anticipation of the needs of the program. The current OSCM faculty members are all involved in research areas that are appropriate for students in the MSCLM program. In addition, some courses that are appropriate for students in the program are currently offered by the Finance faculty and the Accounting and Information Systems faculty of SoBA. Consistent with the orientation of this program, the School has identified Supply Chain Management as one of its five “spires of excellence,” the area has restructured its curriculum at both the graduate and undergraduate levels to infuse supply chain analysis into the curriculum, and three new courses are being developed for the proposed MSCLM program. Faculty hiring has focused on supply chain management and is expected to continue to do so.
1.3 Timetable
The School seeks to launch the program in the fall of 2018 or sooner, if feasible. Most courses in the program are already offered either as MBA core or electives. Four new courses focused more specifically on the needs of the program are being developed (three have already been approved) and will be offered when the program is launched. We will initiate the program with a faculty director and existing SoBA administrative staff. We have conservatively projected enrollments at 5 students in the first year and gradually increasing to a projected maximum of 25 students by the fifth year. These enrollment projections are well below those achieved by other schools offering similar programs. The UCR campus strategic plan provides for growth of professional and self-supporting programs but does not define enrollment goals for self-supporting programs.

1.4 Relation to Existing Programs and Campus Academic Plan
The program fits the overall strategic plans of UCR and SoBA to increase its presence and reputation regionally, nationally, and internationally. The graduate degree in Supply Chain & Logistics Management is a part of the portfolio of offerings at many major business schools, and such graduate master’s degree supply chain management programs are routinely ranked in such publications as US News, Business Week, and the Financial Times. The program will engage professional students in supply chain and logistics research, connect the campus more firmly with the professional supply chain management and logistics community, and strengthen our ability to place our students in significant professional positions.

The proposed Master of Supply Chain & Logistics Management degree program advances the objectives of UCR as reflected in its strategic plan, UCR 2020: The Path to Preeminence. This strategic plan places significant emphasis on increased focus on “professional and graduate education that will benefit a region that is in dire need of practitioners in a variety of professional fields.” The plan notes that UCR’s most successful graduate programs are those that integrate graduate education with academic research and creative activity, and that to achieve the profile of an AAU institution, UCR must increase its proportion of graduate and professional students. The plan points to the potential for professional programs to provide revenue enhancements to the campus.

The strategic plan calls for relative growth of graduate education, including professional education; serving the region by preparing students well for professional employment; reducing dependence on public funds through development of self-supporting graduate programs; connecting professional education to academic research; connecting more closely to the region; and developing the profile of an AAU university.

The proposed Master of Supply Chain & Logistics Management program is also consistent with the strategic goals of the School of Business Administration. The SoBA strategic plan identifies “supply chain management” as one of five spires of excellence. The term, supply chain management, implies that students will have hands on opportunities to learn advanced methods relevant to supply chain analysis and logistics using data analytics and quantitative tools, and that there will be significant complementarities between teaching and research in supply chain management.
We are in an environment where specialized post-graduate education is increasingly demanded. No longer is specialization just for academic Ph.D.s. Appropriate education for supply chain and logistics professionals is similar to that of supply chain management Ph.D.s. In fact, many of the technological advances in supply chain and logistics have come not from the universities, but from the private sector. Supply chain professionals working in the Riverside/San Bernardino area need to be dynamic and innovative because the economy of the region is destined to be the most rapidly growing portion of the California economy in the foreseeable future, and that growth is closely tied with the development and increasing professionalism of the logistics and warehousing sector in the region.

We expect that the Master of Supply Chain & Logistics Management program will positively impact the existing programs of SoBA:

- Because we plan to offer the degree initially using the capacity of existing courses, there will be no reduction in the capacity of the existing faculty to serve the teaching missions of the existing graduate and undergraduate degree programs.
- As the program grows, it will be necessary to add additional faculty in OSCM. The program will provide sufficient sustainable free cash flow to support the addition of lines.
- Faculty hired in response to growth of the program will help build critical mass in the school, help to advance the school’s research mission, and help to support the eventual launch of the supply chain component of the Ph.D. in Management.
- While the program may be attractive to some students who otherwise would apply to the school’s MBA program, it will also generate its own stream of applicants. Based on experience of other schools, the net effect is substantially positive for recruitment to the MBA program.
- Students admitted to the MSCLM program will be strong quantitatively and will contribute positively to the classroom experience and learning of MBA and other specialized Master students.
- Students of the MSCLM program are frequently interested in pursuit of the Ph.D. so that the program will provide a means of attracting and screening future Ph.D. candidates.
- The MSCLM program is not expected to impact the undergraduate program offered by the school. The balance of staffing undergraduate courses will be maintained or enhanced when new faculties are added as the program grows.

The experience of other universities that offer similar specialized degrees in supply chain and logistics shows that additional degree offerings in supply chain and logistics tend to complement and ultimately augment the MBA programs of the school, bringing dividends of additional prestige to the school, as well as benefits of networking with the firms in the industry. While the MSCLM degree program will share resources with the MBA program, it will attract its own pool of applicants. Because we can achieve sustainability at a very low level of students, and because MBA staff will also be involved in the MSCLM admissions, we can control the admission of students to the appropriate programs. Overall, the MSCLM program is expected to have a positive impact on the web traffic from students who are interested in the UCR MBA.

There is ample evidence in the experience of other schools that those who apply for Master’s degrees in supply chain management tend to have stronger quantitative background than MBA applicants. Therefore, not just the market but the selection criteria for admission to the MBA and
MSCLM programs will differ. The marketing efforts for attracting students to the MSCLM program will result in a boost to the profile of the school as a whole. Students in the two programs will attend several courses together, and the presence of students with stronger quantitative background will tend to elevate the experience of both sets of students.

The effort to place graduates of the MSCLM program, coordinated with the placement effort for MBAs will help us to better place students into the cohorts that best suit them.

1.5 Interrelationships with the Programs of other Institutions, Market and Competition

Southern California is greatly underserved in graduate supply chain management education.
- The University of Southern California (USC) is the only other school in Southern California that currently offers advanced degree in supply chain management.
- Schools on the East Coast and east of the Mississippi are in the forefront of development and introduction of specialized graduate degrees in supply chain management and logistics.
- The USC program, Master’s in Global Supply Chain Management, is a joint program between the Vitebri school of Engineering and the Marshal School of Business. It is fundamentally different from the proposed program and targets a different market.
- It is only a matter of time before our local competitors will introduce such programs, making UCR’s introduction of the program at this time partly defensive.

The Master of Supply Chain & Logistics Management will provide a comprehensive overview of the entire field of supply chain management, with an emphasis on analytical methods and applications using business analytics tools.

1.6 Administration

The program will be administered by a faculty director within the OSCM area of the UCR School of Business. The School will establish a faculty admissions committee that will operate similarly to the current MBA program admissions committee. These admissions committees will collaborate and work with SoBA staff to establish clear distinctions in admissions criteria. Among other considerations, the MSCLM will place less emphasis on work experience and more on evidence of quantitative aptitude, ability and interest. Because of the importance of participative learning, the admissions committee will make selective use of interviews for foreign students, in addition to standardized tests of English proficiency.

Initially, the program will be marketed almost exclusively on the School’s website, through local information sessions, and through promotion to faculty and administration of likely feeder schools. Information about the program will be distributed at MBA forums whenever the School decides to participate in such forums for the purpose of MBA recruiting.

Course staffing will be administered mainly by the OSCM area coordinator (faculty), in conjunction with their normal staffing responsibilities for MBA and other MS courses. Performance reviews of lecturers are the shared responsibility of faculty members in the discipline, and a formal annual review process for lecturers is already in place and is working well. Formal student advising will be administered through faculty-led advising/information sessions, with informal advising by faculty on an as-needed/as-requested basis.
Initial administrative support will be provided by existing SoBA staff in conjunction with their existing responsibilities for program administration.

As the program grows, it may become important to add dedicated staff and to formally allocate a portion of faculty time to program administration. Based on prior experience and conversations with directors of other programs, once the program reaches a scale sufficient to justify a full complement of course offerings, the program could need up to one faculty FTE fully committed to administration of this program and at least one dedicated administrative staff member who would be involved with recruiting, advising, and placement. The faculty FTE can be spread over several individuals and can include LSOE.

1.7 Plan for Evaluation

Within the School, the program will be continuously evaluated based on attainment of student FTE projections, the quality of applicants and matriculated students, curriculum effectiveness relative to learning objectives, placement success, and continuing involvement of program alums.

Campus policy is to evaluate new programs after three years and routinely thereafter, following established Graduate Program review procedures.

§ 2.0 PROGRAM

2.1 Undergraduate Preparation for Admission

Eligibility for admission depends on having completed a four-year undergraduate degree or equivalent. Based on experience of other schools, appropriate undergraduate majors include business, engineering, economics, mathematics, statistics, and physics, among others. Students with less quantitative backgrounds may also apply, but should expect to use electives to develop quantitative background or take additional courses if admitted to the program. Because classroom participation requirements in the program are high, international students will need to demonstrate competency in written and spoken English.

Students admitted to the program will have an academic profile somewhat different from those likely to be admitted to other master's level programs in SoBA. In particular, the MSCLM places substantially greater emphasis on quantitative background as reflected in undergraduate degree, courses taken, and scores on quantitative portions of admissions tests. In comparison to the MBA, the MSCLM places less emphasis on work experience. However, over time we expect that the cohort will include individuals with significant relevant work experience.

To be qualified for admission, an applicant to this program must have completed a Bachelor's degree or its approved equivalent from an accredited institution and attained an undergraduate record that satisfies the standards established by the Graduate Division and University Graduate Council. Applications are accepted for fall term. All applicants must submit scores from the Graduate Management Admissions Test (GMAT) or Graduate Record Exam, General Test (GRE). Applicants whose first language is not English are required to submit acceptable scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) unless they have a degree from an institution where English is the
exclusive language of instruction. In some cases, an interview may be required to assess English language ability. Additionally each applicant must submit at least two letters of recommendation, including at least two academic references. All other application requirements are specified in the graduate application or in the General UCR catalog.

The admissions criteria to the Supply Chain and Logistics Management program will be aligned with current admissions practices in all SoBA’s graduate programs. These criteria use a holistic assessment of eligibility and potential for success. This holistic process includes both quantitative criteria (GPA, GMAT score), and qualitative criteria (including quantitative background, work experience, the quality of undergraduate institution attended, and the rigor of the undergraduate major) in the overall assessment of an applicant’s eligibility for admission to the Supply Chain and Logistics Management Program.

The recommended Academic Index Score of \((200 \times \text{GPA}) + \text{GMAT} + \text{Qualitative Index}\), is currently used by all SoBA’s graduate programs to inform their admissions decisions, as well as for determination of eligibility for merit scholarships. The Qualitative Index will range from 0-100 and will be assigned by Graduate program staff and reviewed by the Graduate Advisor. An applicant with an Academic Index Score \(\geq 1000\) may be recommended to the Graduate Division for admission by the Graduate Advisor in consultation with the program director. Those applicants with lower scores will be placed on a waiting list, advised to retake the GMAT, or rejected, as appropriate. For those qualified students with lower scores, a request for an exception from the UCR’s Graduate Division will be sought.

As presented in Exhibit III, in the first quarter of the Master of Supply Chain & Logistics Management degree program, students will be expected to take core courses in data models and decisions, quantitative methods, and operations management. This grounding is sufficient to expose students, in the second quarter, to the main field of Supply Chain Management. In the third quarter, the students are expected to build on what they learned in the second quarter by taking more advanced courses in the area, such as Logistics and Transportation and Procurement and strategic sourcing. In the summer quarter, students are expected to intern with local and global companies. The purpose of the summer internship is to expose students to real supply chain issues and apply the knowledge they acquired in the first three quarters of the curriculum. Ideally, we would like the students to do the internship in the summer after taking the foundation and necessary courses to take better advantage of the internship. However, although the program does not encourage it, students will be allowed to do the internship starting their second quarter provided the internship is at the quality level the program requires. In their final quarter, students take a capstone course. In the capstone course, students undertake a team-based project where they apply their acquired knowledge from prior courses as well as the experience gained in their summer internship.

Students should be able to complete the coursework for this program in 16 months. Admission is intended to be primarily in the fall quarter in order to match graduation timing with the normal recruiting cycle. However, the current offerings of SoBA do enable us to consider students for admission beginning in other terms or on a part time-basis. Required courses and sufficient elective courses will be offered every year.
2.2 Foreign Language

The program has no foreign language requirement.

2.3 Program of Study

2.3. A Field of emphasis

The specific field of emphasis is Supply Chain Management. Within this field, students can use elective offerings to tailor the curriculum to their own objectives.

2.3. B Plan(s)

Plan I (Thesis) will not be an option for the Master of Supply Chain & Logistics Management program. Given this would be typically a four-quarter program it is unlikely that a Plan I (Thesis) option will be feasible for students.

Plan II (Comprehensive Examination) requires that at least 18 units be in graduate level courses taken at a UC campus. None of these may be in courses numbered 297 or 299. Every candidate must take a comprehensive examination, the content of which is determined by the department or program. In most cases, units from courses numbered 291 cannot be used. Candidates for the degree are required to complete all of the general requirements specified by Graduate Studies. The program conforms to Plan II.

2.3. C Unit requirement

The Master of Supply Chain & Logistics Management will be offered as a four-quarter program (64 units) for graduates of a baccalaureate degree in a field that provides sufficient quantitative background to enable successful completion of the program.

2.3. D Required and recommended courses, including teaching requirement

Of the 64 units, 32 units (8 courses) are required courses; 4 units are a required summer internship course; 4 units are a required capstone course; and 24 units (6 courses) are elective courses must be selected from a list of elective courses designated by the Operations and Supply Chain Management area.

Required courses currently offered to MBA students

- MGT 201 Quantitative Analysis
- MGT 203 Economics for Management
- MGT 207 Operations Management for Competitive Advantage
- MGT 256 Applied Business Analytics
- MGT 258 Logistics and Supply Chain Management
- MGT 255 Procurement and Strategic Sourcing
- MGT 271 Quantitative Decision Making and Analysis
- MGT 275 Transportation and Logistics Management

Capstone course not currently offered (to be developed) to MBA students

- MGT ??? Supply Chain Integration

Elective courses currently offered to MBA students

- MGT 221 Decision Making Under Uncertainty
- MGT 224 Managing for Quality Improvement
- MGT 230 Databases for Management
• MGT 236 Decision Making under Certainty
• MGT 239 Simulation for Business
• MGT 259 Production Planning and Scheduling (to be reinstated)
• MGT 266 Project Management
• MGT 267 Applied Business Forecasting
• MGT 280 Business Issues in Electronic Commerce

Summary:

Required courses:

Capstone course:
MGT ???

Internship course:
MGT 298I

Elective courses (choose 6):
MGT 221, 224, 230, 236, 239, 259, 266, 267, 280

Exhibit I contains current catalog copy for the required courses currently being offered to MBA students and for selected electives. All elective courses are currently regularly offered at least annually. During the first year or two of the program, with MBA enrollments at current levels, there is sufficient capacity in these classes to accommodate the needs of the Master of Supply Chain and Logistics students. Upon approval of the program, the new courses will be offered at least annually and will require staffing. Planned operations and supply chain management hiring is expected to meet the additional staffing needs.

2.4 Sample Program (full time)

Quarter 1
• MGT 201 Quantitative Analysis
• MGT 207 Operations Management for Competitive Advantage
• MGT 271 Quantitative Decision Making and Analysis
• Elective

Quarter 2
• MGT 203 Economics for Management
• MGT 258 Logistics and Supply Chain Management
• Elective
• Elective

Quarter 3
• MGT 256 Applied Business Analytics
• MGT 275 Transportation and Logistics Management
• Elective
• Elective
Summer Internship
- MGT 298I

Quarter 4
- MGT 255 Procurement and Strategic Sourcing
- MGT ??? Supply Chain Integration
- MGT 298I Internship (retroactive credit)
- Elective

2.4 Normative time from matriculation to degree (full-time)
Plan II students should be able to complete the coursework for this program in four academic quarters in addition to the summer quarter (16 months from beginning). Required courses and sufficient elective courses will be offered every year. The minimum academic residence in the UC is three quarters, two of which must be spent at the Riverside campus. Only courses in which grades of B- or above or “S” are received may be counted toward satisfying graduate degree requirements. To continue in good standing and obtain an advanced degree, students must maintain a minimum GPA of 3.00. In addition, students must demonstrate acceptable progress toward their degree objectives. This entails the acceptable completion of all course work and other degree requirements in a timely fashion. Students are considered to be making unacceptable progress and become subject to dismissal when

1. They have 12 or more units of “I” grades (incomplete course work) outstanding
2. The quarterly GPA falls below 3.00 for two consecutive quarters
4. They fail to fulfill program requirements in a timely and satisfactory manner, or
5. They have not completed their degree within 2 years for full-time students or within 5 years for part-time students.

§ 3.0 PROJECTED NEED

3.1 Student Demand for the Program
Business schools are undergoing a significant shift in the applicant pool for Master’s degree programs. Applications for traditional MBA programs that provide a general management focus have seen a sustained decline nationwide. Coincidentally, more students are seeking Master’s degrees that specialize in various business fields, including supply chain management and logistics. Institutions such as Ohio State University, Arizona State University, Washington University, MIT, Penn State University, Michigan State University, and University of Southern California have similarly launched Master’s degree programs in supply chain management within the last five years. Numerous institutions nationwide are planning to enter this market and launch their own Master of Science in Supply Chain Management programs, in traditional classroom and/or online distance learning formats. Such degrees are becoming an increasingly common offering at peer and aspirational institutions. This enduring strength of nationwide demand for an advanced master’s degree in supply chain management and logistics and an underserved market here in Southern California offer an opportunity to gain an advantage over other universities in the area. While we seek to serve the firms in our geographical area by making available to them a pool of trained supply chain and logistics professionals, we shall not restrict ourselves to admitting only those from Southern California. Expanding the potential market to the pool of students beyond California to the national arena, and beyond US borders to
the international arena will ensure that we are able to recruit students who are well qualified to stand the rigors of the proposed program.

We anticipate that the tuition, fees, and other costs of the program will be comparable to other highly regarded supply chain management programs. The Table below shows the tuition of similar Master programs. In order to have a base for comparison, we calculated the tuition per course offered in the corresponding program. As the table shows, our tuition per course is relatively competitive. In addition, this is also what is being currently charged to students in the Master of Finance and Master of accounting programs.

<table>
<thead>
<tr>
<th>University Or School</th>
<th>Program Length</th>
<th>Tuition</th>
<th>Number of Courses</th>
<th>Tuition per Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts Institute of Technology</td>
<td>10 Months</td>
<td>$67,938</td>
<td>10</td>
<td>$6,794</td>
</tr>
<tr>
<td>University of Michigan/Ross School of Business</td>
<td>10 Months</td>
<td>$50,000</td>
<td>10</td>
<td>$5,000</td>
</tr>
<tr>
<td>Portland State University</td>
<td>21 Months</td>
<td>$47,365</td>
<td>13</td>
<td>$3,643</td>
</tr>
<tr>
<td>University of Southern California</td>
<td>16 Months</td>
<td>$46,170</td>
<td>9</td>
<td>$5,130</td>
</tr>
<tr>
<td>UCR/SoBA</td>
<td>16 Months</td>
<td>$64,000</td>
<td>16</td>
<td>$4,000</td>
</tr>
</tbody>
</table>

Our intent is to develop the Master of Supply Chain & Logistics Management as a full-time program and we expect that initial enrollments will be of full-time students. As local demand from supply chain and logistics professionals increases, we anticipate an increasing but low percentage of part-time students.

Evidence from other programs indicates that students with supply chain management masters degrees are able to command materially higher compensation than undergraduates and often higher than MBA students. Generally, the cost of the degree to the student is normally justified based on anticipated impact on compensation. Given that there is a ready market for supply chain management masters students, scholarship aid in these programs is quite limited, normally around 10 to 15% of total tuition and fees. Scholarship aid is normally awarded competitively. Students who are not employer-sponsored or state-sponsored and who need funding can generally borrow much of the cost of the degree. In addition, because we do not currently have a supply chain management track in our Ph.D. program, we expect that a number of the students will be able to work on campus as teaching assistants, graders, and research assists. Students who take the program on a part-time basis normally do not receive scholarship aid, and usually are working full time and can cover the cost of the program from their compensation.
3.2 Opportunities for Placement of Graduates

Supply Chain executives require increasingly high levels of specialized expertise for professional advancement: A master’s degree or a doctorate is a prerequisite in several specialized fields such as medicine and law for example. As a result of an exponential increase in the knowledge and skills needed for successful discharge of professional responsibilities in the field of supply chain management, industry has come to expect potential entrants to the supply chain management profession to have a command of supply chain management as a structured body of knowledge with its own paradigms that can only be acquired by pursuing an advanced degree in the field.

The regional market is underserved: The Master of Supply Chain & Logistics Management program will meet an untapped and growing demand for graduate supply chain management education in the region served by UCR. Riverside and the Inland Empire sit at the hub of the western United States logistics and supply chain industry, connecting two of the world’s largest ports, Los Angeles and Long Beach, to the rest of North America. Southern California, specifically the eight county region comprised of Los Angeles, San Diego, Riverside, Orange, San Bernardino, Kern, Imperial and Ventura counties is home to approximately eight hundred and fifty thousand businesses (ESRI, 2009). Several thousands of these businesses require, supply, and/or produce raw materials, semi-finished or finished products, assemblies and sub-assemblies, etc. in various shapes and form. The role of warehouses and storage facilities for storing the goods, merchandise, etc. worth millions of dollars and keeping them secure is extremely crucial. In order to facilitate the movement and distribution of goods and/or products along a supply chain, warehouses and storage facilities provide a range of logistics services, related to the distribution of goods. Logistics services can include “labeling, breaking bulk, inventory control and management, light assembly, order entry and fulfillment, packaging, pick and pack, price marking and ticketing, and transportation arrangement”. Thus the region has a significant population of professionals who are involved in supply chain and logistics management, and other fields, who could benefit from a specialized Master of Supply Chain & Logistics Management degree. Moreover, it is expected to experience the most rapid population growth in the state. SoBA is the only graduate school of management affiliated with a major research university in Riverside and San Bernardino Counties.

Diversity in the Profession: The Program will meet an untapped demand for under-represented minority graduates. Many firms that recruit our graduates have inclusiveness initiatives with a goal of attracting individuals with diverse backgrounds and experiences. UCR has one of the most diverse campuses in the country and is in a unique position to meet the demands of these firms.

3.3 Importance of the Discipline

SCM is Globally Necessary: Basically, the world is one big supply chain. Supply chain management –the acquisition of parts and raw materials, from purchasing to delivery– touches major issues, including the rapid growth of multinational corporations and strategic partnerships; global expansion and sourcing; fluctuating gas prices and environmental concerns, each of these issues dramatically affects corporate strategy and bottom line. Because of these emerging trends, supply chain management is the most critical business discipline in the world today.
Until recently, supply chain management was not one of the classic B-school majors, for either undergraduates or MBAs. But job openings, comfortable salaries, and the prospect for advancement have caused the academic community to take notice, with more students majoring in the subject and more programs offering courses and concentrations in it. Today, business schools are undergoing a significant shift in the applicant pool for Master’s degree programs. Applications for traditional MBA programs that provide a general management focus have seen a sustained decline nationwide. Coincidentally, more students are seeking Master’s degrees that specialize in various business fields, including supply chain management and logistics. With such companies as H.J. Heinz and AnnTaylor Stores creating C-level supply chain positions in the past few years, more students are seeing career possibilities in the major. According to the Association to Advance Collegiate Schools of Business (AACSB), the number of undergraduate SCM programs has increased 25 percent since 2006. Almost half that jump happened during the 2009-10 school year.

The development of professionally oriented masters programs in SCM and Logistics is in direct response to the recognition that students who aspire to work in the field of SCM need more specialized education than is available through standard undergraduate or broad masters-level degree programs.

The importance of logistics in the economy is attributed to the fact that logistics alone accounts for more than 8.3% of the U.S. Gross Domestic Product with over $1.3 trillion in spending on transportation, inventory, and related logistics activities. According to the U.S. Department of Labor Occupational Outlook Handbook (2014-2015), for five typical occupations within supply chain management, the projected growth rate through 2024 ranged from 2.5% to 30% with salaries ranging from $74,260 to $108,120. According to the Graduate Management Admission Council (GMAC) 2016 Corporate Recruiters Survey Report, Overall, about a quarter or more of corporate recruiters are actively seeking graduates of Master in Supply Chain Management programs (27% of respondents). The same survey indicates that Graduates of Master in Supply Chain Management programs are in greatest demand among companies in the manufacturing (42% of respondents), technology (39%), and products and services (37%) sectors. The report further indicates that recent graduates with a Master in Supply Chain Management degree can expect to see a median starting salary of $75,000, on par with Master of Finance graduates.

3.4 Ways in Which the Program Will Meet the Needs of Society

SCM is necessary to the foundation and infrastructure within societies: SCM within a well-functioning society creates jobs, decreases pollution, decreases energy use and increases the standard of living. Two examples of the effect of SCM within societies include:

- **Hurricane Katrina – 2005.** In 2005, Hurricane Katrina flooded New Orleans, LA, leaving residents without access to food or clean water. As a result, a massive rescue of the inhabitants had to be made. During the first weekend of the rescue effort, 1.9 million meals and 6.7 million liters of water were delivered.

- **Foundation for Economic Growth.** A society with a highly developed supply chain infrastructure that includes interstate highways, a large railroad network, ports and airports is able to trade many goods at low cost. Business and consumers are able to obtain these goods quickly, resulting in economic growth.
MBA students, while they have a more holistic education, often do not have enough training to understand the supply chain and logistics issues a business organization deals with. Students in the UCR Master of Supply Chain & Logistics program will acquire the knowledge and tools necessary to effectively manage their organization and will have the ability to understand the importance of a global view of the supply chain within which their organization operates. They will understand that effective supply chains give businesses a competitive advantage in the marketplace and help mitigate risks associated with acquiring raw materials and delivering products or services. They will learn that by implementing supply chain management systems, businesses are able to reduce waste, overhead costs and shipping delays in a scientific way and that the benefits of this systematic approach impacts areas ranging from product quality to order turn-around times. Students will also learn that there are costs involved in every process of the product life cycle, and it is the responsibility of management to ensure that these costs are kept low, so the company can continue to pass along these savings to the consumer.

By moving rapidly we can help UCR graduates to reap the benefits of this expanding demand. The Master of Supply Chain & Logistics Management program will address an unmet need for graduate supply chain management education in Southern California in general and specifically Inland Southern California and is therefore consistent with the School of Business Administration’s mission to service the educational needs of businesses in the region. The program will contribute to our developing a reputation for leadership in U.S. higher education, to recruiting outstanding faculty, and to the diversification of our sources of revenue, which will help the School of Business Administration maintain financial stability and independence and reduce dependence on state funding. The program also fits well with the School of Business Administration’s strategies for building reputation by hiring high quality faculty who demonstrate excellence in both research and teaching.

It is remarkable that apart from the University of Southern California is the only other school in Southern California that currently offers an advanced degree in supply chain management. Southern California is greatly underserved. It is only a matter of time before our local competitors will introduce such programs.

### 3.5 Relationship of the Program to Research and/or Professional Interests of the Faculty

The emphasis, in the SoBA strategic plan was developed partly on the basis of the quantitative orientation of the Operations and Supply Chain Management faculty and partly on the value that the faculty recognizes in making sure that graduates of our programs are quantitatively well-trained in supply chain management and are capable of quantitative analysis at appropriate levels for their degrees. The Master of Supply Chain & Logistics program fits well with the strategic plan and with the quantitative orientation of our faculty.

Moreover, the quantitative nature of the supply chain management degree will provide competent research assistants, and will help to provide funding for the eventual launch of the supply chain management track of the management Ph.D. program.
§ 4.0 FACULTY

Quantitative supply chain and logistics management is one of the strengths of UCR Faculty, and we propose to position our degree offering accordingly. The Master of Supply Chain & Logistics Management that SoBA will offer is designed to provide overview of the entire field of supply chain and logistics management, with an emphasis on quantitative methods and applications, and with elective offerings that draw upon the strengths of our faculty.

BRIEF BIOGRAPHY OF THE OSCM FACULTY

1. Mohsen Elhafsi (Professor) received both Ph.D. and M.S. in Operations Research from the industrial and systems engineering department at the University of Florida and was ΦΚΦ Honor Graduate. He received the Diplôme d’Ingénieur Principal from the Ecole Nationale d’Ingénieurs de Tunis, Tunisia, in 1988. He joined SoBA as a tenure-track faculty member in 1997. He was promoted to associate professor in 2002 and to Full professor in 2009. He was awarded the prestigious Fulbright Fellowship for the 2006 to 2007 academic year to spend his sabbatical year in France at the Ecole Centrale de Lille, one of France's elite engineering schools. There he worked with host researchers at the Industrial and Logistics Laboratory on supply chain management issues ranging from coordination to performance measures and assessment. In 2007, he was awarded a $10,000 COR Research Fellowship (a fellowship program administered by the Academic Senate Committee on Research) for his proposal to work on supply chain issues related to contract manufacturing. His tenure at SoBA includes a number of administrative and faculty governance assignments, including: department chair (2004-2005), associate dean for graduate program (2007-2010), and area coordinator (2011-present). His areas of research include operations and supply chain management, manufacturing and service operations, and production and inventory systems. He is the author of numerous articles that have been published in peer-reviewed journals such as: Management Science, IIE Transactions, European Journal of Operational Research, Production and Operations Management, and Global Optimization.

2. Long Gao (Associate Professor) earned his Ph.D. in business administration and operations research from Penn State University, and his M.E. and B.E. in engineering physics from Tsinghua University in Beijing, China. His research interests include supply chain management, stochastic modeling of manufacturing and service systems, Markov decision processes, and simulation. He has published in journals such as Management Science, Production and Operations Management, and European Journal of Operational Research.

3. Elodie Goodman (Associate Professor) joined the School of Business Administration of the University of California at Riverside as an assistant professor of management science in 2012. Previously, she was assistant professor of industrial engineering at the University of Illinois at Chicago from 2006 to 2012. She holds a Diplôme d’Ingénieur from Ecole Centrale Paris, France (2002) and a Ph.D. in operations research from MIT (2006). Her research interests are on the modeling and solution of optimization problems in a variety of areas, in particular those involving game theory. Her recent work includes supply chain, influenza vaccine supply chain, pricing and inventory management and disaster planning.

1 Exhibit VII contains full C.V’s.
4. **Adem Orsdemir (Assistant Professor)** is an assistant professor of operation and supply chain management. He received his BS degree from Bilkent University in electrical engineering and his MS from University of Rochester in electrical and computer engineering. He is also holding an MS degree from UNC in statistics and operations research. He received his PhD from UNC in operations management. He studies the profitability and environmental benefits of green operations driven by the environmental wave and market competition. His research also includes supply chain management in the context of corporate social responsibility.

5. **Yunzeng Wang (Professor and Dean)** joined the faculty of the UCR School of Business Administration (SoBA) in July 2008 as the Dean’s Distinguished Scholar in Supply Chain Management and Professor of Finance and Management Science. He is currently the dean of the SoBA. Dean Wang obtained a Ph.D. degree in Operations Research from the Wharton School at the University of Pennsylvania in 1997. Prior to moving to the United States in 1993, he studied at the University of Waterloo in Canada, and obtained a master's degree in management sciences. He also holds a bachelor’s degree in electrical engineering from Shandong University in China, and a master’s degree in engineering management from the Harbin Institute of Technology in China. Dean Wang’s research interests include supply chain management, technology acquisition and adoption strategy, US-China economic development and trade, stochastic optimization, and game theory. He has published over 30 academic journal articles and invited book chapters.

§ 5.0 COURSES

As presented in Exhibit III, in the first quarter of the Master of Supply Chain & Logistics Management degree program, students will be expected to take core courses in data models and decisions, quantitative methods, and operations management. This grounding is sufficient to expose students, in the second quarter, to the main field of Supply Chain Management. In the third quarter, the students are expected to build on what they learned in the second quarter by taking more advanced courses in the area, such as Logistics and Transportation and Procurement and Strategic Sourcing. In the summer quarter, students are expected to intern with local and global companies. The purpose of the summer internship is to expose students to real supply chain issues and apply the knowledge they acquired in the first three quarters of the curriculum. In their final quarter, students take a capstone course. In the capstone course, students undertake a team-based project where they apply their acquired knowledge from prior courses as well as the experience gained in their summer internship.

The students are expected to choose 6 elective courses from an extensive range of relevant courses, such as Decision Making under Uncertainty, Databases for Management, Project Management, Business Issues in Electronic Commerce, Simulation for Business, Applied Business Forecasting, as well as other courses from other disciplines in Business.

Students should be able to complete the coursework for this program in 16 months. Admission is intended to be primarily in the fall quarter in order to match graduation timing with the normal recruiting cycle. However, the current offerings of SoBA do enable us to consider students for admission beginning in other terms or on a part-time basis. Required courses and sufficient elective courses will be offered every year.
§ 6.0 RESOURCE REQUIREMENTS

The School of Business Administration currently has a reserve that will allow it to launch and market this program without having to reduce funds allocated to existing programs, hiring initiatives or request start-up funds from the university. To launch the program, time will be required from current faculty for program development. The majority of the courses that will be offered are already developed and most are currently taught in SoBA’s MBA program. There is sufficient excess capacity in the classes that are currently offered to absorb the start-up enrollment without adding sections.

The School of Business Administration has developed financial projections for the proposed Master of Supply Chain & Logistics Management program based on conservative assumptions. We plan to offer this program using the self-supporting model with a per credit fee. The Financial Projection shown in Exhibit II conservatively assumes an initial class size of 5 and a steady growth at a rate of 5 students per year. We believe that we can deliver a high quality program to as many as 40 students per year utilizing current resources.

Assumptions regarding marketing costs and incremental costs of instruction are detailed in our Financial Projection shown in Exhibit II.

Based on the experience of other specialized masters programs in supply chain management, the Master of Supply Chain & Logistics Management program is expected to grow steadily. In the Financial Projection shown in Exhibit II, we have projected steady growth at a rate of about 5 students per year. While student FTE growth is always subject to uncertainty, the program is structured to be cash flow positive even if the growth targets are not achieved as quickly as projected. Moreover, there is significant potential that these projections will be exceeded due to the high demand for specialized master’s degrees in supply chain management and the near absence of significant local competition.

As presented in detail in the Financial Projection, the Master of Supply Chain & Logistics degree program can be launched at minimal expense including direct costs of $20,000 stipend for the Academic Program Director and $25,000 for marketing. Existing staff at SoBA are expected to have the capacity to contribute to the administrative and recruitment effort for the new degree at the initial launching stage. However, to follow the UC Policy on Self-Supporting Graduate Degree Programs the financial projection has allocated indirect costs based on student credit hours of all programs offered at UCR in the School of Business.

The Operations and Supply Chain Management faculty already offers a comprehensive range of required and elective courses in operations, supply chain management, and statistics to MBA students. As discussed in Exhibit III (Courses), the curriculum of the new degree will be fashioned out of the existing menu of course offerings with the addition of three new courses. We plan to add special Master of Supply Chain & Logistics Management sections to these courses only as we are justified in doing so by demand and constraints on the capacity of the MBA and other Master programs.

Since we initially can leverage the staff support of the existing MBA and other Master programs, the Master of Supply Chain & Logistics Management program is expected to generate a positive cash flow from its inception. As the program grows and begins to generate its own revenue
stream, it is envisaged that additional support staff will be hired to accommodate the growth, including student recruitment and application oversight. The Master of Supply Chain & Logistics Management program will incur direct expenses for marketing, stipend for the Academic Program Director, UCOP overhead assessment and UCR overhead assessment (after 3 years). In addition, a minimum of 15% of gross revenue will be allocated for financial aid to Master of Supply Chain & Logistics Management students. As the program grows we anticipate increasing the allocation to financial aid as shown in the Financial Projections. In addition, indirect costs will be allocated based on student credit hours of all programs offered at SoBA. This allocation of indirect costs is to comply with the UC Policy on Self-Supporting Graduate Degree Programs. As all SoBA graduate programs grow, additional faculty and staff will be hired to accommodate the growth and provide a quality education. These costs will be allocated to all UCR School of Business programs, as well as additional classroom support, instructional software, program operations and administrative costs (as displayed in the Financial Projections). The Supply Chain & Logistics Management program will be subject to continuous review by the faculty of the School of Business Administration. Reasons for deviations between projected and actual enrollments will be examined and revisions to the program and to financial projections will be made as appropriate.

The Master of Supply Chain & Logistics Management program will enhance SoBA’s net revenues, help build the resource base, diversify existing sources of revenue, and reduce dependence on state funding. In the long term, the program revenues will contribute to improvement of the educational experience of students in all of the degree offerings of the School.

**Alumni and Development:** Graduates of the Master of Supply Chain & Logistics Management program have the potential to become influential and supportive alumni soon after they complete their degree. Based on the experience of similar programs at other schools, including the experience of some of our own faculty, recent graduates tend to become important contributors and resources for the programs within months of completion of their graduate degrees. The Master of Supply Chain & Logistics Management program will facilitate development of stronger relationships with the corporate and professional communities. It is anticipated that most students in the program will be recruited for important positions after graduation.

**§ 7.0 GRADUATE STUDENT SUPPORT**

The Master of Supply Chain & Logistics Management program will offer graduate student support by reserving 15% of the gross fee revenue for student financial aid. As the program grows we anticipate increasing the allocation to financial aid as shown in the Financial Projection in Exhibit II. In addition, the SoBA Development officers will strive to attain donor commitments for scholarships for the Master of Supply Chain & Logistics Management graduate students.

**§ 8.0 GOVERNANCE**

The program will be directed by the Faculty of the School of Business Administration through its Executive Committee and a Graduate Programs Committee, which have oversight responsibility for all Graduate Programs offered by SoBA. Several firms in the sector in our geographical area have expressed keen interest in working together with the school. We can harness this interest by
inviting senior executives of prominent firms in the area to serve on the advisory board for the program. The resulting coordination will lead to a closer relationship with future employers of graduates of the program. These senior executives serving on the advisory board will be available for events such as formal talks, and occasional classroom visit for a case discussion or select topic on real-world experience. These events will enrich the experience of students in all programs offered at the school.

§ 9.0 CHANGES IN SENATE REGULATIONS

The Master of Supply Chain & Logistics Management program will require adding the new degree objective to the Senate bylaws.
EXHIBIT I
COURSE DESCRIPTIONS OF REQUIRED AND SELECTED ELECTIVE COURSES

Required Courses available to Master of Supply Chain & Logistics and MBA students:

MGT 201. Quantitative Analysis (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): MGT 403 or equivalent; familiarity with Microsoft's Excel spreadsheet software. Addresses the process of generating decision making information from data and solving management problems using common computer tools. Covers problem identification and formulation, model selection and use, and interpretation of the results of statistical analysis. Topics include estimation, hypothesis testing, analysis of variance, simple and multiple regression, time series, and forecasting. May not be taken for degree credit by students in statistics undergraduate or graduate programs.

MGT 203 Economics for Management (4) Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 403 or equivalent. A study of the use of microeconomics and macroeconomics in managerial decision making. Topics include demand and supply, production and cost functions, competition, labor supply, national income accounting, aggregate output, interest rates, fiscal and monetary policy, inflation, economic growth, and business cycles.

MGT 207 Operations Management for Competitive Advantage (4) Lecture, 3 hours; outside projects and extra reading, 3 hours per week. Prerequisite(s): MGT 201, spreadsheet skills. Focuses on managing the activities involved directly in the creation of products and services, such as design, production, and distribution. Provides managers with the skills and tools to analyze, optimize, and improve production processes for competitive advantage. Explores issues through lectures, cases, and videos pertaining to various industries.

MGT 255 Procurement and Strategic Sourcing (4) Lecture, 3 hours; discussion, 1 hour. Basic concepts and processes in purchasing and sourcing management are introduced in this course. It teaches global sourcing techniques and the application of various management tools and quality tools in purchasing. Focus is on the proactive and planned analysis of supply markets and the selection of suppliers, with the objective of delivering solutions to meet pre-determined and agreed upon organizational needs.

MGT 256 Business Analytics for Management (4) Lecture, 3 hours; written work, 1 hour; extra reading, 1 hour; practicum, 1 hour. Prerequisite(s): MGT 201 or consent of instructor. Provides the fundamental concepts and tools needed to understand the emerging role of business analytics in organizations and apply basic business analytics tools in a spreadsheet environment. Makes extensive use of data, statistical and quantitative analysis, exploratory and predictive models, and fact-based management to drive decisions and actions.

MGT 258 Logistics and Supply Chain Management (4) Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Studies the integration of value-creating elements in supply, procurement, manufacturing, distribution, and logistics processes, using information technologies as a main enabler. Topics include distribution networks, demand
management, sourcing, transportation, pricing, supply chain coordination, information technology, and e-business.

**MGT 271 Quantitative Decision Making and Analysis (4)** Lecture, 3 hours; discussion, 1 hour. This course covers many approaches to solving business problems from managerial point of view. Various optimization techniques are surveyed with an emphasis on the why and how of these types of models. Spreadsheet Solvers are used to accomplish the mathematical manipulations. Emphasis is placed on input requirements and interpretation of results.

**MGT 275 Transportation and Logistics Management (4)** Lecture, 3 hours; discussion, 1 hour. The course provides deep insight into the key functional areas related to transportation and logistics management within supply chain operations. Focus will include the role of transportation systems; managerial and economic aspects of various transportation modes, transport, storage/handling, and facility location decisions with applications to both domestic and international operations.

*Required Courses to be developed for the Master of Supply Chain & Logistics students:*

**MGT ??? Supply Chain Integration (4)** Lecture, 3 hours; discussion, 1 hour. This course draws on the concepts, theories and techniques, specifically emphasizing the role of the supply chain manager in implementing and accomplishing project plans and objectives. Students may draw on topics from their workplace or may choose from projects provided by companies in our local area requesting consulting services in developing feasibility studies and project proposals. Note that the ability to assign such a "real world" project depends on the availability of companies interested in such analyses at the time.

*Example Elective Courses*

**MGT 205 Information Systems (4)** Lecture, 3 hours; laboratory, 1 hour; outside projects and extra reading, 2 hours. Prerequisite(s): graduate standing; familiarity with basic computer operations and software packages. Examines the operation and management of information systems as applied to the business environment. Topics include hardware, software, databases, decision support, and systems analysis. Software packages are used to integrate information systems concepts and business applications.

**MGT 209 Marketing Management (4)** Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 403 or equivalent. Analyzes the marketing process, the environment within which it operates, institutions involved, and the functions performed. Examines the relationships and trends in a market-based economic system. Develops concepts and terms applied to marketing decisions from the perspective of a manager.

**MGT 210 Human Resources Management (4)** Lecture, 3 hours; outside projects and reading, 3 hours. Prerequisite(s): MGT 200. Introduces methods for managing the firm’s human resources within the context of regulatory and economic conditions and changing workforce demographics. Topics include recruitment and selection, compensation and reward systems, employee development and appraisal, and information systems for meeting HRM objectives.
MGT 215 International Comparative Management (4) Lecture, 3 hours; outside projects and readings, 3 hours. Prerequisite(s): graduate standing. Comparative analysis of significant management practices. The impacts of cultural, political, social, and economic factors on decision making within the international arena are examined.

MGT 221 Decision Making Under Uncertainty (4) Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Introduces basic tools for using data to make informed managerial decisions under uncertainty. Addresses modeling, performance evaluation, and optimization of systems with uncertain parameters. Topics include Markov chains, Markov decision processes, and probabilistic linear and dynamic programming. Applications are drawn from operations, finance, marketing, and other management fields.

MGT 224 Managing for Quality Improvement (4) Lecture, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 201 or consent of instructor. Discusses the operational aspects of quality improvement in manufacturing and service organizations. Focuses on the broader issues of total quality management, statistical process control, and the difficulties in implementing quality efforts in organizations.

MGT 230 Databases for Management (4) Lecture, 3 hours; outside projects and readings, 3 hours. Prerequisite(s): MGT 205. Examines the features and capabilities of database management systems, including database classification, data structures, file organizations, evaluation, and management of database systems.

MGT 231 Corporate Finance (4) Lecture, 3 hours; extra reading, 1.5 hours; outside problem sets, 1.5 hours. Prerequisite(s): MGT 202. An intensive analysis of the effects of corporate financial policy decisions on firm value. Examines the interrelation of firm value, financing policy, investment decisions, and other considerations. Provides an understanding of the theoretical issues involved in the choice of these policies.

MGT 233 Marketing Research (4) Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 209; or consent of instructor. Examines how marketing-related data is gathered from individuals and organizations. Explores the importance of integrating problem formulation, research design, questionnaire construction, and sampling so as to yield the most valuable information. Also studies the proper use of statistical methods and the use of computers for data analysis.

MGT 236 Decision Making Under Certainty (4) Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Introduces basic tools for using data to make informed managerial decisions under certainty. Covers modeling and solution methods in network optimization, integer and nonlinear programming, and multiple criteria decision analysis. Examines applications and case studies in operations, logistics, finance, and marketing.

MGT 239 Simulation for Business (4) Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 205. Introduces computer simulation as a tool for
analyzing complex decision problems. Analyzes and discusses the theory and practice of modeling through simulation. Topics include modeling uncertainty and collecting input data, basic simulation principles, Monte Carlo simulation techniques, model verification and validation, and analysis of simulation output. Examines applications in manufacturing, finance, health services, and public policy.

MGT 250 Marketing Channels and Sales Force (4) Lecture, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 209. Examines decisions related to distribution channels and sales force. Discusses how to select the most appropriate marketing channel. Channel management topics include distribution intensity, power, control, and channel conflict. Covers issues in sales-force management, compensation, structure, and size.

MGT 266 Project Management (4) Seminar, 3 hours; extra reading and project, 3 hours. Prerequisite(s): MGT 207 or equivalent. Addresses issues of project planning and control. Topics include differences between projects and production systems; project selection; project teams; breakdown structures of organization and work; scheduling and budgeting; resources management; project control and evaluation; and current project management software.

MGT 267 Applied Business Forecasting (4) Seminar, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 201 or equivalent. Provides experience in developing forecasting models and applying them to problems in marketing, production, inventory management, business economics, and other fields. Discusses issues in data acquisition, data analysis, modeling of relations between variables, trend analysis, and seasonal forecasting. Uses case studies and applications from a variety of management areas.

MGT 280 Business Issues in Electronic Commerce (4) Seminar, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 205 or consent of instructor. Provides an understanding of the various business strategies, management issues, and pertinent technologies related to electronic commerce. Explores several of the problems surrounding electronic commerce including security issues, privacy, encryption, safeguarding of intellectual property rights, acceptable use policies, and legal issues.
# EXHIBIT II: FINANCIAL PLANNING

## Master of Supply Chain & Logistics Management
### Budget Projection

<table>
<thead>
<tr>
<th>FTE ENROLLMENT</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Year 2</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Total Year-average Program Enrollment</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

### REVENUE

1. Program Unit Fee Per Student
   - $1,200

2. Year 1 - 48 Units
   - $288,000

Year 2 - 16 Units
   - $96,000

**TOTAL PROGRAM REVENUE**

- $288,000
- $384,000
- $672,000
- $768,000
- $1,056,000

### COSTS

#### A. Program Direct Costs

3. Faculty Salaries w/benefits
   - Year 1: $211,590
   - Year 2: $163,800
   - Year 3: $171,990
   - Year 4: $180,590
   - Year 5: $189,619

4. Program Director Salary w/benefits
   - Year 1: $40,000
   - Year 2: $41,200
   - Year 3: $42,436
   - Year 4: $43,709
   - Year 5: $45,020

5. Readers
   - Year 1: $9,941
   - Year 2: $19,883
   - Year 3: $29,824
   - Year 4: $39,766
   - Year 5: $49,707

6. S&E
   - Year 1: $20,000
   - Year 2: $20,000
   - Year 3: $20,000
   - Year 4: $20,000
   - Year 5: $20,000

7. Equipment
   - Year 1: $0
   - Year 2: $0
   - Year 3: $0
   - Year 4: $0
   - Year 5: $0

8. Travel
   - Year 1: $0
   - Year 2: $0
   - Year 3: $0
   - Year 4: $0
   - Year 5: $0

6. Financial Aid
   - Year 1: $57,600
   - Year 2: $76,800
   - Year 3: $134,400
   - Year 4: $153,600
   - Year 5: $211,200

7. UCOP Assessment
   - Year 1: $756
   - Year 2: $1,512
   - Year 3: $2,267
   - Year 4: $3,023
   - Year 5: $3,779

8. Campus Assessment paid by Program to Campus
   - Year 1: $0
   - Year 2: $22,042
   - Year 3: $44,084
   - Year 4: $66,126
   - Year 5: $88,169

**TOTAL DIRECT COSTS**

- $339,887
- $345,237
- $445,002
- $506,814
- $607,494

#### B. Program Indirect Costs

9. MBA/Career Services Staff & Operations
   - Year 1: $1,554,957
   - Year 2: $1,586,056
   - Year 3: $1,617,777
   - Year 4: $1,650,133
   - Year 5: $1,683,135

10. Academic Course Support & Instructional Databases
    - Year 1: $327,508
    - Year 2: $334,058
    - Year 3: $340,739
    - Year 4: $347,554
    - Year 5: $354,505

**TOTAL GRADUATE PROGRAM INDIRECT COSTS**

- $1,882,465
- $1,920,114
- $1,958,517
- $1,997,687
- $2,037,641

11. Program Indirect Cost Per Graduate Student Average
    - Year 1: $7,470
    - Year 2: $7,620
    - Year 3: $7,772
    - Year 4: $7,927
    - Year 5: $8,086

12. Administration Salary/Benefits
    - Year 1: $2,173,055
    - Year 2: $2,216,516
    - Year 3: $2,260,846
    - Year 4: $2,306,063
    - Year 5: $2,352,184

12. Faculty Salary/Benefits
    - Year 1: $11,028,541
    - Year 2: $11,359,397
    - Year 3: $11,700,179
    - Year 4: $12,051,185
    - Year 5: $12,412,720

12. Faculty Research
    - Year 1: $1,337,484
    - Year 2: $1,364,234
    - Year 3: $1,391,518
    - Year 4: $1,419,349
    - Year 5: $1,447,736

12. Non-program Specific Operations
    - Year 1: $1,116,168
    - Year 2: $1,138,491
    - Year 3: $1,161,261
    - Year 4: $1,184,486
    - Year 5: $1,208,176

**TOTAL ADMIN & FACULTY INDIRECT COSTS**

- $15,655,248
- $16,078,638
- $16,513,805
- $16,961,083
- $17,420,816

12. Admin & Faculty Indirect Cost Per Student Average
    - Year 1: $4,715
    - Year 2: $4,843
    - Year 3: $4,974
    - Year 4: $5,109
    - Year 5: $5,247

**TOTAL PROGRAM INDIRECT COSTS**

- $60,928
- $124,625
- $191,189
- $260,722
- $333,328

### ANNUAL COST PER FTE STUDENT

- Program Direct Costs: $67,977
- Program Indirect Costs: $12,186
- **TOTAL COST PER FTE STUDENT**
  - Year 1: $80,163
  - Year 2: $46,986
  - Year 3: $42,413
  - Year 4: $38,377
  - Year 5: $37,633

### TOTAL PROGRAM COST

- Year 1: $400,815
- Year 2: $469,861
- Year 3: $636,191
- Year 4: $767,536
- Year 5: $940,822

### SURPLUS (DEFICIT)

- Year 1: $(112,815)
- Year 2: $(85,861)
- Year 3: $(35,809)
- Year 4: $(153,600)
- Year 5: $(211,200)

### SURPLUS (DEFICIT) PER HEADCOUNT STUDENT

- Year 1: $(22,563)
- Year 2: $(8,586)
- Year 3: $(2,387)
- Year 4: $(23)
- Year 5: $(4,607)

Faculty FTE should be based on the FTE reported in Table 4 with faculty paid on overload counted based on the number of courses taught, relative to a normal teaching load for that title code. For example, a ladder-rank faculty member teaching one course on overload in the self-supporting program would be counted as 0.25 FTE, based on a normal four course load.
<table>
<thead>
<tr>
<th>Explanation</th>
<th>Cost Analysis Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tuition @$1,200 per unit was based on the current Master of Finance program at UCR School of Business. The plan is to keep the cost level for the first five years to support growth in the program.</td>
<td></td>
</tr>
<tr>
<td>2. Per proposal, the Master of Supply Chain and Logistics Management Program will be a 64-credit unit curriculum. Normal student will complete in 16 months.</td>
<td></td>
</tr>
<tr>
<td>3. Faculty cost for the 4 courses specifically designed for the Master of Supply Chain and Logistics Management Program. Based on average cost per Graduate course. Year 1 includes cost to develop program.</td>
<td></td>
</tr>
<tr>
<td>4. Program Director salary based on current SSP program managers - PSOE appointment at 2/3 teaching &amp; 1/3 Program Director</td>
<td></td>
</tr>
<tr>
<td>5. UCR School of Business policy for a Reader is 1 reader hour per student per week. FY17-18 rate is $15.78/hour. 10 academic weeks per quarter. 4 courses per student</td>
<td></td>
</tr>
<tr>
<td>6. Financial Award budgeted at 20% of the projected revenue.</td>
<td></td>
</tr>
<tr>
<td>7. UCOP Assessment based on prior year as follows: 1/3 on current fund actual expenditures, 1/3 on total student FTE and 1/3 on total academic and staff FTE.</td>
<td></td>
</tr>
<tr>
<td>8. UCR In-Direct Overhead based on prior year expenditures for Infrastructure, UCR Administration, Student Support &amp; Academic/Research allocated at 6.80% per new budget model.</td>
<td></td>
</tr>
<tr>
<td>9. Graduate Program &amp; Career Center staff &amp; operations based on a per student average based on FY16-17 enrollment in all graduate programs.</td>
<td></td>
</tr>
<tr>
<td>10. Graduate Course Support &amp; Instructional Databases</td>
<td></td>
</tr>
<tr>
<td>11. Based on number of students enrolled in School of Business Graduate Programs.</td>
<td></td>
</tr>
<tr>
<td>12. Based on number of students enrolled in the School of Business Graduate and Undergraduate Programs.</td>
<td></td>
</tr>
</tbody>
</table>
EXHIBIT III

COURSE SCHEDULE AND COURSE STATUS

Sample Program (full-time)

Quarter 1
MGT 201 Quantitative Analysis            MBA Core Course
MGT 207 Operations Management for Competitive Advantage MBA Core Course
MGT 271 Quantitative Decision Making and Analysis MSCLM Core Course
Elective

Quarter 2
MGT 203 Economics for Management MBA Core Course
MGT 258 Logistics and Supply Chain Management MBA Core Course
Elective
Elective

Quarter 3
MGT 256 Applied Business Analytics MBA Course
MGT 275 Transportation and Logistics Management MSCLM Core Course
Elective
Elective

Summer Internship
MGT 298I

Quarter 4
MGT 255 Procurement and Strategic Sourcing MSCLM Core Course
MGT ?? Supply Chain Integration MSCLM Core Course
MGT 298I Internship (retroactive credit) MBA Core Course
Elective
1. **Name of Program:**
   Master of Supply Chain & Logistics Management

2. **Campus:**
   University of California Riverside

3. **Degree/Certificate:**
   Master's Degree

4. **CIP Classification:** (to be completed by the Office of the President)

5. **Date to be started:**
   September 1, 2018 or sooner, if feasible

6. **If modification of existing program, identify that program & explain changes.**
   Not Applicable.

7. **Purpose (academic or professional training) and distinctive features (how does this program differ from others, if any, in California?)**

   **Program Differentiation**

   There is a large and increasing demand and professional need for specialized masters programs in Supply Chain & Logistics Management. Southern California is greatly underserved in graduate supply chain management education. Whereas Schools on the East Coast and east of the Mississippi are in the forefront of development and introduction of specialized graduate degrees in supply chain management & logistics, the University of Southern California (USC) is the only school in Southern California that currently offers an advanced degree in supply chain management. The USC program, Master’s in Global Supply Chain Management, is a joint program between the Vitebri school of Engineering and the Marshal School of Business. It is fundamentally different from the proposed program and targets a different market. It is only a matter of time before our local competitors will introduce such programs, making UCR’s introduction of the program at this time partly defensive. UCR will be unique in the UC system in offering a Master of Supply Chain & Logistics Management. The Master of Supply Chain & Logistics Management will provide a comprehensive overview of the entire field of supply chain management, with an emphasis on analytical methods and applications using business analytics tools. The specific positioning of this degree is for students who desire a more specialized graduate education than is provided by an MBA, with substantially more depth in supply chain and logistics management. The program is designed to develop sophisticated supply chain and logistics management expertise including modeling, analysis, decision making, and supply chain planning.

8. **Type(s) of students to be served:**

   The Master of Supply Chain & Logistics Management will be offered as a 16-month program (64 units) for graduates of a baccalaureate degree in a field that provides sufficient quantitative background to enable successful completion of the program. Appropriate undergraduate majors include business, economics, engineering, mathematics, statistics, and physics, among others. Students admitted to the program will have an academic profile somewhat different from those likely to be admitted to other master's level programs in the Anderson Graduate School of Management. In particular, the Master’s in Supply Chain and Logistics Management places substantially greater emphasis on quantitative background as reflected in undergraduate degree, courses taken, and scores on quantitative portions of admissions tests. Compared to the MBA, the Master of Supply Chain & Logistics Management places
less emphasis on work experience, though over time we expect that the cohort will include individuals with significant relevant work experience.

9. If program is not in current campus academic plan give reasons for proposing program now:

There are at least eight compelling reasons why the School of Business Administration and the Anderson School should launch this new degree program at this time:

- Supply Chain and Logistics executives require increasingly high levels of specialized expertise for professional advancement.
- The regional market is underserved.
- The Master of Supply Chain & Logistics Management will be an immediate source of net revenue.
- The program will enable us to build critical mass in the faculty.
- The program will increase the prospects for earning supply chain management accreditation from The Association to Advance Collegiate Schools of Business (AACSB International).
- The program is consistent with the UCR and SoBA strategic plans.
- Graduates of the Master of Supply Chain & Logistics Management program have the potential to become influential and supportive alumni soon after they complete their degree.
- The Program will meet an untapped demand for under-represented minority graduates.

10. If program requires approval of licensure board, what is the status of such approval?

Not Applicable

11. Please list special features of the program:

- Specialized graduate level supply Chain management and logistics education
- Significant complementarities with existing programs of SoBA

12. List all courses required:

The majority of the courses are currently offered by the SoBA

Quarter 1

MGT 201 Quantitative Analysis
MGT 207 Operations Management for Competitive Advantage
MGT 271 Quantitative Decision Making and Analysis
Elective

Quarter 2

MGT 203 Economics for Management
MGT 258 Logistics and Supply Chain Management
Elective
Elective

Quarter 3

MGT 256 Applied Business Analytics
MGT 275 Transportation and Logistics Management
Elective
Elective

664
Summer Internship
MGT 298I Internship

Quarter 4
MGT 255 Procurement and Strategic Sourcing
MGT ??? Supply Chain Integration (new course)
Elective

15. List any related program offered by the proposing institution and explain relationship.
We anticipate that the program will help us to attract good candidates to the School’s Ph.D. program in management.

16. Summarize employment prospects for graduates of the proposed program.
The program will educate individuals for employment in all types of organizations in particular the logistics and supply chain sector. The experience of our faculty with other programs is that opportunities for professional employment are excellent and that it is possible to develop a virtuous cycle where recent graduates who are placed become ambassadors for the program, helping to place subsequent graduates.

17. Give estimated enrollment for the first 5 years and state basis for estimate.
We project 5 students in the first year, increasing by 5 per year to reach 25 in five years.

18. Give estimates of the additional cost of the program by year in each of the following categories: FTE Faculty, Library Acquisitions, Computing, Other Facilities, Equipment. Provide brief explanation of any of the costs where necessary.
Exhibit II of the full proposal (reproduced below) contains our financial projections. FTE Faculty, Library Acquisitions, Computing, Facilities and Equipment are considered by SoBA to be “in-direct costs” and are allocated across all graduate programs and the undergraduate program based on the projected student credit hours in each program. The projected budget uses the current 90% undergraduate student credit hours, with the remaining 10% graduate student credit hours allocated over the individual graduate program.
An increase in faculty FTE is shown by the increase in costs allocated to the Master of Supply Chain & Logistics Management, however, it is not possible to state an accurate FTE proration since the faculty teach in all area. Library acquisitions and computing are allocated in the line “Instructional Databases, IT & Course Materials. There will be no facilities cost as we will use available capacity in existing classrooms. Also we do not have specific equipment needs for the Master of Supply Chain & Logistics Management program.

Direct costs for the Master of Supply Chain & Logistics Management program include: UCOP Assessment at 1.7% of gross revenue, stipend for the Academic Program Director (faculty), marketing and financial aid at 15% of gross revenue.

19. How and by what agencies will the program be evaluated.
The program will be evaluated by the AACSB at UCR's next accreditation review. An initial campus level review will occur after 3 years and normal campus-level reviews will occur periodically thereafter.
EXHIBIT V

LETTER FROM SCHOOL OF BUSINESS ADMINISTRATION DEAN

September 17, 2015

Courses and Program Sub Committee of the Graduate Council
University of California, Riverside
Riverside, CA 92521

RE: Master in Supply Chain and Logistics Management

Dear Committee Members:

I am writing to endorse the proposed Master in Master in Supply Chain and Logistics Management. This is a well-designed program to expand SoBA's self-supporting program offerings. Over the last decade, the industry demand for business graduates has been shifting from the general Master for Business Administration (MBA) to specialized Masters. By offering the Master in Supply Chain and Logistics Management, SoBA will continue to build up capacity to meet the industry demand. The program will provide a stream of revenue to strengthen the School's financial stability.

Like our faculty, I enthusiastically support the program.

Sincerely,

Yunzeng Wang
Dean
EXHIBIT VI

LETTERS FROM LOCAL LOGISTICS COMMUNITY REPRESENTATIVES

July 16, 2015

Yunzeng Wang, Ph.D.
Dean, University of California, Riverside School of Business Administration
Anderson Hall 0122
Riverside, CA 92521

Dear Dean Wang:

I am writing to offer my support for the proposed Master’s Degree of Supply Chain and Logistics Management at the University of California, Riverside. Our industry is in need of qualified professionals who have demonstrated their skills and understanding by achieving a master’s degree in this field.

Our organization would welcome the opportunity to hire a future graduate of this program. I anticipate the continued growth of the logistics industry in the Southern California region, and your program would be instrumental in supporting that growth through the education of highly trained logistics professionals.

Best Regards,

George Hynes
President
Logistic Edge, LLC

2091 Raymer Avenue Unit A-B
Fullerton, California 92833
(714) 997-0570 (888) 305-3343
(714) 908-2010 fax
www.logisticedge.com
July 6, 2015
Dean Yunzeng Wang
Dean UCR School of Business Administration (SoBA)
Anderson Hall 0122
Riverside, CA 92521

Dear Dean Wang:

This letter is sent in support of the proposed Master of Supply Chain and Logistics Management at the University of California, Riverside. The logistics industry needs programs like this to enable us to provide better services through better trained professionals. We endorse the program and would look forward to the potential long term benefit to our industry.

As a senior Logistics executive in the inland southern California region, I would be pleased to hire Supply Chain and Logistics professionals graduating from the Master degree program at the University of California, Riverside.

Sincerely,

[Signature]

James Lin
CEO
Logistics Team
July 30, 2015

Yunzeng Wang, Ph.D.
Dean
School of Business Administration
University of California, Riverside
900 University Avenue
Riverside, California 92521

Dear Dean Wang,

On behalf of Yamato Transport U.S.A., Inc. (Secaucus, NJ)—a fully owned subsidiary of Yamato Holdings Co., Ltd., the number one company in the parcel express home delivery service in Japan—I support and endorse the proposed Master of Arts in Supply Chain and Logistics program in the School of Business Administration at the University of California, Riverside.

The Inland Southern California region’s economy is driven to a significant degree by the supply chain and logistics industries. A large component of the area’s working population are involved in the various sectors that make up supply chain and logistics, from transportation to commercial real estate to the Long Beach and L.A. ports, and would benefit from a specialized degree in supply chain and logistics.

Also, the Southern California region is underserved in graduate supply chain and logistics education and this new program will enable the University of California, Riverside to address a regional market need. In addition, the program will allow existing supply chain and logistics executives to gain the specialized training required for professional advancement.

As a senior supply chain and logistics executive located in the Southern California region, I would welcome high-quality professionals graduating from the Master of Arts degree program at UC Riverside.

Sincerely,

Koji Ogura
President and Chief Executive Officer,
Yamato Transport U.S.A., Inc.
July 24, 2015

Yunzeng Wang, Ph.D.
University of California, Riverside
School of Business Administration
Anderson Hall 0122
Riverside, California 92521

Dear Dr. Wong,

Please accept this letter in support of a proposed Master’s Degree Program in Supply Chain and Logistics Management at the University of California, Riverside.

I have been diligently working with individuals responsible for educational endeavors within the grocery industry for the past year in an attempt to get support for such a program as there is a real need in our area for it. There are numerous programs for individuals seeking to advance their education in Retail Management, but not such a program for individuals involved in Supply Chain and Logistics Management.

The Inland Empire is a hub of supply chain and logistics for the entire Southern California region. It makes a great deal of sense that the University of Riverside would lead the way in developing and offering a Master’s Degree program in this area.

Our company would be supportive of this program and would have several individuals who we would encourage to attend in furtherance of their careers with Stater Bros. Markets.

Sincerely,

STATER BROS. MARKETS

George A. Frahm
Executive Vice President
Administration/Distribution

GAF/amz
Los Angeles, September 26, 2017

To whom it may concern,

This brief letter serves to express my support for the proposed Master of Supply Chain and Logistics Management, to be offered by the Anderson Graduate School of Management at UC Riverside. I had written a brief generic note of support previously (on September 6, 2016), at which time I had not seen the proposal. I have now seen the proposal, and hence can offer a few more specific comments in support.

The design of the program is sensible, starting with basics in quantitative methods, data models and decisions, and operations management, before introducing the main topics such as supply chain management, logistics, transportation, and outsourcing. Allowing some flexibility in the timing of the internship should also help with finding good internships. The program appears to exhibit a nice synergy with the existing MBA program, building on several courses that are already offered there and that are appropriate for students in the new MSCLM program as well.

I agree with the premise of the proposal, which is that the Southern California region (or perhaps the Western US in general) is underserved with respect to programs focusing on supply chain management, especially given the large role of supply chains and logistics in the Western US.

Finally, supply chain management is well-aligned with the interests and expertise of the Operations and Supply Chain Management faculty, which suggests that they would be able to design and deliver a solid program.

Sincerely,

Charles
September 8, 2016

Professor Yunzeng Wang
Dean, School of Business Administration
University of California, Riverside
Riverside, CA 92521

Dear Yunzeng,

I am writing to offer my support of the proposed Master Program in Supply Chain and Logistics Management from your School of Business Administration at UCR.

With two of the largest container ports in Los Angeles and Long Beach, Southern California is a major international logistics hub for global trade, especially between the U.S. and Asia-Pacific region. In addition, the Inland Empire has a large number of warehouses and storage facilities for many logistics firms. As such, I believe there is a high demand for professionals with adequate supply chain and logistics management knowledge in the Southern California area.

I think the proposed program curriculum provides a good set of important knowledge and skills that can help to develop professionals for the supply chain and logistics industry. Also, your School has several faculty members who are active researchers in the operations/supply chain management area and are capable of delivering high-quality courses in the proposed program.

Therefore, I believe your School is well positioned to offer a good Master Program in Supply Chain and Logistics Management to meet the local demand in this functional area.

Regards,

Rick So
Professor and Area Coordinator
Operations and Decision Technologies Group
October 1, 2017

Professor Mohsen El Hafsi
School of Business Administration
University of California at Riverside
134 Anderson Hall
900 University Avenue
Riverside, CA 92521

Dear Mohsen:

I am writing to provide a letter of support for your proposal to launch a Master’s level degree program in the area of Supply Chain and Logistics Management. Although the material that you provided to me did not include detailed syllabi, the mix of course topics in the proposed curriculum seems appropriate and I believe that you and the other faculty members in the Operations and Supply Chain Management group at your School are well-qualified to teach the pertinent courses. In view of Riverside’s proximity to the ports of Los Angeles and Long Beach, termini of major railroads, and large numbers of major warehouses for retail and industrial goods, your proposed program seems to be well-designed to address the needs of the regional business community.

Please note that this represents my personal viewpoint, as there was insufficient time for me to solicit the views of other faculty or the Haas School of Business as a whole. Nevertheless, I hope this is helpful in some way.

If you or your colleagues or campus administrators need further information, please feel free to contact me.

Sincerely,

Candace Arai Yano
Associate Dean for Academic Affairs, Gary and Sherron Kalbach Professor of Business Administration and Professor of Operations & Information Technology Management, Haas School of Business
Professor, Department of Industrial Engineering and Operations Research
MOHSEN ELHAFSI
School of Business Administration
University of California, Riverside CA 92521
Phone: (951) 827-4557
Fax: (951) 827-3970
E-mail: mohsen.elhafsi@ucr.edu
Web site: http://agse.ucr.edu/directory/faculty.html?netid=melhafsi

My research interest is in the general area of Operations and Supply Chain Management. It includes using optimization in the design, planning and control of large-scale industrial processes and service operations. My focus is on developing analytical models of complicated systems, developing solution procedures using quantitative techniques, and drawing managerial insights from the analysis of these models.

EDUCATION

<table>
<thead>
<tr>
<th>Degree</th>
<th>Field</th>
<th>Institution</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D.</td>
<td>Industrial Engineering</td>
<td>University of Florida</td>
<td>1995</td>
</tr>
<tr>
<td>M.S.</td>
<td>Industrial Engineering</td>
<td>University of Florida</td>
<td>1995</td>
</tr>
<tr>
<td>M.E./B.Sc.</td>
<td>Industrial Engineering</td>
<td>Ecole National d'Ingénieurs de Tunis</td>
<td>1988</td>
</tr>
</tbody>
</table>

PROFESSIONAL EXPERIENCE

2009 – present Full Professor A. Gary Anderson Graduate School of Management, University of California, Riverside

2007 – 2010 Associate Dean of MBA Program & Graduate Advisor A. Gary Anderson Graduate School of Management, University of California, Riverside

2002 – 2006 Associate Professor A. Gary Anderson Graduate School of Management, University of California, Riverside

2006 – 2007 Visiting Professor Ecole Centrale de Lille, France Fulbright Fellow

1997 – 2002 Assistant Professor A. Gary Anderson Graduate School of Management, University of California, Riverside

1996 – 1997 Visiting Professor A. Gary Anderson Graduate School of Management, University of California, Riverside

1995 – 1996 Post Doctoral fellow Dept. of Industrial and Systems Engineering, University of Florida
1988 – 1990  Project Manager  Institut Regional des Science
Informatiques et des Télécommunication,
Tunisia

FIELDS OF INTEREST
Operations and Supply Chain Management
Design and Management of Manufacturing and Service Systems
Mathematical Modeling and Operations Research

COURSES TAUGHT

_Undergraduate Level_
Production and Operations Management
Decision Analysis & Management Science
Supply Chain Management
Practical Business Forecasting

_Graduate Level_
Operations Management for Competitive Advantagage
Logistics and Supply Chain Management
Introduction to Management Science
Statistics for Management
Applied Business Forecasting
Operations Planning and Control
Management Synthesis

AWARDS AND HONORS
First $10,000 Committee on Research (COR) Fellowship Award, University of
California, Riverside, 2007-2008
Fulbright Fellowship Award (Ecole Centrale de Lille, France), 2006-07
Regents Faculty Fellowship Award: University of California, Riverside, 2000-01
ΦΚΦ: Honor Graduate, 1995
Teaching Assistantship: ISE Department, the University of Florida, 1994–95
Research Assistantship: ISE Department, the University of Florida, 1991 – 94
High Honors Qualified Engineer Diploma: IE Department, Ecole Nationale d'Ingénieurs de Tunis, 1988
High honors Baccalaureate Diploma, 1982

LANGUAGES
- English (Fluent)
- French (Fluent, education language)
- Russian (Two-year Certificate)

SERVICES AND PROFESSIONAL ACTIVITIES

School and Campus Wide Services
- Elected Member: Senate Committee on Committees, 2014-2017
- Elected Member: SoBA Executive Committee, 2014-2016
- Member: Finance Recruiting Committee, 2014-2015
- Member: SoBA Undergraduate Committee, 2014-2016
- Chair: OSCM Recruiting Committee, 2013-2014
- Member: Academic Senate Research Committee (09/2013-09/2014)
- Member: SoBA Committee on Research (01/2012-01/2014)
- Member: Special Committee on International Activities (03/2009-09/2010)
- Member: SoBA Executive Committee (09/2010-09/2012)
- Member: Academic Senate Graduate Council (2010-2013)
- Member: Courses and Programs Subcommittee (2010-2013)
- Chair: MS/OM Recruiting Committee, 2010-2011
- Member: Academic Senate Courses Committee (2009-2010)
- Chair: Research Committee (2010)
- Graduate Advisor: 2007-2010
- Chair: Graduate Program Committee, 9/2007-9/2010
Chair: Recruiting Committee (two senior positions in Supply Chain Management), 2007-2008
Member: Internal Strategic Planning Steering Committee, 2007-2008
Member: Academic Senate Research Committee, 2007-2008
Member: Interdisciplinary Teams and Networks Grants Program Committee, 09/2007-09/2010
Chair: Recruiting Committee for Dean’s Academic Appointment, 2004-2005
Chair: "Management Department: The Economic Approach”, 2003-04
Member: Strategic Planning Committee, 2003-04
Chair: MS/OM Recruiting Committee, 2002-03
Member: Steffy Chair Recruiting Committee, 2002-03
Member: Graduate Program Committee, 1997-2000, 2002-03
Member: Research Committee, 2000-2001
Member: MIS Recruiting Committee, 1997-1998
Member: Center for Research in Intelligent Systems (CRIS), 1996-present
Member: Ad hoc committee for 5th year appraisal evaluation 2002-2003
Member: Several Ph.D. Oral Examination, Statistics Department, 1999-2006

Editorial Board Membership
Member of the IFAC (International Federation of Automatic Control) Technical Committee on Manufacturing Modeling for Management and Control (since 2015)
Asia Pacific Journal of Mathematics (since 2014)
Statistics, Optimization & Information Computing (since 2013)
Open Journal of Optimization (since 2012)
The International Journal of Mathematics in Operational Research (since 2008)
International Journal of Commerce and Management (since 2009)

Session Chair
2014 Production and Operations Management Society, Annual Conference, Atlanta, Georgia, May 9-12, 2014.
2013 INFORMS Annual Conference, Minneapolis, October 6-9, 2013.
2002 33rd Annual DSI Meeting, San Diego, California, Nov. 23-26, 2002
2001 National INFORMS Meeting, Miami, FL, November 4-7, 2001
2001 International Conference, Academy of Business and Administrative Sciences, Brussels, Belgium
2000 International Conference, Academy of Business and Administrative Sciences, Prague, Czech Republic
5th Industrial Engineering Research Conference, Minneapolis, MN, May 18-21, 1996

Proposal Assessor
"Information and Decision Dynamics in Manufacturing", Executive Board of the Austrian Science Fund, 2014
Hong Kong Research Grants Council (RGC), 2000
Grants to Enhance and Advance Research (GEAR) Program, University of Houston, 2006.

Journals Refered

PROFESSIONAL AFFILIATIONS
The Institute for Operations Research and Management Science, since 1991
The Manufacturing and Service Operations Society, since 1997
The Production and Operations Management Society, since 1993
The Institute of Industrial Engineering, since 1992
The Honor Society of Phi Kappa Phi, since 1995
The Fulbright Association, since 2007

PUBLICATIONS

ARTICLES IN JOURNALS (TECHNICAL, REFEREED)


ARTICLES IN PROCEEDINGS (TECHNICAL, REFEREED)


36. ElHafsi, M., H. Camus, E. Craye, "Optimal Control of a Production System with Information on the Production and Demand Status: Application to Vendor Managed Inventory" Proceedings of the 8th ENIM IFAC International Conference


Submitted ARTICLES (TECHNICAL, REFEREED)


Working Papers


45. M. Elhafsi “Optimal Dynamic Pricing for a Multi-Product Nested ATO system with Heterogeneous Demand” To be submitted to Manufacturing & Service Operations Management.


INVITED TALKS AT UNIVERSITIES

ESSEC Business School, Operations Management Area, Paris, France, 2014

University of Waterloo, Management Science Department, Canada, 2009
University of Geneva, College of Business (HEC), Switzerland, 2006
Ecole Centrale de Lille, France, 2006 (1)
Ecole Centrale de Lille, France, 2006 (2)
University of Neuchâtel, College of Business (HEC), Switzerland, 2006
University of Montreal, Business School (HEC), Canada, 2005

CONFERENCE PARTICIPATION - PAPER PRESENTATIONS


20th Conference of the International Federation of Operational Research Societies – IFORS (Managing an Assemble-to-Order System with After Sales Market for Components), Barcelona, Spain, July 13-18, 2014

POMS Annual Meeting (An Assemble to Order System with Product and Components Demand with Lost Sales), Atlanta Georgia, May 9-12, 2014

INFORMS Annual Meeting (Optimal Control of an Inventory System with Stochastic Leadtimes), Minneapolis Minnesota, October 6-9, 2013

POMS Annual Meeting (Managing an Integrated Production-Inventory System with Multiple Production Facilities), Denver Colorado, May 3-6, 2013

INFORMS Annual Meeting (Optimal Control of Production-Inventory Systems with Multiple Facilities), Phoenix Arizona, October 14-17, 2012

International Annual Conference of the German OR Society (A Production-Inventory System with both Patient and Impatient Demand Classes), Hanover Germany, September 4-7, 2012

23rd Production and Operations Management Society Annual Conference (Managing an Integrated Production Inventory System with information on the Production and Demand Status), Chicago Illinois, April 20 – 23, 2012

22nd Production and Operations Management Society Annual Conference (A Production-Inventory System with both Patient and Impatient Demand Classes), Reno Nevada, April 29 – May 02, 2011

International Annual Conference of the German OR Society, (Managing a Production System with Information on the Production and Demand Status and Multiple Non-Unitary Demand Classes), Munich, Germany, September 1-3, 2010

2010, 11th Workshop on Optimal Control, Dynamic Games and Nonlinear Dynamics (Optimal Control of a Production-Inventory System with both Backorders and Lost Sales), University of Amsterdam, May 31 – June 2, 2010.
2008, 15th International Annual EUROMA Conference. (Production and Inventory Control of a System with Multiple Sources of Supply), University of Groningen, the Netherlands, June 15 – 18, 2008

2008, Production and Operations Management Society (POMS) Conference (Optimal Control of a Production-Inventory System with both Backorders and Lost Sales), San Diego, CA, May 9 – 12, 2008

2007 National INFORMS Conference (Optimal Control of a Production-Inventory System with both Backorders and Lost Sales), Seattle, WA, Nov. 3 – 7, 2007

2007, Production and Operations Management Society (POMS) Conference (Optimal Control of an Assembly Systems with Multiple Stages and Multiple Demand Classes), Dallas, TX, May 4 – 7, 2007

International Conference on Service Systems and Service Management (ICSSSM’06), (Optimal Control of Inventory Systems with Multiple Supply Sources), University of Technology of Troyes-France. October 25 – 27, 2006

2005 National INFORMS Conference (Optimal Control of Inventory Systems with Multiple Supply Sources), San Francisco, CA, Nov. 13-16, 2005

Operations Research 2005, International Scientific Annual Conference (Optimal Production and Inventory Control of Assemble-to-Order Systems with Multiple Customer Classes), Bremen, Germany, September 7-9, 2005


2004, 2nd World Conference and 15th Annual POMS Conference (Demand Allocation in Multiple-Product, Multiple-Facility Make-To-Stock Production Systems), Cancun, Mexico. April 30- May3, 2004

OR2003 - SYMPOSIUM ON OPERATIONS RESEARCH (Assignment and Loading of Liquid Chemicals to Ship Compartments), University of Heidelberg, Germany, September 3 - 5, 2003

Eighth Viennese Workshop on Optimal Control, Dynamic Games and Nonlinear Dynamics: Theory and Applications in Economics and OR/MS Vienna (Dynamic Loading of Liquid Chemicals to Ship Compartments), Austria, May 14-16, 2003

OR2002 - International Conference on Operations Research (Demand Allocation in Multiple-Product, Multiple-Facility Make-To-Stock Production Systems), University of Klagenfurt, Austria, September 2 - 5, 2002

2001 National INFORMS meeting (Transporting and Managing Inventories of Liquid Chemical products Using Oceangoing Vessels and Demand Allocation in Multiple-Product, Multiple-Facility Make-To-Stock Production Systems), Miami Beach, Florida, Nov. 4-7, 2001
2001 International Conference, Academy of Business and Administrative Sciences, Brussels (Demand Allocation in Multiple-Product, Multiple-Facility Make-To-Stock Production Systems), Belgium, July 23-25, 2001


17th European Conference on Operational Research (Assignment and Loading of Liquid Chemicals to Oceangoing Vessels), Budapest, Hungary, July 16-19, 2000

2000 International Conference, Academy of Business and Administrative Sciences (Optimal Lead-Time Planning in Serial Production Systems with Earliness and Tardiness Costs), Prague, Czech Republic, July 10-12, 2000

National INFORMS Meeting ("Assignment and Loading of Liquid Chemicals to Oceangoing Vessels" and "The Use of Flowlines to Simplify Routing Complexity in Two-Stage Flowshops"), Salt Lake City, UT, May 7-10, 2000

11th Annual Meeting of the Production Operations Management Society (Scheduling of a Multi-Item-Single-Facility System with Time Varying Demands and Inventory and Backorder Costs), San Antonio, TX, April 1-4, 2000

National INFORMS Meeting (Scheduling of a Multi-Item-Single-Facility System with Time Varying Demands and Inventory and Backorder Costs), Philadelphia, PA, November 7-10, 1999

9th International Conference on Flexible Automation and Intelligent Manufacturing, Tilburg University, The Netherlands, (A Production Planning Model for an Unreliable Production Facility: Case of Finite Horizon and Single Demand) June 23-25, 1999

National INFORMS Meeting, (A Production Planning Model for an Unreliable Production Facility: Case of Finite Horizon and Single Demand), Cincinnati, OH, May 2-5, 1999


National INFORMS Meeting (Optimal and Near Optimal Control of a Two-Part-Type Stochastic Manufacturing System with Dynamic Setups), Dallas, TX, October 26-29, 1997

National INFORMS Meeting (Multi-Period Production Planning and Control with Demand and Cost Fluctuations), San Diego, CA, May 4-7, 1997

Production and Operations Management Society, Eighth Annual Meeting (Scheduling of an Unreliable Manufacturing System with Nonresumable Setup Changes), Miami, FL, April 12-15, 1997
National INFORMS Meeting (The Common Cycle Economic Lot Scheduling Problem with Backorders: Benefits of a Controllable Production Rate), Atlanta, GA, November 3-6, 1996

5th Industrial Engineering Research Conference (Production and Setup Control in a Stochastic Manufacturing System), Minneapolis, MN, May 18-21, 1996

National INFORMS Meeting (Production Scheduling in a Price Competition) New Orleans, LO, October 29 – November 1, 1995

National INFORMS Meeting (Optimal Production and Setup Control of a Dynamic Two-Product Manufacturing System: Analytical Solution), Los Angeles, CA, April 23-26, 1995

National ORSA/TIMS Meeting (Optimal Production Control of a Dynamic Two-Product Manufacturing System with Setup Costs and Setup Times), Boston, MA, April 24-27, 1994
Long Gao

January 8, 2015

221 Anderson Graduate School of Management, University of California, Riverside, CA 92521

Research Interests: Revenue Management, Inventory Control, Supply Risk, Contracting, Transportation, Mechanism Design, Dynamic Programming

Education:
- M.S. in Engineering Physics, TSINGHUA UNIVERSITY, CHINA, 2000-2002
- B.S. in Engineering Physics, TSINGHUA UNIVERSITY, CHINA, 1996-2000

Academic Appointments:
- Assistant Professor, AGSM, UC, Riverside, July '08-Present
- Assistant Professor, University of Dayton, August '07-May '08
- Visiting Scholar, The University of Sydney, June '11
- Visiting Scholar, Tsinghua University, June '08
- Research Assistant, Penn State University, Spring '05-Summer '07

Journal Publications:

Other Publications:

Invited Seminars:
3. “Managing an Available-to-Promise Assembly System with Dynamic Short-Term Pseudo Order Forecast,” The University of Sydney, June 10, 2011.

Tel: 951-827-5284  Email: long.gao@ucr.edu  URL: longgao.wordpress.com


10. "Optimal Inventory Control with Retail Pre-packs," Purdue University, Feb. 15, 2007.


Conference Presentations


Teaching Experience

- MGT 201: Quantitative Analysis (MBA core), UCR Winter ’09, ’10, ’11, ’12, ’14
- MGT 207: Operations Management (MBA core), UCR, Spring ’12, ’14
- MGT 220: Simulation for Business (MBA elective), UCR Spring, Fall ’08, Fall ’09, ’11, ’12, ’13, Spring ’14
- MGT 201: Directed Studies (MBA elective), UCR Winter, Spring ’10, Spring ’11
- BUS 125: Simulation for Business, UCR Spring Fall ’10

- DSC 210: Statistics for Business I, University of Dayton Fall ’07, Spring ’08
- Introduction to Statistics for Business Summer ’05
- Demand Fulfillment (MBA), TA Spring ’06
- Introduction to Statistics for Business, TA Fall ’04, Spring ’05, Fall ’06, Fall ’07

Honors & Grants

- SoBA’s favorite Professor list, Highlander Guide, UCR, 2014
- Academic Senate Regents Award, UCR, 2012
- Finalist, DiWyn Paine, III Teaching Award, 2005
- Smeal Dissertation Research Award, 2005
- Smeal Graduate Fellowship, Pennsylvania State University, 2002
- Guanzhua Scholarship, Tsinghua University, 2001
- Academic Excellence Scholarship, Tsinghua University, 1998, 1999

Professional Activities

- Senior Editor, Surveys in Operations Research and Management Science, 2013–Now
- Member, Graduate Program Committee, AGSM, UCR, 2013-Present
- Member, Recruiting Committee, AGSM, UCR, 2012, 2014
- Member, Seminar Committee, AGSM, UCR, 2006-Present
- Chair, Scholarship Committee, AGSM, UCR, 2006, 2011
- Member, Doctoral Committee, Statistics, UCR, 2010
- Vice president, Penn State University INFORMS student chapter, 2005-2007
- Member, The Institute of Operations Research and Management Sciences (INFORMS)
- Member, Manufacturing and Service Operations Management Society (M&SOM)
- Member, Production and Operations Management Society (POMS)
- Member, Applied Probability Society (APS)
Adem Orsdemir

University of California Riverside
School of Business Administration
Anderson Hall
Riverside, CA 92521

Curriculum Vitus, January, 2015
919.928.3353
E-mail: orsdemiradem@gmail.com

RESEARCH INTERESTS
- Sustainable Operations Management
- Operations/Marketing Interface

EDUCATION
- PhD Business Administration, 2014
  Kenan-Flagler Business School. Operations Area
  University of North Carolina at Chapel Hill
- MS in Statistics and Operations Research, 2014
  University of Rochester
- MS in Electrical and Computer Engineering, 2009
  University of Rochester
- BS in Electrical and Electronics Engineering, 2008
  Bilkent University, Turkey

PROFESSIONAL EXPERIENCE
- Assistant Professor, 2014-Present
  University of California Riverside
- Research Assistant, 2009-2014
  University of North Carolina at Chapel Hill
- Research Assistant, 2006-2009
  University of Rochester
- Summer Intern, 2005
  Ohio State University

RESEARCH
*Presented at MISOIM Sustainable Operations Special Interest Group 2012
Orsdemir, A., B. Hu, V. Deshpande. Responsible Sourcing via Vertical Integration. (Working Paper)

OTHER RESEARCH (ENGINEERING)
Adem Orsdemir

"On the Security and Robustness of Encryption via Compressed Sensing", A. Orsdemir, O. Altun, G. Sharma, and M. Bocko, in Military Communications Conference (MILCOM), Nov. 17-19, 2008, San Diego, CA


Seminars & Talks


Teaching Experience
- Instructor, University of North Carolina (Fall 2013)
  - Busi 410 Operations Management
  - Class Enrollment: 50
  - Overall Rating: 4.2/5
    - Teaching Assistant, University of North Carolina (Fall 2011, Fall 2012)
      - For Course: Busi 410, Busi 410. Conducted recitations, held office hours, designed and graded problem sets.
    - Teaching Assistant, University of Rochester (Fall 2006, Spring 2007)
      - For Courses: Signals and Systems, Circuits and Signals. Conducted recitations, held office hours, designed and graded problem sets and laboratory projects

Service
- Reviewer: Decision Sciences, Naval Research Logistics

Honors & Awards
- INFORMS 2013 Future Academicians Colloquium Participant
- Awarded full-tuitionship for graduate studies by University of Rochester
- Listed as high honor student at Bilkent University
- Ranked 309th at University Entrance Examinations in Turkey

Personal Info
- Languages: Turkish (native), English (fluent), German (beginner)

Activities
- Student Reviewer: IEEE ICIP, IEEE ICASSP, EUSIPCO
- Clubs: President of Turkish Students Association in University of Rochester
Elodie Adida (Goodman)

School of Business Administration
University of California at Riverside
Anderson Hall Room 225
900 University Ave., Riverside, CA 92521

office: (951) 827-7812
cell: (617) 959-1419
http://faculty.ucr.edu/~elodiegp/
elodie.g Goodman@ucr.edu

Professional Appointments
2012 – present  University of California at Riverside, School of Business Administration, Riverside CA
Assistant Professor of Operations and Supply Chain Management

2006 – 2012  University of Illinois at Chicago, Mechanical and Industrial Engineering, Chicago IL
Assistant Professor of Industrial Engineering

Education
Ph.D. in Operations Research.
Dissertation: Dynamic Pricing and Inventory Control: Uncertainty and Competition
Advisor: Dr. Georgia Peraldi

1999 – 2001  Ecole Centrale Paris, France
MS in Engineering (Diplôme d’Ingénieur)

Publications
Published Peer-Reviewed Journal Articles


Submitted Peer-Reviewed Journal Articles


Working Papers

Other – Refereed Conference Proceedings

Adida, E., N. Baeksh, V. DeMiguel. 2013. Supply Chain Intermediation when Retailers Lead. Proceedings of MSOM Supply Chain Special Interest Group (SIG), INSEAD.


Adida, E., V. DeMiguel. 2009. Efficiency and Coordination in a Supply Chain with Competing Manufacturers and Retailers. Proceedings of MSOM, MIT.

January 2015


Other – Book Publication

Invited Talks
University College London, Management Science and Innovation, 2012, London UK.
University of California - Riverside, Anderson Graduate School of Management, 2012, Riverside CA.
San José State University, College of Business, 2012, San José CA.
Illinois Institute of Technology, Stuart School of Business, 2012, Chicago IL.
Illinois Institute of Technology, Stuart School of Business, 2011, Chicago IL.
Massachusetts Institute of Technology, Sloan School of Management, 2011, Cambridge MA.
Northwestern University, Industrial Engineering and Management Sciences, 2010, Evanston IL.
University of California at Irvine, The Paul Merage School of Business, 2009, Irvine CA.
University of Chicago, Graduate School of Business, 2007, Chicago IL.
Purdue University, Biomedical Engineering, 2007, West Lafayette IN.
Northwestern University, Kellogg School of Management and Industrial Engineering and Management Sciences, 2007, Evanston IL.
University of Illinois at Chicago, Mechanical and Industrial Engineering, 2006, Chicago IL.
University of Washington in St. Louis, Olin School of Business, 2006, St. Louis MO.
University of Texas at Dallas, School of Management, 2006, Dallas TX.
IBM Research T.J. Watson Labs, 2004, Hawthorne NY.

Conference Presentations
"Bundled Payments vs. Fee-for-Service: Impact of Medicare's Payment Scheme on Treatment Level Participation and Social Welfare."
MSOM Annual Conference, University of Washington Seattle, June 2014.

"Competition and Coordination in a Two-Channel Supply Chain."
IFORS Conference, Barcelona, Spain, July 2014.
POMS Annual Conference, Atlanta GA, May 2014.
INFORMS Annual Meeting, Minneapolis MN, October 2013.
INFORMS Annual Meeting, Phoenix AZ, October 2012.

"Managing Long-Term Supplier Relationship under Changing Productivity."
POMS Annual Conference, Atlanta GA, May 2014.
INFORMS Annual Meeting, Minneapolis MN, October 2013.

"Supply Chain Intermediation When Retailers Load."
INFORMS Annual Conference, Supply Chain Management SIG, INSEAD, France, July 2013.
INFORMS Annual Meeting, Phoenix AZ, October 2012.
MSOM Annual Conference, Columbia University, June 2012.
POMS Annual Conference, Chicago IL, April 2012.

January 2015
"Operational Issues and Network Effects in Vaccine Markets."
INFORMS Annual Meeting, Phoenix AZ, October 2012.
MSOM Annual Conference, Columbia University, June 2012.
POMS Annual Conference, Chicago IL, April 2012.

"Consignment Contracts with Retail Competition."
POMS Annual Conference, Chicago IL, April 2012.
INFORMS Annual Conference, Charlotte NC, November 2011.

"Public Policy Implications for a Vaccine Supply Chain: Operational Issues and Negative Network Effects."
INFORMS Annual Meeting, Charlotte NC, November 2011.

"Supply Chain Intermediation: A Three-Tier Competition Model."
INFORMS Annual Meeting, Charlotte NC, November 2011.

"Vaccine Market: Operational Issues and Externality Effect."
INFORMS Annual Meeting, Charlotte NC, November 2011.
INFORMS Healthcare Conference, Montreal, Canada, June 2011.

"An Investigation in Real-Time Base Holding Policy."
Hong Kong Society for Transportation Studies Conference, Hong Kong, December 2010.

"Economics of Vaccine Coverage and Public Policy Implications."
INFORMS Annual Meeting, Austin TX, November 2010.

"Integrating Exposure and Epidemiological Models to Select Non-Pharmaceutical Interventions for Influenza."
Joint Conference of International Society of Exposure Science & International Society for Environmental Epidemiology (poster), Seoul, Korea, August 2010.

"Hospital stockpiling for disaster preparedness."
HE Annual Conference, Cancun, Mexico, June 2010.

"Efficiency and Coordination in a Supply Chain with Competing Manufacturers and Retailers."
Behavioral and Quantitative Game Theory Conference, Newport Beach CA, May 2010.
International Symposium on Mathematical Programming, Chicago IL, August 2009.
MSOM Annual Conference, MIT, June 2009.
INFORMS Revenue Management and Pricing Conference, Northwestern University, June 2009.
Optimization Applications in Engineering and Applied Sciences Conference, UIUC, March 2009.

"Hospital Stockpiling for Influenza Pandemics with Preset Response Levels."
IEEE Conference on Service Operations, Logistics and Informatics (SOLI), Chicago IL, July 2009.

"Inventory Stockpiling and Sharing for Disaster Preparedness."

"A Game Theoretical Approach for Hospital Stockpile in Preparation for Pandemics."

January 2015
"The Strategic Role of Capacity in a Joint Inventory Management and Pricing Game."
INFORMS Midwest Regional Conference, Northwestern University, August 2007.

"Dynamic Pricing and Inventory Control under Uncertainty."
EURO XXI, Prague, July 2007.
INFORMS Annual Meeting, Pittsburgh PA, November 2006.

"Dynamic Pricing and Inventory Control: Uncertainty and Competition through Robust Optimization and Quasi-Variational Inequalities."
International Symposium on Mathematical Programming, Rio de Janeiro, Brazil, August 2006.

"Dynamic Pricing and Inventory Control with no Backorders: Uncertainty and Competition."
IFORS Triennial, Honolulu HI, July 2005.

"A Robust Nonlinear Fluid Model of Dynamic Pricing and Inventory Control with no Backorder."
INFORMS Annual Meeting, Atlanta GA, October 2003.

Awards and Distinctions

Research awards
UCR Research and Travel Award: $1700, 2014–15
UCR Academic Senate Regents Fellowship: $4400, 2013–14
UCR Research and Travel Award: $1650, 2013–14
First author of the IEEE Transactions article "Hospital Stockpiling for Disaster Planning" selected to be highlighted in the IEEE Magazine of May 2011.
UIC STEM Education Research Grant: $6,000, 2010–11
UIC Faculty Scholarship Support award: $1,000, 2012
UIC Faculty Scholarship Support award: $1,000, 2011
UIC Faculty Scholarship Support award: $1,000, 2010
UIC Faculty Scholarship Support award: $1,000, 2009
UIC Women in Science and Engineering Research award: $6,000, 2010
UIC Women in Science and Engineering Research award: $1,000, 2009
UIC Women in Science and Engineering Research award: $5,000, 2008

Service awards
IEEE Regional Outstanding Faculty Advisor Award, 2012
Outstanding reviewer for the journal IEEE Transactions on Automatic Control, 2007

Other
Participant, INFORMS Doctoral Colloquium, Pittsburgh PA, 2006
Georges Bsey Foundation Fellowship, 2001
Jean Gaillard Memorial Fellowship, 2001
Hoschert Prize, 2000–01

Teaching
Decision-Making Under Uncertainty MGT 221, UCR, Spring 2013, Spring 2014, Fall 2014
Elective MBA course. Introduces computer-based models for business decision-making under

January 2015

Quantitative Analysis MGT 201, UCR, Winter 2013, Fall 2014, Winter 2015
Core MBA / Master of Finance course. Introduces statistics for management. Introduces fundamental statistical tools for managerial decision-making. Basics of data analysis, probability, sampling theory, estimation, hypothesis testing, regression analysis. Enrollment: 1 or 2 sections of 50-60.

Operations Research IIE 471, UIC, Fall 2008, Fall 2009, Fall 2010, Fall 2011
Undergraduate and Masters course. Introduction to operations research, formulation of linear programming problems, simplex methods, duality theory, sensitivity analysis, network models, and integer linear programming formulations. Enrollment: 15-30.

Probability and Statistics for Engineers IIE 342, UIC, Fall 2006, Spring 2007, Summer 2010, Fall 2010, Spring 2012

Undergraduate course. Principles and techniques of economic analysis in engineering and management science. Time value of money, interest rates, present worth analysis, rate of return analysis. Enrollment: 100.

Nonlinear Optimization IIE 576, UIC, Fall 2009, Fall 2011
Masters and PhD course. Convex analysis, line search techniques, unconstrained and constrained optimization, optimality conditions, duality, convex and non-convex optimization, interior point methods, and real-world applications. Enrollment: 14-17.

Professional Service
Panel participation
Invited panelist at INFORMS 2014 Doctoral Student Colloquium, 2014

Organization of Sponsored/Invited Sessions in International Conferences
Session Chair, INFORMS, 2014
Session Chair, IFORS, 2014
Session Chair, INFORMS, 2013
Session Chair, INFORMS, 2009
Session Chair, Optima, 2009
Session Chair, INFORMS, 2008
Session Chair, EURO XXII, 2007
Session Chair, INFORMS/INFORMS, 2007
Session Chair, INFORMS, 2007

Judging service for paper competitions
Judge of POMS College of Healthcare Operations Management Best Paper Competition, 2012
Judge of MSOM Student Paper Competition, 2009

Refereeing service for conferences
Reviewer for ISB-POM Workshop paper submissions, 2014
Reviewer for MSOM Conference paper submissions, 2014
Reviewer for MSOM Conference paper submissions, 2012
Reviewer for MSOM Conference paper submissions, 2011

Refereeing service for grant proposals
Panel Reviewer for National Science Foundation, Service Enterprise Systems program, 2011
Panel Reviewer for National Science Foundation, Service Enterprise Systems program, 2010

January 2015
Panel Reviewer for National Science Foundation, Computational Mathematics program, 2010

Refereeing service for journals:

Other:
Affiliated Faculty Member of the Transportation Center at Northwestern University, 2010 – present.
Faculty Advisor, UIC Student Chapter of the Institute of Industrial Engineers, 2009–12.

Academic Service:
UCR SoBa School Research Committee member, 2014–present
UCR SoBa Graduate Academic Committee member, 2014–present
UCR SoBa Management Faculty Search Committee member, 2014–present
UCR SoBa Interdepartmental Graduate Program in Management Faculty member, 2012 – present
UCR SoBa School Research Committee Chair, 2014
UCR SoBa Undergraduate Academic Committee member, 2012–14
UCR SoBa Operations and Supply Chain Management Faculty Search Committee member, 2013–14
UCR SoBa Finance and Marketing Endowed Chairs Search Committee member, 2013–14
UIC Honors College Fellow, 2010–12
UIC Honors students Faculty Advisor, 2010–12
UIC MIE Department Advisory Committee member 2010–11
UIC MIE Department IE Recruiting Committee member, 2009–10, 2011–12
UIC MIE Department Outreach and Publicity Committee member, 2009–11
UIC MIE Department Faculty Secretary, 2006–09
UIC IE Seminar coordinator, 2006–09
UIC IE thesis committee member of 8 Masters/PhD students, 2006–12
UIC IE undergraduate recruiting committee, 2007–12

Graduate student advising:
MBA Thesis Committee member for Kevin Straight, UCR, 2013–14
PhD Thesis committee Chair for Amy Davids, UIC, 2010–12 (2014 placement: Purdue University, Kranmer School of Management)
PhD Thesis committee Chair for Nantaporn Ratsoomorn, UIC, 2009–12 (placement: UIC, MIE)
PhD co-advisor, Qin Chen, UIC, 2009–12
Undergraduate advisor for 4 undergraduate students, UIC, 2007–09
Masters advisor, Pradnya Joshi, UIC, 2007–09

Memberships:
Institute for Operations Research and the Management Sciences (INFORMS)
Health Applications Society
MSOM Society
Women In OR/MS Forum

January 2015
Response to Committee on Planning and Budget
Proposal for a new self-supporting Master of Supply Chain & Logistics Management

We thank the members of the committee on Planning and Budget (CPB) for their effort and thorough review of the proposal for a new Master of Supply Chain & Logistics Management. The proposal greatly benefitted from your feedback and suggestions. In the following we respond to the concerns expressed by the members of the CPB item by item.

**Comment:** The budget is not in the proper form necessary to determine if the program is self-supporting. A few examples of difficulties are listed below.
- Exhibit II does not explain how indirects are calculated. While the footnotes provide guidance, they are not specific. For instance, footnote 3 does not state what services, facilities, or staff time are or are not supported by the SOBA indirect rate, nor how that rate is figured. Answers to question 18 are not sufficient and not included in the official proposal.
- The budget only supplies $10-12K for readers. $12K in reader support for 25 students per year is not nearly sufficient. It would support approximately 1 TA for 1 quarter.
- The budget item for a director is unclear. $25K/year is very low. It is not clear if this is the faculty director or a staff position.
- The attached spreadsheet is recommended from the system-wide committee on planning and budget as a way of accounting for all activities. As they will be reviewing the final document, we recommend its use.

**Response:** We have revised the budget according to CPB suggestions and used the new format that is used system-wide (Please see attached excel below for explanation).

**Comment:** There are only two academic letters of review of this proposal. Furthermore, both are from within the UC, and one of the reviewers (Corbett) did not see the proposal prior to writing his letter.

**Response:** We now have a revised letter from Professor Corbett from UCLA and also obtained another letter from Professor and Associate Dean Yano from Berkeley. We were advised in the prior review by CBP to obtain academic letters from the UC system.

**Comment:** There is no faculty-involved professionalization component of the degree program.

**Response:** Faculty will be involved in mentoring students in the same way they are involved in all our other programs (self- and state-supported).

**Comment:** Placement of graduates in careers is left to the Career Center. It is not clear if the Career Center has the expertise necessary to place students of this specialized graduate program. Further, the Career Center would need to be compensated for the effort for this to be a self-supporting program.

**Response:** The SoBA career center is capable to help graduates of this program achieve good placement. The career center compensation due to efforts expended on students of this program are now reflected in the overhead.
Comment: The "tuition per course" and "tuition" columns on the table on page 14 do not match for USC and UCR.

Response: We have fixed this typo.

Comment: The proposal states that it was approved by the faculty in 2015. Whether this approval was by vote or not, and the extent of the participation of the faculty in the approval is not clear. Additionally, as the approval was from two years ago, it is not clear the extent to which the faculty's approval applies to the current version.

Response: The proposal was unanimously approved by the EC and then by the full body of faculty on 06/05/2015.
### Master of Supply Chain & Logistics Management
#### Budget Projection

<table>
<thead>
<tr>
<th>FTE ENROLLMENT</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Year 2</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><strong>Total Year-average Program Enrollment</strong></td>
<td><strong>5</strong></td>
<td><strong>10</strong></td>
<td><strong>15</strong></td>
<td><strong>20</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REVENUE</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1 Program Unit Fee Per Student</td>
<td>$1,200</td>
<td>$1,200</td>
<td>$1,200</td>
<td>$1,200</td>
<td>$1,200</td>
</tr>
<tr>
<td>2 Year 1 - 48 Units</td>
<td>$288,000</td>
<td>$288,000</td>
<td>$576,000</td>
<td>$576,000</td>
<td>$864,000</td>
</tr>
<tr>
<td>Year 2 - 16 Units</td>
<td>$96,000</td>
<td>$96,000</td>
<td>$192,000</td>
<td>$192,000</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL PROGRAM REVENUE</strong></td>
<td><strong>$288,000</strong></td>
<td><strong>$384,000</strong></td>
<td><strong>$672,000</strong></td>
<td><strong>$768,000</strong></td>
<td><strong>$1,056,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COSTS</th>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Program Direct Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Faculty Salaries w/benefits</td>
<td>$211,590</td>
<td>$163,800</td>
<td>$171,990</td>
<td>$180,590</td>
<td>$189,619</td>
</tr>
<tr>
<td>4 Program Director Salary w/benefits</td>
<td>$40,000</td>
<td>$41,200</td>
<td>$42,436</td>
<td>$43,709</td>
<td>$45,020</td>
</tr>
<tr>
<td>5 Readers</td>
<td>$9,941</td>
<td>$19,883</td>
<td>$29,824</td>
<td>$39,766</td>
<td>$49,707</td>
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<tr>
<td>S&amp;E</td>
<td>$20,000</td>
<td>$20,000</td>
<td>$20,000</td>
<td>$20,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>Equipment</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<tr>
<td>Travel</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>6 Financial Aid</td>
<td>$57,600</td>
<td>$76,800</td>
<td>$134,400</td>
<td>$153,600</td>
<td>$211,200</td>
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<tr>
<td>7 UCOP Assessment</td>
<td>$756</td>
<td>$1,512</td>
<td>$2,267</td>
<td>$3,023</td>
<td>$3,779</td>
</tr>
<tr>
<td>8 Campus Assessment paid by Program to Campus</td>
<td>$0</td>
<td>$22,042</td>
<td>$44,084</td>
<td>$66,126</td>
<td>$88,169</td>
</tr>
<tr>
<td><strong>TOTAL DIRECT COSTS</strong></td>
<td><strong>$339,887</strong></td>
<td><strong>$345,237</strong></td>
<td><strong>$445,002</strong></td>
<td><strong>$506,814</strong></td>
<td><strong>$607,494</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Program Indirect Costs</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9 MBA/Career Services Staff &amp; Operations</td>
<td>$1,554,957</td>
<td>$1,586,056</td>
<td>$1,617,777</td>
<td>$1,650,133</td>
<td>$1,683,135</td>
</tr>
<tr>
<td>10 Academic Course Support &amp; Instructional Databases</td>
<td>$327,508</td>
<td>$334,058</td>
<td>$340,739</td>
<td>$347,554</td>
<td>$354,505</td>
</tr>
<tr>
<td><strong>TOTAL GRADUATE PROGRAM INDIRECT COSTS</strong></td>
<td><strong>$1,882,465</strong></td>
<td><strong>$1,920,114</strong></td>
<td><strong>$1,958,517</strong></td>
<td><strong>$1,997,687</strong></td>
<td><strong>$2,037,641</strong></td>
</tr>
<tr>
<td>11 Program Indirect Cost Per Graduate Student Average</td>
<td>$7,470</td>
<td>$7,620</td>
<td>$7,772</td>
<td>$7,927</td>
<td>$8,086</td>
</tr>
<tr>
<td>12 Administration Salary/Benefits</td>
<td>$2,173,055</td>
<td>$2,216,516</td>
<td>$2,260,846</td>
<td>$2,306,063</td>
<td>$2,352,184</td>
</tr>
<tr>
<td>13 Faculty Salary/Benefits</td>
<td>$11,028,541</td>
<td>$11,359,397</td>
<td>$11,700,179</td>
<td>$12,051,185</td>
<td>$12,412,720</td>
</tr>
<tr>
<td>14 Faculty Research</td>
<td>$1,337,484</td>
<td>$1,364,234</td>
<td>$1,391,518</td>
<td>$1,419,349</td>
<td>$1,447,736</td>
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<tr>
<td>15 Non-program Specific Operations</td>
<td>$1,116,168</td>
<td>$1,138,491</td>
<td>$1,161,261</td>
<td>$1,184,486</td>
<td>$1,208,176</td>
</tr>
<tr>
<td><strong>TOTAL ADMIN &amp; FACULTY INDIRECT COSTS</strong></td>
<td><strong>$15,655,248</strong></td>
<td><strong>$16,078,638</strong></td>
<td><strong>$16,513,805</strong></td>
<td><strong>$16,961,083</strong></td>
<td><strong>$17,420,816</strong></td>
</tr>
<tr>
<td>Admin &amp; Faculty Indirect Cost Per Student Average</td>
<td>$4,715</td>
<td>$4,843</td>
<td>$4,974</td>
<td>$5,109</td>
<td>$5,247</td>
</tr>
<tr>
<td><strong>TOTAL PROGRAM INDIRECT COSTS</strong></td>
<td><strong>$60,928</strong></td>
<td><strong>$124,625</strong></td>
<td><strong>$191,189</strong></td>
<td><strong>$260,722</strong></td>
<td><strong>$333,328</strong></td>
</tr>
</tbody>
</table>

### ANNUAL COST PER FTE STUDENT

| Program Direct Costs | $67,977 | $34,524 | $29,667 | $25,341 | $24,300 |
| Program Indirect Costs | $12,186 | $12,462 | $12,746 | $13,036 | $13,333 |
| **TOTAL COST PER FTE STUDENT** | **$80,163** | **$46,986** | **$42,413** | **$38,377** | **$37,633** |

### TOTAL PROGRAM COST

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$400,815</td>
<td>$469,861</td>
<td>$636,191</td>
<td>$767,536</td>
<td>$940,822</td>
</tr>
<tr>
<td><strong>SURPLUS (DEFICIT)</strong></td>
<td><strong>($112,815)</strong></td>
<td><strong>($85,861)</strong></td>
<td><strong>$35,809</strong></td>
<td><strong>$464</strong></td>
</tr>
<tr>
<td><strong>SURPLUS (DEFICIT) PER HEADCOUNT STUDENT</strong></td>
<td><strong>($22,563)</strong></td>
<td><strong>($8,586)</strong></td>
<td><strong>$2,387</strong></td>
<td><strong>$23</strong></td>
</tr>
</tbody>
</table>

Faculty FTE should be based on the FTE reported in Table 4 with faculty paid on overload counted based on the number of courses taught, relative to a normal teaching load for that title code. For example, a ladder-rank faculty member teaching one course on overload in the self-supporting program would be counted as 0.25 FTE, based on a normal four course load.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost Analysis Explanation</strong></td>
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<td>Per proposal, the Master of Supply Chain and Logistics Management Program will be a 64-credit unit curriculum. Normal student will complete in 16 months.</td>
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Response to Graduate Council
Proposal for a new self-supporting Master of Supply Chain & Logistics Management

We thank the members of the Graduate Council for their effort and thorough review of the proposal for a new Master of Supply Chain & Logistics Management. The proposal greatly benefitted from your feedback and suggestions. In the following we respond to the concerns expressed by the members of the Graduate Council, item by item.

Comment: In regards to the Comprehensive Exam (page 11, section 2.3), SoBA has been moving away from offering an exam in some of their other programs and instead toward this type of requirement (see MBA example below).

Plan II (Comprehensive Examination) Students who elect Plan II must complete an industry-based group case analysis as part of the management synthesis course. This case serves in lieu of a comprehensive final examination. Students whose case analyses are deemed “not acceptable” are given one additional quarter to revise them to an “acceptable” level.

Does SoBA plan on giving a comprehensive exam for this new Master’s degree? If not, this needs to be adjusted.

Response: We are not sure which version of the proposal the graduate council looked at. In the submitted version, here is what we have:

Plan II (Comprehensive Examination) requires that at least 18 units be in graduate level courses taken at a UC campus. None of these may be in courses numbered 297 or 299. Every candidate must take a comprehensive examination, the content of which is determined by the department or program. In most cases, units from courses numbered 291 cannot be used. Candidates for the degree are required to complete all of the general requirements specified by Graduate Studies. The program conforms to Plan II.

Comment: Also, nine courses are listed under “required” but only eight courses are stated as required in the text. The internship course (298I) is not on the course list, but is mentioned in the text. Graduate Council suggests the following layout:

Required courses:
MGT 201, 203, 207, 255, 256, 258, 271, 275
Capstone course:
MGT ??
2 Internship course:
MGT 298I
Elective courses (choose 6):
MGT 221, 224, 230, 236, 239, 259, 266, 267, 280

Response: We have incorporated the suggested format as recommended by the Graduate Council as follows:
Summary:

Required courses:

Capstone course:
MGT ???

Internship course:
MGT 298I

Elective courses (choose 6):
MGT 221, 224, 230, 236, 239, 259, 266, 267, 280

Comment: To obtain system-wide approval, the proposal must state exactly where the funding is coming from, as self-supporting programs cannot be state funded.

Response: We have now indicated in the proposal title that this is a self-supporting program. Thus, it is clear that the funding is coming from students’ tuition. The setting of this proposed Master is the same as the two already running self-supporting Master degrees: Master of Finance and Master of Accounting.

Comment: The proposal states that USC is the only other school in Southern California that currently offers an advanced degree in supply chain management. The Council would like to know how this program will be different than USC’s.

Response: The SCM program is run in collaboration with the Engineering College in the case of USC. Hence, a good majority of business background students will shy away from such a program because of the Engineering component. In our case, the program will be entirely run through SoBA and will attract students with similar profile as those attracted by the Master of Finance and Accounting programs.

Comment: The Council suggests including a sustainability plan to the proposal. In regards to point 3.4, Ways in Which the Program Will Meet the Needs of Society, are there specific course requirements that speak to sustainability and pollution?

Comment: The supply chain management curriculum naturally addresses issues in supply chain sustainability. As a matter of fact, there is a whole research topic within Supply chain management dealing with supply chain sustainability, green supply chain management, green sourcing, etc. Topics include Corporate Social Responsibility, recycling/remanufacturing and reverse logistics, and green/sustainable sourcing to cite a few. Three colleagues in the area are already engaging in supply chain sustainability research. Furthermore, we are in the process of proposing an entire course on Supply Chain Sustainability which will be available as an elective to all SoBA graduate students within a year.

Comment: Lastly, the number of faculty seems to be low (5 faculty) compared to the number of students the program plans to admit (up to 40). Teaching in self-supporting programs must be in
addition to the normal teaching commitments as required by the department. The Council feels that more faculty with relevant experience will be needed to make this a successful program.

**Response:** The point is well taken. However, through the Supply Chain Cluster Hiring, we are in the process of recruiting two faculty members with expertise in Supply Chain Management and Marketing/Supply Chain Management interface. This is in addition to another faculty who just joined us with expertise in Marketing/Supply Chain Management. We also have a portfolio of excellent lecturers with the required expertise.
February 5, 2018

To: Dylan Rodriguez  
   Riverside Division Academic Senate

From: Vyjayanthi Chari, Chair  
      Committee on Academic Personnel

Re: Revised New Master Degree in Supply Chain and Logistics Management

The Committee on Academic Personnel met to consider the Revised New Master Degree in Supply Chain and Logistics Management and by a vote of +10-0-0, unanimously endorsed the proposal without any substantial comments to add.
Graduate Council

February 16, 2018

To: Dylan Rodriguez, Chair
Riverside Division

From: Christiane Weirauch, Chair
Graduate Council

Re: [Campus Review] New Master’s Degree Proposal: Revised - New Master Degree in Supply Chain and Logistics Management (MSCLM)

The Graduate Council reviewed the revised proposal for a self-supporting Master of Supply Chain and Logistics Management at their February 15, 2018 meeting. Many of the concerns the Council raised in 2015 and 2017 have been addressed; however, the Council still has a couple of concerns. Regarding faculty salaries and benefits, the Council is confused as to why in Exhibit II: Financial Planning the faculty salaries with benefits drop in year two and then slowly increase. How does this number relate to the one faculty FTE referred to on page 9? Additionally, the Council would like clarification on why the proposed UCR program will be more expensive than the program at USC. If this is the case, how does SoBA plan to attract students with USC offering a less expensive program?
February 26, 2018

To: Dylan Rodriguez, Chair
Riverside Division

From: Lisa Raphals, Vice Chair
Committee on Library and Information Technology

Re: Campus Review- New Master Degree Proposal: Revised-New Master Degree in Supply Chain and Logistics Management (MSCLM)

The Committee on Library and Information Technology reviewed the New Master Degree Proposal: Revised-New Master Degree in Supply Chain and Logistics Management (MSCLM) at their February 13, 2018 meeting. The Committee sees no significant increase on library and IT resources, thus the committee approves the proposal.
To:            Dylan Rodriguez, Chair  
Riverside Division

From:  Christian Shelton, Chair  
Committee on Planning and Budget

RE:    Revised proposal for a new Master’s degree in Supply Chain and Logistics  
Management

The Committee on Planning & Budget discussed the revised proposal for a new Master’s degree  
in Supply Chain and Logistics Management at their February 27, 2018 meeting.

This revised proposal is much improved from the previous version; the committee thanks SoBA  
for addressing our previous concerns.

P&B had two remaining concerns. First, the proposed degree would be more expensive than other  
surveyed degrees. In particular, according to the proposal, USC charges approximately $46K,  
while the proposed UCR degree would take seven additional courses (over the same period of  
time) and cost $64K. MIT’s degree is priced similarly to UCR's, but takes six months fewer. The  
proposal does state that UCR's degree costs less per course, and the proposal does make a case that  
there is market demand for such degrees in general. However, it is not obvious if the market will  
support the degree at UCR, when compared with a less expensive and less intensive degree from  
elsewhere. While the committee commended the increased rigor of the degree compared to  
alternatives, the committee would have liked to see a direct market demand survey to judge the  
economic feasibility.

The committee also noted that a marketing budget had been removed from the proposal; yet this  
might be necessary given other universities' offerings.

Second, and more minor, some of the text could be reworked to be more recent or accurate:
- The information on page 20 appears to be out-of-date. It mentions $25,000 for marketing. It also states that the program "can leverage the staff support of the existing MBA and other Masters programs" which is not allowed without compensation. This wording should be removed or clarified.

- On page 1 "Management" (in the title) is misspelled.

- Page 5 has some outdated numbers, including the McKinsey & Company study and the "Big Data market" information at the end of the third full paragraph.

Overall, the committee appreciated the improvements in the proposal since the last revision, and voted 8-1-0 in favor of moving the proposal forward, but would encourage changes to address the points above.
Response to Graduate Council  
Proposal for a new self-supporting Master of Supply Chain & Logistics Management

We thank the members of the Graduate Council for their effort and thorough review of the proposal for a new Master of Supply Chain & Logistics Management. The proposal greatly benefitted from your feedback and suggestions. In the following we respond to the concerns expressed by the members of the Graduate Council, item by item.

**Comment:** Regarding faculty salaries and benefits, the Council is confused as to why in Exhibit II: Financial Planning the faculty salaries with benefits drop in year two and then slowly increase. How does this number relate to the one faculty FTE referred to on page 9?

**Response:** The reason for the higher faculty salaries in year one is explained in the Cost Analysis Explanation Tab #3: “Year 1 includes the faculty cost to develop the 4 courses specifically designed for the Master of Supply Chain and Logistics Management Program.”

**Comment:** The council would like clarification on why the proposed UCR program will be more expensive than the program at USC. If this is the case, how does SoBA plan to attract students with USC offering at less expensive program?

**Response:** USC program is softer than our proposed program. As such, our program requires a quantitative foundation (first quarter) before students start taking the specialized Supply Chain and Logistics course. We believe our program will graduate successful managers with analytical thinking and model based decision making abilities. Based on our observation of the latest hiring trends and discussions, in consortium and such, by executives from the largest corporations in the country, companies are no longer looking for soft management skills, rather they are emphasizing quantitative and business analytics skills which our program offers.

Furthermore, our program will draw from the same student population as the Master of finance and Master of accounting which (both programs) attract high number of quality students who will succeed in our program.

Finally, our program will give the proper knowledge for those students who aspire to continue in a Ph.D. program after graduation. This will also allow us to have a good pool of students to choose from to continue their Ph.D. in Operations/Supply Chain Management at SOBA if they wish to do so.
Response to Committee on Planning and Budget
Proposal for a new self-supporting Master of Supply Chain & Logistics Management

We thank the members of the committee on Planning and Budget (CPB) for their effort and thorough review of the proposal for a new Master of Supply Chain & Logistics Management. The proposal greatly benefitted from your feedback and suggestions. In the following we respond to the concerns expressed by the members of the CPB item by item.

Comment: The proposed degree would be more expensive than other surveyed degrees. In particular, according to the proposal, USC charges approximately $46K, while the proposed UCR degree would take seven additional courses (over the same period of time) and cost $64K. MIT's degree is priced similarly to UCR's, but takes six months fewer. The proposal does state that UCR's degree costs less per course, and the proposal does make a case that there is market demand for such degrees in general. However, it is not obvious if the market will support the degree at UCR, when compared with a less expensive and less intensive degree from elsewhere. While the committee commended the increased rigor of the degree compared to alternatives, the committee would have liked to see a direct market demand survey to judge the economic feasibility.

Response: USC program is softer than our proposed program. As such, our program requires a quantitative foundation (first quarter) before students start taking the specialized Supply Chain and Logistics course. We believe our program will graduate successful managers with analytical thinking and model based decision making abilities. Based on our observation of the latest hiring trends and discussions, in consortium and such, by executives from the largest corporations in the country, companies are no longer looking for soft management skills, rather they are emphasizing quantitative and business analytics skills which our program offers.

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Finally, our program will give the proper knowledge for those students who aspire to continue in a Ph.D. program after graduation. This will also allow us to have a good pool of students to choose from to continue their Ph.D. in Operations/Supply Chain Management at SOBA if they wish to do so.

Comment: The committee also noted that a marketing budget had been removed from the proposal; yet this might be necessary given other universities' offerings.

Response: The School of Business marketing plan includes all existing programs. Marketing expenses for this program will be expensed from the School of Business Marketing budget.

Comment: The information on page 20 appears to be out-of-date. It mentions $25,000 for marketing. It also states that the program "can leverage the staff support of the existing MBA and
other Masters programs" which is not allowed without compensation. This wording should be removed or clarified.

**Response:** We have reworded the paragraph as follows: “As presented in detail in the Financial Projection, the Master of Supply Chain & Logistics degree program can be launched at minimal expense including direct costs of $20,000 stipend for the Academic Program Director. Marketing expenses will be expensed from the School of Business Marketing budget which includes all existing programs. Following the UC Policy on Self-Supporting Graduate Degree Programs the financial projection has allocated indirect costs based on student credit hours of all programs offered at UCR in the School of Business.”

**Comment:** On page 1 "Management" (in the title) is misspelled.

**Response:** Fixed.

**Comment:** Page 5 has some outdated numbers, including the McKinsey & Company study and the "Big Data market" information at the end of the third full paragraph.

**Response:** we deleted the “Big Data market” reference as it does not contribute to the point anyway.
PROPOSAL FOR A SELF-SUPPORTING MASTER OF SUPPLY CHAIN & LOGISTICS MANAGEMENT

January 2018

STATUS:

Approved by School of Business Administration Executive Committee: 10/12/2015
Approved by School of Business Administration Faculty: 10/23/2015, 01/12/2018
Submitted to Graduate Division for Feedback: 09/25/2015
Submitted to the Chair of the Senate of the Division: 11/05/2015
Re-approved by School of Business Administration Executive Committee: 02/24/2017
Re-submitted to the Chair of the Senate of the Division: 03/06/2017
Re-approved by School of Business Administration Faculty: 01/12/2018
Re-submitted to the Chair of the Senate of the Division: 01/16/2018
GRADUATE DEGREE PROGRAM PROPOSAL

Proposers:
- The faculty of the School of Business Administration and the A. Gary Anderson Graduate School of Management
- The faculty members in the area of Operations and Supply Chain Management (OSCM) and the faculty chair
- Mohsen Elhafsi, OSCM area coordinator
- Long Gao
- Elodie Goodman
- Peter Chung, Faculty Chair
- Adem Orsdemir

Contact Information:
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School of Business Administration
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§ 1.0 INTRODUCTION

The UCR School of Business Administration (SoBA) proposes to offer a new Master of Supply Chain & Logistics Management (MSCLM) degree program to address the substantial unmet demand for trained Supply Chain Management (SCM) and logistics professionals. The new degree program will require sixteen months (four academic quarters plus a summer internship) of full-time study or its equivalent on a part-time basis. The program will be a self-supporting program. While the program is structured as self-supporting, it is designed to leverage the existing capacity of the School’s current MBA and MS self-supporting programs and is expected to be cash-flow-positive from the first term it is offered.

SoBA offers a Bachelor of Science in Business Administration where an undergraduate student may choose to concentrate in a specialized area such as SCM. However, coursework culminating in a baccalaureate degree with a concentration in SCM is not usually sufficient for advanced SCM and logistics professionals. A student may also earn an MBA with a concentration in SCM; however, by design, an MBA is a generalist degree, and is perceived as such by employing firms.

The MSCLM program is designed to provide students with a rigorous understanding of and the ability to apply core principals within the field of Supply Chain Management and logistics using powerful quantitative and Business Analytics tools. Today’s supply chains are truly global. Effective supply chain management is crucial and solves many of the problems encountered by businesses today. A thorough knowledge of this discipline and the execution of a sound supply chain strategy are necessary in today’s global economy to be competitive, efficient and maximize a firm’s profitability. Supply chain and logistics professionals are sought after in all industries today, with new and growing opportunities in biotech, cyber-security – even disaster and famine logistics.

The proposed MSCLM degree will bring greater visibility to UCR, the Graduate School, and SoBA; contribute positively to the reputation of the school nationally and internationally; and serve the growing needs of the region for well-educated SCM and logistics professionals. The program is consistent with the UCR and SoBA strategic plans; will give us an important edge over our competition as we move to take advantage of the fact that our geographical area is underserved in this sphere; and will elevate our national and international visibility as we do our part to meet the growing demand for SCM professionals. The program maybe a possible pathway into a PhD program in supply chain management. Several former students who graduated from our MBA program, who either have pursued a Ph.D. degree in SCM or expressed the desire to do so, encountered difficulties due to the lack of foundation in the SCM concentration. Having a program focusing on Supply Chain and Logistics Management will likely improve the marketability of our students seeking to pursue a PhD specializing in supply chain management or the like.
This proposal describes the rationale for the degree program, outlines how the program advances our strategic plan, and provides background on the market for the degree. The proposal includes information comparing the proposed program to those offered by other schools nationally and internationally, and includes details of the curriculum of the sixteen-month degree program. The program requires only a small frontend investment because most of the courses in the curriculum are already offered routinely by SoBA.

1.1 Aims and Objectives

Business schools are undergoing a significant shift in the applicant pool for Master’s degree programs. Applications for traditional MBA programs that provide a general management focus have seen a sustained decline nationwide. Coincidentally, more students are seeking Master’s degrees that specialize in various business fields, including supply chain management and logistics.

In recent years, demand for professionals with supply chain credentials has skyrocketed. According to Fortune Magazine, Logistics alone accounted for 8.5% of Gross Domestic Product in 2014 with over $1.3 trillion in spending on transportation, inventory, and related logistics activities. According to the same Magazine, there is a need for 1.4 million additional supply chain workers by 2018. The U.S. Department of Labor Occupational Outlook Handbook (2014-2015), for five typical occupations within supply chain management, the projected growth rate through 2024 ranged from 25% to 30% with salaries ranging from $74,260 to $108,120. The average annual income for supply chain professionals in 2013 was over $100,000 a year, according to the Institute for Supply Chain Management. The Bureau of Labor Statistics has predicted a 26 percent increase in logistics jobs by 2020 and a 29 percent rise in the need for freight agents by the end of the decade. The Graduate Management Admission Council (GMAC) 2016 Corporate Recruiters Survey Report indicates that, overall, about a quarter or more of corporate recruiters are actively seeking graduates of Master in Supply Chain Management programs (27% of respondents). The same survey indicates that Graduates of Master in Supply Chain Management programs are in greatest demand among companies in the manufacturing (42% of respondents), technology (39%), and products and services (37%) sectors.

The development of professionally oriented masters programs in SCM and Logistics is in direct response to the recognition that students who aspire to work in the field of SCM need more specialized education than is available through standard undergraduate or masters-level degree programs. Advanced SCM education has developed along a general structure. Students normally take more quantitative courses such as Management Science, Operations, Logistics, Procurement, and Inventory Management, focused on supply chain and logistics applications. These programs are normally called Master’s in Supply Chain Management, Master’s in Global Supply Chain Management, or Master of Arts or Master of Science in Global Logistics. This line is the focus of the proposed Master of Supply Chain & Logistics Management program of UCR. Institutions such as University of Southern California (very recently), Ohio State University, Arizona State University, Washington University, MIT, Penn State University and Michigan State University have similarly launched Master’s degree programs in supply chain management within the last five years. The programs offered by Penn State and Arizona State are online
programs. Numerous institutions nationwide are planning to enter this market and launch their own Master of Science in Supply Chain Management programs.

The SoBA Master of SCLM program will meet the needs of two types of students: international students who are seeking a master’s degree with an emphasis in SCLM and domestic students who generally have work experience and wish to strengthen their experience via attaining a master’s degree in SCLM for future professional growth in the work environment. Work experience is not required, nor is it essential to succeed in the SoBA MSCLM program. However, inclusion of some students with work experience in the supply chain and logistics sector can contribute to the quality of the experience of others, help connect the school to the SCM community, and enrich classroom discussion. Students with experience tend to come from the U.S. and may choose to pursue the degree on a part-time basis.

Supply chain management offers a wide variety of job options for entry-level managers and beyond. We expect that students will find employment as “Supply Chain Analyst”, “Purchasing Manager”, “Warehouse Operations Manager”, “Supply Chain Software Manager”, “Transportation Manager”, and “Vice President of SCM” among others.

Based on the experience of faculty involved with the proposed program, it is possible to develop a strong sense of esprit de corps among the students, even with substantial variations in prior experience, and to build lasting relationships with recent graduates that are useful to current students, other alums, and the School.

The following are among our main aims and objectives for the program:

- The program will enable supply chain management and logistics executives to gain the specialized expertise required for professional advancement.
- The regional market for supply chain and logistics professionals is underserved by institutions of higher education. The program will enable UCR to address the regional market need for professional education in supply chain & logistics management.
- The program will enable us to maintain and build critical mass of faculty in supply chain management and related fields.
- The program is expected, to advance the research mission of the School, and to fund well-qualified Ph.D. students with emphasis in supply chain management (to be launched in the future).
- The program is congruent with the UCR and SoBA strategic plans.
- Graduates of the program can be of immediate value in helping the School to place its graduates in attractive professional employment and supply chain and logistics alums can quickly become important prospects for campus development efforts.
- The particular strengths of UCR will enable the program to help bring greater socioeconomic diversity to the profession.

1.2 Historical Development of the Field and Department Strengths

Before the 1950s, logistics was thought of in military terms. It had to do with procurement, maintenance, and transportation of military facilities, materiel, and personnel. The study and practice of physical distribution and logistics emerged in the 1960s and 1970s. Logistics costs were high. On a national level, it was estimated that logistics cost in the U.S. accounted for 15
percent of the gross national product (Heskett et al., 1973). On an individual firm level, they could be as high as 32 percent of sales (LaLonde and Zinszer, 1976). Physical distribution with its outbound orientation was first to emerge, since it represents about two thirds of logistics costs and it was considered a component of the marketing mix (product, place or physical distribution, promotion, and price) of essential elements. Business logistics, with its broader scope that includes inbound movement, was soon to follow.

The first college course (Michigan State University) and textbook (Smykay et al., 1961) appeared around 1960. Within the context of the total cost approach, activities such as transportation, inventory control, warehousing, and facility location were discussed. The emphasis was on a firm’s outbound movement of goods and dealt little with inbound movements. In 1964, the scope of physical distribution was expanded to include physical supply and was called business logistics. Using the descriptive name of business logistics was not only an attempt to distinguish the name from military logistics but to focus on logistics activities that took place within the business firm.

Although physical distribution is usually associated with outbound product movements from a firm, this definition indicates a broader concept that includes both inbound and outbound movements. Heskett et al. (Heskett et al., 1964) described business logistics in terms of both physical supply and physical distribution, but they also recognized that logistics takes place throughout the supply channel, from producer to end consumer. They suggested that there needs to be coordination of the product flows throughout the entire channel. These concepts are similar to what is currently described as supply chain management and, at that time, physical distribution and logistics were somewhat synonymous terms.

In the 1990s, a new name emerges: Supply Chain Management. This name took the logistics area by storm since so many in various business fields seemed to embrace it and saw activities of their areas imbedded in it. The origin of the name seems a mystery and exactly what supply chain management is, compared with physical distribution and logistics, is being debated. Some are saying that it is a fulfillment of the activity integration promise implied in early definitions while others think it is a new and bold concept. Those believing that supply chain management is evolutionary claim that supply chain management is not new and they recognize that the logistics pioneers had many of the ideas promoted by current supply chain enthusiasts.

Recently, the Council of Supply Chain Management Professionals (CSCMP), which is the premier organization of supply chain practitioners, researchers, and academics, has defined supply chain management as: “Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies.” Whereas, CSCMP defines logistics to be: “Logistics Management is that part of SCM that plans, implements, and controls the efficient forward and reverse flow and storage of goods, services, and related information between the point of origin and point of consumption in order to meet customer requirements.” Therefore, SCM is viewed as managing product flows across multiple enterprises whereas logistics is seen as managing the product flow activities just
within the firm. This is a deviation from the view that the early visionaries had for logistics. A contemporary view of SCM is to think of it as managing a set of processes, where a process is a group of activities relevant to achieving a defined objective, such as filling orders.

The trend toward increased globalization, free trade, and outsourcing all contribute to a continued and growing interest in logistics/SCM. According to a McKinsey & Company study, “by the year 2020, 80% of the goods in the world will be manufactured in a country different from where they are consumed compared with 20% now.” There will be a tremendous shift in the movement and consumption of goods, all of which will require ever better management of the associated supply chain processes.

The contemporary view is that SCM is a new frontier for demand generation – a competitive weapon. Both views will be important, but the new emphasis will be on designing and operating the supply chain to enhance the revenues of the firm in such a way as to maximize contribution to profit. This view replaces the often-used strategic objective of minimizing supply chain costs, subject to meeting given customer service requirements, and it will elevate SCM in the eyes of top management. Collaboration and coordination will be the keys to achieving the benefits of SCM. When both parties in a supply chain relationship win equally due to their cooperative actions in the supply channel, the benefits are likely to be realized and the relationship remains intact.

In the last decade, business analytics has evolved significantly, and now offers decision support for critical tactical and strategic supply chain activities. The insights from these activities are helping companies optimize their supply chain functions and close the gaps to manage market pressures and contribute to financial performance. The increasing importance of analytics and planning to the success of a company’s business strategy cannot be ignored. A Gartner study shows that several companies gave analytics and planning a high importance score (8.3 out of 10), however the need was not being achieved in performance [6.3 out of 10] as was evident in the ensuing gap. According to Wikibon, the Business Analytics market will top $84B in 2026, attaining a 17% Compound Annual Growth Rate (CAGR) for the forecast period 2011 to 2026.

The SoBA faculty is well-positioned to meet the needs of students in the proposed Master of Supply Chain & Logistics Management program. Our Operations and Supply Chain Management (OSCM) faculty, while currently small, is intended to grow over the next few years, partly in anticipation of the needs of the program. The current OSCM faculty members are all involved in research areas that are appropriate for students in the MSCLM program. In addition, some courses that are appropriate for students in the program are currently offered by the Finance faculty and the Accounting and Information Systems faculty of SoBA. Consistent with the orientation of this program, the School has identified Supply Chain Management as one of its five “spires of excellence,” the area has restructured its curriculum at both the graduate and undergraduate levels to infuse supply chain analysis into the curriculum, and three new courses are being developed for the proposed MSCLM program. Faculty hiring has focused on supply chain management and is expected to continue to do so.

1.3 Timetable
The School seeks to launch the program in the fall of 2018 or sooner, if feasible. Most courses in the program are already offered either as MBA core or electives. Four new courses focused more specifically on the needs of the program are being developed (three have already been approved) and will be offered when the program is launched. We will initiate the program with a faculty director and existing SoBA administrative staff. We have conservatively projected enrollments at 5 students in the first year and gradually increasing to a projected maximum of 25 students by the fifth year. These enrollment projections are well below those achieved by other schools offering similar programs. The UCR campus strategic plan provides for growth of professional and self-supporting programs but does not define enrollment goals for self-supporting programs.

1.4 Relation to Existing Programs and Campus Academic Plan

The program fits the overall strategic plans of UCR and SoBA to increase its presence and reputation regionally, nationally, and internationally. The graduate degree in Supply Chain & Logistics Management is a part of the portfolio of offerings at many major business schools, and such graduate master’s degree supply chain management programs are routinely ranked in such publications as US News, Business Week, and the Financial Times. The program will engage professional students in supply chain and logistics research, connect the campus more firmly with the professional supply chain management and logistics community, and strengthen our ability to place our students in significant professional positions.

The proposed Master of Supply Chain & Logistics Management degree program advances the objectives of UCR as reflected in its strategic plan, UCR 2020: The Path to Preeminence. This strategic plan places significant emphasis on increased focus on “professional and graduate education that will benefit a region that is in dire need of practitioners in a variety of professional fields.” The plan notes that UCR’s most successful graduate programs are those that integrate graduate education with academic research and creative activity, and that to achieve the profile of an AAU institution, UCR must increase its proportion of graduate and professional students. The plan points to the potential for professional programs to provide revenue enhancements to the campus.

The strategic plan calls for relative growth of graduate education, including professional education; serving the region by preparing students well for professional employment; reducing dependence on public funds through development of self-supporting graduate programs; connecting professional education to academic research; connecting more closely to the region; and developing the profile of an AAU university.

The proposed Master of Supply Chain & Logistics Management program is also consistent with the strategic goals of the School of Business Administration. The SoBA strategic plan identifies “supply chain management” as one of five spires of excellence. The term, supply chain management, implies that students will have hands on opportunities to learn advanced methods relevant to supply chain analysis and logistics using data analytics and quantitative tools, and that there will be significant complementarities between teaching and research in supply chain management.

We are in an environment where specialized post-graduate education is increasingly demanded. No longer is specialization just for academic Ph.D.s. Appropriate education for supply chain and
logistics professionals is similar to that of supply chain management Ph.D.s. In fact, many of the technological advances in supply chain and logistics have come not from the universities, but from the private sector. Supply chain professionals working in the Riverside/San Bernardino area need to be dynamic and innovative because the economy of the region is destined to be the most rapidly growing portion of the California economy in the foreseeable future, and that growth is closely tied with the development and increasing professionalism of the logistics and warehousing sector in the region.

We expect that the Master of Supply Chain & Logistics Management program will positively impact the existing programs of SoBA:

- Because we plan to offer the degree initially using the capacity of existing courses, there will be no reduction in the capacity of the existing faculty to serve the teaching missions of the existing graduate and undergraduate degree programs.
- As the program grows, it will be necessary to add additional faculty in OSCM. The program will provide sufficient sustainable free cash flow to support the addition of lines.
- Faculty hired in response to growth of the program will help build critical mass in the school, help to advance the school’s research mission, and help to support the eventual launch of the supply chain component of the Ph.D. in Management.
- While the program may be attractive to some students who otherwise would apply to the school’s MBA program, it will also generate its own stream of applicants. Based on experience of other schools, the net effect is substantially positive for recruitment to the MBA program.
- Students admitted to the MSCLM program will be strong quantitatively and will contribute positively to the classroom experience and learning of MBA and other specialized Master students.
- Students of the MSCLM program are frequently interested in pursuit of the Ph.D. so that the program will provide a means of attracting and screening future Ph.D. candidates.
- The MSCLM program is not expected to impact the undergraduate program offered by the school. The balance of staffing undergraduate courses will be maintained or enhanced when new faculties are added as the program grows.

The experience of other universities that offer similar specialized degrees in supply chain and logistics shows that additional degree offerings in supply chain and logistics tend to complement and ultimately augment the MBA programs of the school, bringing dividends of additional prestige to the school, as well as benefits of networking with the firms in the industry. While the MSCLM degree program will share resources with the MBA program, it will attract its own pool of applicants. Because we can achieve sustainability at a very low level of students, and because MBA staff will also be involved in the MSCLM admissions, we can control the admission of students to the appropriate programs. Overall, the MSCLM program is expected to have a positive impact on the web traffic from students who are interested in the UCR MBA.

There is ample evidence in the experience of other schools that those who apply for Master’s degrees in supply chain management tend to have stronger quantitative background than MBA applicants. Therefore, not just the market but the selection criteria for admission to the MBA and MSCLM programs will differ. The marketing efforts for attracting students to the MSCLM program will result in a boost to the profile of the school as a whole. Students in the two
programs will attend several courses together, and the presence of students with stronger quantitative background will tend to elevate the experience of both sets of students.

The effort to place graduates of the MSCLM program, coordinated with the placement effort for MBAs will help us to better place students into the cohorts that best suit them.

1.5 Interrelationships with the Programs of other Institutions, Market and Competition

Southern California is greatly underserved in graduate supply chain management education.

- The University of Southern California (USC) is the only other school in Southern California that currently offers advanced degree in supply chain management.
- Schools on the East Coast and east of the Mississippi are in the forefront of development and introduction of specialized graduate degrees in supply chain management and logistics.
- The USC program, Master’s in Global Supply Chain Management, is a joint program between the Viterbi school of Engineering and the Marshal School of Business. It is fundamentally different from the proposed program and targets a different market.
- It is only a matter of time before our local competitors will introduce such programs, making UCR’s introduction of the program at this time partly defensive.

The Master of Supply Chain & Logistics Management will provide a comprehensive overview of the entire field of supply chain management, with an emphasis on analytical methods and applications using business analytics tools.

1.6 Administration

The program will be administered by a faculty director within the OSCM area of the UCR School of Business. The School will establish a faculty admissions committee that will operate similarly to the current MBA program admissions committee. These admissions committees will collaborate and work with SoBA staff to establish clear distinctions in admissions criteria. Among other considerations, the MSCLM will place less emphasis on work experience and more on evidence of quantitative aptitude, ability and interest. Because of the importance of participative learning, the admissions committee will make selective use of interviews for foreign students, in addition to standardized tests of English proficiency.

Initially, the program will be marketed almost exclusively on the School’s website, through local information sessions, and through promotion to faculty and administration of likely feeder schools. Information about the program will be distributed at MBA forums whenever the School decides to participate in such forums for the purpose of MBA recruiting.

Course staffing will be administered mainly by the OSCM area coordinator (faculty), in conjunction with their normal staffing responsibilities for MBA and other MS courses. Performance reviews of lecturers are the shared responsibility of faculty members in the discipline, and a formal annual review process for lecturers is already in place and is working well. Formal student advising will be administered through faculty-led advising/information sessions, with informal advising by faculty on an as-needed/as-requested basis.
Initial administrative support will be provided by existing SoBA staff in conjunction with their existing responsibilities for program administration.

As the program grows, it may become important to add dedicated staff and to formally allocate a portion of faculty time to program administration. Based on prior experience and conversations with directors of other programs, once the program reaches a scale sufficient to justify a full complement of course offerings, the program could need up to one faculty FTE fully committed to administration of this program and at least one dedicated administrative staff member who would be involved with recruiting, advising, and placement. The faculty FTE can be spread over several individuals and can include LSOE.

1.7 Plan for Evaluation

Within the School, the program will be continuously evaluated based on attainment of student FTE projections, the quality of applicants and matriculated students, curriculum effectiveness relative to learning objectives, placement success, and continuing involvement of program alums.

Campus policy is to evaluate new programs after three years and routinely thereafter, following established Graduate Program review procedures.

§ 2.0 PROGRAM

2.1 Undergraduate Preparation for Admission

Eligibility for admission depends on having completed a four-year undergraduate degree or equivalent. Based on experience of other schools, appropriate undergraduate majors include business, engineering, economics, mathematics, statistics, and physics, among others. Students with less quantitative backgrounds may also apply, but should expect to use electives to develop quantitative background or take additional courses if admitted to the program. Because classroom participation requirements in the program are high, international students will need to demonstrate competency in written and spoken English.

Students admitted to the program will have an academic profile somewhat different from those likely to be admitted to other master's level programs in SoBA. In particular, the MSCLM places substantially greater emphasis on quantitative background as reflected in undergraduate degree, courses taken, and scores on quantitative portions of admissions tests. In comparison to the MBA, the MSCLM places less emphasis on work experience. However, over time we expect that the cohort will include individuals with significant relevant work experience.

To be qualified for admission, an applicant to this program must have completed a Bachelor's degree or its approved equivalent from an accredited institution and attained an undergraduate record that satisfies the standards established by the Graduate Division and University Graduate Council. Applications are accepted for fall term. All applicants must submit scores from the Graduate Management Admissions Test (GMAT) or Graduate Record Exam, General Test (GRE). Applicants whose first language is not English are required to submit acceptable scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) unless they have a degree from an institution where English is the exclusive language of instruction. In some cases, an interview may be required to assess English
language ability. Additionally each applicant must submit at least two letters of recommendation, including at least two academic references. All other application requirements are specified in the graduate application or in the General UCR catalog.

The admissions criteria to the Supply Chain and Logistics Management program will be aligned with current admissions practices in all SoBA’s graduate programs. These criteria use a holistic assessment of eligibility and potential for success. This holistic process includes both quantitative criteria (GPA, GMAT score), and qualitative criteria (including quantitative background, work experience, the quality of undergraduate institution attended, and the rigor of the undergraduate major) in the overall assessment of an applicant’s eligibility for admission to the Supply Chain and Logistics Management Program.

The recommended Academic Index Score of \((200 \times \text{GPA}) + \text{GMAT} + \text{Qualitative Index}\), is currently used by all SoBA’s graduate programs to inform their admissions decisions, as well as for determination of eligibility for merit scholarships. The Qualitative Index will range from 0-100 and will be assigned by Graduate program staff and reviewed by the Graduate Advisor. An applicant with an Academic Index Score \(\geq 1000\) may be recommended to the Graduate Division for admission by the Graduate Advisor in consultation with the program director. Those applicants with lower scores will be placed on a waiting list, advised to retake the GMAT, or rejected, as appropriate. For those qualified students with lower scores, a request for an exception from the UCR’s Graduate Division will be sought.

As presented in Exhibit III, in the first quarter of the Master of Supply Chain & Logistics Management degree program, students will be expected to take core courses in data models and decisions, quantitative methods, and operations management. This grounding is sufficient to expose students, in the second quarter, to the main field of Supply Chain Management. In the third quarter, the students are expected to build on what they learned in the second quarter by taking more advanced courses in the area, such as Logistics and Transportation and Procurement and strategic sourcing. In the summer quarter, students are expected to intern with local and global companies. The purpose of the summer internship is to expose students to real supply chain issues and apply the knowledge they acquired in the first three quarters of the curriculum. Ideally, we would like the students to do the internship in the summer after taking the foundation and necessary courses to take better advantage of the internship. However, although the program does not encourage it, students will be allowed to do the internship starting their second quarter provided the internship is at the quality level the program requires. In their final quarter, students take a capstone course. In the capstone course, students undertake a team-based project where they apply their acquired knowledge from prior courses as well as the experience gained in their summer internship.

Students should be able to complete the coursework for this program in 16 months. Admission is intended to be primarily in the fall quarter in order to match graduation timing with the normal recruiting cycle. However, the current offerings of SoBA do enable us to consider students for admission beginning in other terms or on a part time-basis. Required courses and sufficient elective courses will be offered every year.

### 2.2 Foreign Language
The program has no foreign language requirement.

2.3 Program of Study

2.3. A Field of emphasis
The specific field of emphasis is Supply Chain Management. Within this field, students can use elective offerings to tailor the curriculum to their own objectives.

2.3. B Plan(s)

*Plan I (Thesis)* will not be an option for the Master of Supply Chain & Logistics Management program. Given this would be typically a four-quarter program it is unlikely that a Plan I (Thesis) option will be feasible for students.

*Plan II (Comprehensive Examination)* requires that at least 18 units be in graduate level courses taken at a UC campus. None of these may be in courses numbered 297 or 299. Every candidate must take a comprehensive examination, the content of which is determined by the department or program. In most cases, units from courses numbered 291 cannot be used. Candidates for the degree are required to complete all of the general requirements specified by Graduate Studies. The program conforms to Plan II.

2.3. C Unit requirement
The Master of Supply Chain & Logistics Management will be offered as a four-quarter program (64 units) for graduates of a baccalaureate degree in a field that provides sufficient quantitative background to enable successful completion of the program.

2.3. D Required and recommended courses, including teaching requirement
Of the 64 units, 32 units (8 courses) are required courses; 4 units are a required summer internship course; 4 units are a required capstone course; and 24 units (6 courses) are elective courses must be selected from a list of elective courses designated by the Operations and Supply Chain Management area.

**Required courses currently offered to MBA students**
- MGT 201 Quantitative Analysis
- MGT 203 Economics for Management
- MGT 207 Operations Management for Competitive Advantage
- MGT 256 Applied Business Analytics
- MGT 258 Logistics and Supply Chain Management
- MGT 255 Procurement and Strategic Sourcing
- MGT 271 Quantitative Decision Making and Analysis
- MGT 275 Transportation and Logistics Management

**Capstone course not currently offered (to be developed) to MBA students**
- MGT ??? Supply Chain Integration

**Elective courses currently offered to MBA students**
- MGT 221 Decision Making Under Uncertainty
- MGT 224 Managing for Quality Improvement
- MGT 230 Databases for Management
- MGT 236 Decision Making under Certainty
- MGT 239 Simulation for Business
• MGT 259 Production Planning and Scheduling (to be reinstated)
• MGT 266 Project Management
• MGT 267 Applied Business Forecasting
• MGT 280 Business Issues in Electronic Commerce

Summary:

Required courses:

Capstone course:
MGT ???

Internship course:
MGT 298I

Elective courses (choose 6):
MGT 221, 224, 230, 236, 239, 259, 266, 267, 280

Exhibit I contains current catalog copy for the required courses currently being offered to MBA students and for selected electives. All elective courses are currently regularly offered at least annually. During the first year or two of the program, with MBA enrollments at current levels, there is sufficient capacity in these classes to accommodate the needs of the Master of Supply Chain and Logistics students. Upon approval of the program, the new courses will be offered at least annually and will require staffing. Planned operations and supply chain management hiring is expected to meet the additional staffing needs.

2.4 Sample Program (full time)
Quarter 1
• MGT 201 Quantitative Analysis
• MGT 207 Operations Management for Competitive Advantage
• MGT 271 Quantitative Decision Making and Analysis
• Elective

Quarter 2
• MGT 203 Economics for Management
• MGT 258 Logistics and Supply Chain Management
• Elective
• Elective

Quarter 3
• MGT 256 Applied Business Analytics
• MGT 275 Transportation and Logistics Management
• Elective
• Elective

Summer Internship
• MGT 298I
Quarter 4

- MGT 255 Procurement and Strategic Sourcing
- MGT ??? Supply Chain Integration
- MGT 298I Internship (retroactive credit)
- Elective

2.4 Normative time from matriculation to degree (full-time)

Plan II students should be able to complete the coursework for this program in four academic quarters in addition to the summer quarter (16 months from beginning). Required courses and sufficient elective courses will be offered every year. The minimum academic residence in the UC is three quarters, two of which must be spent at the Riverside campus. Only courses in which grades of B- or above or “S” are received may be counted toward satisfying graduate degree requirements. To continue in good standing and obtain an advanced degree, students must maintain a minimum GPA of 3.00. In addition, students must demonstrate acceptable progress toward their degree objectives. This entails the acceptable completion of all course work and other degree requirements in a timely fashion. Students are considered to be making unacceptable progress and become subject to dismissal when

1. They have 12 or more units of “I” grades (incomplete course work) outstanding
2. The quarterly GPA falls below 3.00 for two consecutive quarters
4. They fail to fulfill program requirements in a timely and satisfactory manner, or
5. They have not completed their degree within 2 years for full-time students or within 5 years for part-time students.

§ 3.0 PROJECTED NEED

3.1 Student Demand for the Program

Business schools are undergoing a significant shift in the applicant pool for Master’s degree programs. Applications for traditional MBA programs that provide a general management focus have seen a sustained decline nationwide. Coincidentally, more students are seeking Master’s degrees that specialize in various business fields, including supply chain management and logistics. Institutions such as Ohio State University, Arizona State University, Washington University, MIT, Penn State University, Michigan State University, and University of Southern California have similarly launched Master’s degree programs in supply chain management within the last five years. Numerous institutions nationwide are planning to enter this market and launch their own Master of Science in Supply Chain Management programs, in traditional classroom and/or online distance learning formats. Such degrees are becoming an increasingly common offering at peer and aspirational institutions. This enduring strength of nationwide demand for an advanced master’s degree in supply chain management and logistics and an underserved market here in Southern California offer an opportunity to gain an advantage over other universities in the area. While we seek to serve the firms in our geographical area by making available to them a pool of trained supply chain and logistics professionals, we shall not restrict ourselves to admitting only those from Southern California. Expanding the potential market to the pool of students beyond California to the national arena, and beyond US borders to the international arena will ensure that we are able to recruit students who are well qualified to stand the rigors of the proposed program.
We anticipate that the tuition, fees, and other costs of the program will be comparable to other highly regarded supply chain management programs. The Table below shows the tuition of similar Master programs. In order to have a base for comparison, we calculated the tuition per course offered in the corresponding program. As the table shows, our tuition per course is relatively competitive. In addition, this is also what is being currently charged to students in the Master of Finance and Master of accounting programs.

<table>
<thead>
<tr>
<th>University Or School</th>
<th>Program Length</th>
<th>Tuition</th>
<th>Number of Courses</th>
<th>Tuition per Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts Institute of Technology</td>
<td>10 Months</td>
<td>$67,938</td>
<td>10</td>
<td>$6,794</td>
</tr>
<tr>
<td>University of Michigan/Ross School of Business</td>
<td>10 Months</td>
<td>$50,000</td>
<td>10</td>
<td>$5,000</td>
</tr>
<tr>
<td>Portland State University</td>
<td>21 Months</td>
<td>$47,365</td>
<td>13</td>
<td>$3,643</td>
</tr>
<tr>
<td>University of Southern California</td>
<td>16 Months</td>
<td>$46,170</td>
<td>9</td>
<td>$5,130</td>
</tr>
<tr>
<td>UCR/SoBA</td>
<td>16 Months</td>
<td>$64,000</td>
<td>16</td>
<td>$4,000</td>
</tr>
</tbody>
</table>

Our intent is to develop the Master of Supply Chain & Logistics Management as a full-time program and we expect that initial enrollments will be of full-time students. As local demand from supply chain and logistics professionals increases, we anticipate an increasing but low percentage of part-time students.

Evidence from other programs indicates that students with supply chain management masters degrees are able to command materially higher compensation than undergraduates and often higher than MBA students. Generally, the cost of the degree to the student is normally justified based on anticipated impact on compensation. Given that there is a ready market for supply chain management masters students, scholarship aid in these programs is quite limited, normally around 10 to 15% of total tuition and fees. Scholarship aid is normally awarded competitively. Students who are not employer-sponsored or state-sponsored and who need funding can generally borrow much of the cost of the degree. In addition, because we do not currently have a supply chain management track in our Ph.D. program, we expect that a number of the students will be able to work on campus as teaching assistants, graders, and research assists. Students who take the program on a part-time basis normally do not receive scholarship aid, and usually are working full time and can cover the cost of the program from their compensation.

3.2 Opportunities for Placement of Graduates

Supply Chain executives require increasingly high levels of specialized expertise for professional advancement: A master’s degree or a doctorate is a prerequisite in several
specialized fields such as medicine and law for example. As a result of an exponential increase in the knowledge and skills needed for successful discharge of professional responsibilities in the field of supply chain management, industry has come to expect potential entrants to the supply chain management profession to have a command of supply chain management as a structured body of knowledge with its own paradigms that can only be acquired by pursuing an advanced degree in the field.

**The regional market is underserved:** The Master of Supply Chain & Logistics Management program will meet an untapped and growing demand for graduate supply chain management education in the region served by UCR. Riverside and the Inland Empire sit at the hub of the western United States logistics and supply chain industry, connecting two of the world’s largest ports, Los Angeles and Long Beach, to the rest of North America. Southern California, specifically the eight county region comprised of Los Angeles, San Diego, Riverside, Orange, San Bernardino, Kern, Imperial and Ventura counties is home to approximately eight hundred and fifty thousand businesses (ESRI, 2009). Several thousands of these businesses require, supply, and/or produce raw materials, semi-finished or finished products, assemblies and sub-assemblies, etc. in various shapes and form. The role of warehouses and storage facilities for storing the goods, merchandise, etc. worth millions of dollars and keeping them secure is extremely crucial. In order to facilitate the movement and distribution of goods and/or products along a supply chain, warehouses and storage facilities provide a range of logistics services, related to the distribution of goods. Logistics services can include “labeling, breaking bulk, inventory control and management, light assembly, order entry and fulfillment, packaging, pick and pack, price marking and ticketing, and transportation arrangement”. Thus the region has a significant population of professionals who are involved in supply chain and logistics management, and other fields, who could benefit from a specialized Master of Supply Chain & Logistics Management degree. Moreover, it is expected to experience the most rapid population growth in the state. SoBA is the only graduate school of management affiliated with a major research university in Riverside and San Bernardino Counties.

**Diversity in the Profession:** The Program will meet an untapped demand for under-represented minority graduates. Many firms that recruit our graduates have inclusiveness initiatives with a goal of attracting individuals with diverse backgrounds and experiences. UCR has one of the most diverse campuses in the country and is in a unique position to meet the demands of these firms.

**3.3 Importance of the Discipline**

**SCM is Globally Necessary:** Basically, the world is one big supply chain. Supply chain management –the acquisition of parts and raw materials, from purchasing to delivery– touches major issues, including the rapid growth of multinational corporations and strategic partnerships; global expansion and sourcing; fluctuating gas prices and environmental concerns, each of these issues dramatically affects corporate strategy and bottom line. Because of these emerging trends, supply chain management is the most critical business discipline in the world today.

Until recently, supply chain management was not one of the classic B-school majors, for either undergraduates or MBAs. But job openings, comfortable salaries, and the prospect for advancement have caused the academic community to take notice, with more students majoring
in the subject and more programs offering courses and concentrations in it. Today, business schools are undergoing a significant shift in the applicant pool for Master’s degree programs. Applications for traditional MBA programs that provide a general management focus have seen a sustained decline nationwide. Coincidentally, more students are seeking Master’s degrees that specialize in various business fields, including supply chain management and logistics. With such companies as H.J. Heinz and AnnTaylor Stores creating C-level supply chain positions in the past few years, more students are seeing career possibilities in the major. According to the Association to Advance Collegiate Schools of Business (AACSB), the number of undergraduate SCM programs has increased 25 percent since 2006. Almost half that jump happened during the 2009-10 school year.

The development of professionally oriented masters programs in SCM and Logistics is in direct response to the recognition that students who aspire to work in the field of SCM need more specialized education than is available through standard undergraduate or broad masters-level degree programs.

The importance of logistics in the economy is attributed to the fact that logistics alone accounts for more than 8.3% of the U.S. Gross Domestic Product with over $1.3 trillion in spending on transportation, inventory, and related logistics activities. According to the U.S. Department of Labor Occupational Outlook Handbook (2014-2015), for five typical occupations within supply chain management, the projected growth rate through 2024 ranged from 2.5% to 30% with salaries ranging from $74,260 to $108,120. According to the Graduate Management Admission Council (GMAC) 2016 Corporate Recruiters Survey Report, Overall, about a quarter or more of corporate recruiters are actively seeking graduates of Master in Supply Chain Management programs (27% of respondents). The same survey indicates that Graduates of Master in Supply Chain Management programs are in greatest demand among companies in the manufacturing (42% of respondents), technology (39%), and products and services (37%) sectors. The report further indicates that recent graduates with a Master in Supply Chain Management degree can expect to see a median starting salary of $75,000, on par with Master of Finance graduates.

**3.4 Ways in Which the Program Will Meet the Needs of Society**

**SCM is necessary to the foundation and infrastructure within societies:** SCM within a well-functioning society creates jobs, decreases pollution, decreases energy use and increases the standard of living. Two examples of the effect of SCM within societies include:

**Hurricane Katrina – 2005.** In 2005, Hurricane Katrina flooded New Orleans, LA, leaving residents without access to food or clean water. As a result, a massive rescue of the inhabitants had to be made. During the first weekend of the rescue effort, 1.9 million meals and 6.7 million liters of water were delivered.

**Foundation for Economic Growth.** A society with a highly developed supply chain infrastructure that includes interstate highways, a large railroad network, ports and airports is able to trade many goods at low cost. Business and consumers are able to obtain these goods quickly, resulting in economic growth.

MBA students, while they have a more holistic education, often do not have enough training to understand the supply chain and logistics issues a business organization deals with. Students in
the UCR Master of Supply Chain & Logistics program will acquire the knowledge and tools necessary to effectively manage their organization and will have the ability to understand the importance of a global view of the supply chain within which their organization operates. They will understand that effective supply chains give businesses a competitive advantage in the marketplace and help mitigate risks associated with acquiring raw materials and delivering products or services. They will learn that by implementing supply chain management systems, businesses are able to reduce waste, overhead costs and shipping delays in a scientific way and that the benefits of this systematic approach impacts areas ranging from product quality to order turn-around times. Students will also learn that there are costs involved in every process of the product life cycle, and it is the responsibility of management to ensure that these costs are kept low, so the company can continue to pass along these savings to the consumer.

By moving rapidly we can help UCR graduates to reap the benefits of this expanding demand. The Master of Supply Chain & Logistics Management program will address an unmet need for graduate supply chain management education in Southern California in general and specifically Inland Southern California and is therefore consistent with the School of Business Administration’s mission to service the educational needs of businesses in the region. The program will contribute to our developing a reputation for leadership in U.S. higher education, to recruiting outstanding faculty, and to the diversification of our sources of revenue, which will help the School of Business Administration maintain financial stability and independence and reduce dependence on state funding. The program also fits well with the School of Business Administration’s strategies for building reputation by hiring high quality faculty who demonstrate excellence in both research and teaching.

It is remarkable that apart from the University of Southern California is the only other school in Southern California that currently offers an advanced degree in supply chain management. Southern California is greatly underserved. It is only a matter of time before our local competitors will introduce such programs.

### 3.5 Relationship of the Program to Research and/or Professional Interests of the Faculty

The emphasis, in the SoBA strategic plan was developed partly on the basis of the quantitative orientation of the Operations and Supply Chain Management faculty and partly on the value that the faculty recognizes in making sure that graduates of our programs are quantitatively well-trained in supply chain management and are capable of quantitative analysis at appropriate levels for their degrees. The Master of Supply Chain & Logistics program fits well with the strategic plan and with the quantitative orientation of our faculty.

Moreover, the quantitative nature of the supply chain management degree will provide competent research assistants, and will help to provide funding for the eventual launch of the supply chain management track of the management Ph.D. program.

### § 4.0 FACULTY

Quantitative supply chain and logistics management is one of the strengths of UCR Faculty, and we propose to position our degree offering accordingly. The Master of Supply Chain & Logistics
Management that SoBA will offer is designed to provide overview of the entire field of supply chain and logistics management, with an emphasis on quantitative methods and applications, and with elective offerings that draw upon the strengths of our faculty.

**BRIEF BIOGRAPHY OF THE OSCM FACULTY**

1. **Mohsen Elhafsi (Professor)** received both Ph.D. and M.S. in Operations Research from the industrial and systems engineering department at the University of Florida and was ΦΚΦ Honor Graduate. He received the Diplôme d’Ingénieur Principal from the Ecole Nationale d’Ingénieurs de Tunis, Tunisia, in 1988. He joined SoBA as a tenure-track faculty member in 1997. He was promoted to associate professor in 2002 and to Full professor in 2009. He was awarded the prestigious Fulbright Fellowship for the 2006 to 2007 academic year to spend his sabbatical year in France at the École Centrale de Lille, one of France's Elite engineering schools. There he worked with host researchers at the Industrial and Logistics Laboratory on supply chain management issues ranging from coordination to performance measures and assessment. In 2007, he was awarded a $10,000 COR Research Fellowship (a fellowship program administered by the Academic Senate Committee on Research) for his proposal to work on supply chain issues related to contract manufacturing. His tenure at SoBA includes a number of administrative and faculty governance assignments, including: department chair (2004-2005), associate dean for graduate program (2007-2010), and area coordinator (2011-present). His areas of research include operations and supply chain management, manufacturing and service operations, and production and inventory systems. He is the author of numerous articles that have been published in peer-reviewed journals such as: *Management Science, IIE Transactions, European Journal of Operational Research, Production and Operations Management*, and *Global Optimization*.

2. **Long Gao (Associate Professor)** earned his Ph.D. in business administration and operations research from Penn State University, and his M.E. and B.E. in engineering physics from Tsinghua University in Beijing, China. His research interests include supply chain management, stochastic modeling of manufacturing and service systems, Markov decision processes, and simulation. He has published in journals such as *Management Science, Production and Operations Management*, and *European Journal of Operational Research*.

3. **Elodie Goodman (Associate Professor)** joined the School of Business Administration of the University of California at Riverside as an assistant professor of management science in 2012. Previously, she was assistant professor of industrial engineering at the University of Illinois at Chicago from 2006 to 2012. She holds a Diplôme d’Ingénieur from Ecole Centrale Paris, France (2002) and a Ph.D. in operations research from MIT (2006). Her research interests are on the modeling and solution of optimization problems in a variety of areas, in particular those involving game theory. Her recent work includes supply chain, influenza vaccine supply chain, pricing and inventory management and disaster planning.

4. **Adem Orsdemir (Assistant Professor)** is an assistant professor of operation and supply chain management. He received his BS degree from Bilkent University in electrical engineering and his MS from University of Rochester in electrical and computer engineering. He is also holding an MS degree from UNC in statistics and operations research. He received his PhD from UNC in

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1 Exhibit VII contains full C.V’s.
operations management. He studies the profitability and environmental benefits of green operations driven by the environmental wave and market competition. His research also includes supply chain management in the context of corporate social responsibility.

5. Yunzeng Wang (Professor and Dean) joined the faculty of the UCR School of Business Administration (SoBA) in July 2008 as the Dean’s Distinguished Scholar in Supply Chain Management and Professor of Finance and Management Science. He is currently the dean of the SoBA. Dean Wang obtained a Ph.D. degree in Operations Research from the Wharton School at the University of Pennsylvania in 1997. Prior to moving to the United States in 1993, he studied at the University of Waterloo in Canada, and obtained a master's degree in management sciences. He also holds a bachelor’s degree in electrical engineering from Shandong University in China, and a master’s degree in engineering management from the Harbin Institute of Technology in China. Dean Wang’s research interests include supply chain management, technology acquisition and adoption strategy, US-China economic development and trade, stochastic optimization, and game theory. He has published over 30 academic journal articles and invited book chapters.

§ 5.0 COURSES

As presented in Exhibit III, in the first quarter of the Master of Supply Chain & Logistics Management degree program, students will be expected to take core courses in data models and decisions, quantitative methods, and operations management. This grounding is sufficient to expose students, in the second quarter, to the main field of Supply Chain Management. In the third quarter, the students are expected to build on what they learned in the second quarter by taking more advanced courses in the area, such as Logistics and Transportation and Procurement and Strategic Sourcing. In the summer quarter, students are expected to intern with local and global companies. The purpose of the summer internship is to expose students to real supply chain issues and apply the knowledge they acquired in the first three quarters of the curriculum. In their final quarter, students take a capstone course. In the capstone course, students undertake a team-based project where they apply their acquired knowledge from prior courses as well as the experience gained in their summer internship.

The students are expected to choose 6 elective courses from an extensive range of relevant courses, such as Decision Making under Uncertainty, Databases for Management, Project Management, Business Issues in Electronic Commerce, Simulation for Business, Applied Business Forecasting, as well as other courses from other disciplines in Business.

Students should be able to complete the coursework for this program in 16 months. Admission is intended to be primarily in the fall quarter in order to match graduation timing with the normal recruiting cycle. However, the current offerings of SoBA do enable us to consider students for admission beginning in other terms or on a part-time basis. Required courses and sufficient elective courses will be offered every year.

§ 6.0 RESOURCE REQUIREMENTS

The School of Business Administration currently has a reserve that will allow it to launch and market this program without having to reduce funds allocated to existing programs, hiring initiatives or request start-up funds from the university. To launch the program, time will be
required from current faculty for program development. The majority of the courses that will be
offered are already developed and most are currently taught in SoBA’s MBA program. There is
sufficient excess capacity in the classes that are currently offered to absorb the start-up
enrollment without adding sections.

The School of Business Administration has developed financial projections for the proposed
Master of Supply Chain & Logistics Management program based on conservative assumptions.
We plan to offer this program using the self-supporting model with a per credit fee. The
Financial Projection shown in Exhibit II conservatively assumes an initial class size of 5 and a
steady growth at a rate of 5 students per year. We believe that we can deliver a high quality
program to as many as 40 students per year utilizing current resources.

Assumptions regarding marketing costs and incremental costs of instruction are detailed in
our Financial Projection shown in Exhibit II.

Based on the experience of other specialized masters programs in supply chain management, the
Master of Supply Chain & Logistics Management program is expected to grow steadily. In the
Financial Projection shown in Exhibit II, we have projected steady growth at a rate of about 5
students per year. While student FTE growth is always subject to uncertainty, the program is
structured to be cash flow positive even if the growth targets are not achieved as quickly as
projected. Moreover, there is significant potential that these projections will be exceeded due to
the high demand for specialized master’s degrees in supply chain management and the near
absence of significant local competition.

As presented in detail in the Financial Projection, the Master of Supply Chain & Logistics degree
program can be launched at minimal expense including direct costs of $20,000 stipend for the
Academic Program Director. Marketing expenses will be expensed from the School of Business
Marketing budget which includes all existing programs. Following the UC Policy on Self-
Supporting Graduate Degree Programs the financial projection has allocated indirect costs
based on student credit hours of all programs offered at UCR in the School of Business.

The Operations and Supply Chain Management faculty already offers a comprehensive range of
required and elective courses in operations, supply chain management, and statistics to MBA
students. As discussed in Exhibit III (Courses), the curriculum of the new degree will be
fashioned out of the existing menu of course offerings with the addition of three new courses. We
plan to add special Master of Supply Chain & Logistics Management sections to these courses
only as we are justified in doing so by demand and constraints on the capacity of the MBA and
other Master programs.

Since we initially can leverage the staff support of the existing MBA and other Master programs,
the Master of Supply Chain & Logistics Management program is expected to generate a positive
cash flow from its inception. As the program grows and begins to generate its own revenue
stream, it is envisaged that additional support staff will be hired to accommodate the growth,
including student recruitment and application oversight. The Master of Supply Chain & Logistics
Management program will incur direct expenses for marketing, stipend for the Academic
Program Director, UCOP overhead assessment and UCR overhead assessment (after 3 years). In
addition, a minimum of 15% of gross revenue will be allocated for financial aid to Master of
Supply Chain & Logistics Management students. As the program grows we anticipate increasing the allocation to financial aid as shown in the Financial Projections. In addition, indirect costs will be allocated based on student credit hours of all programs offered at SoBA. This allocation of indirect costs is to comply with the UC Policy on Self-Supporting Graduate Degree Programs. As all SoBA graduate programs grow, additional faculty and staff will be hired to accommodate the growth and provide a quality education. These costs will be allocated to all UCR School of Business programs, as well as additional classroom support, instructional software, program operations and administrative costs (as displayed in the Financial Projections). The Supply Chain & Logistics Management program will be subject to continuous review by the faculty of the School of Business Administration. Reasons for deviations between projected and actual enrollments will be examined and revisions to the program and to financial projections will be made as appropriate.

The Master of Supply Chain & Logistics Management program will enhance SoBA’s net revenues, help build the resource base, diversify existing sources of revenue, and reduce dependence on state funding. In the long term, the program revenues will contribute to improvement of the educational experience of students in all of the degree offerings of the School.

Alumni and Development: Graduates of the Master of Supply Chain & Logistics Management program have the potential to become influential and supportive alumni soon after they complete their degree. Based on the experience of similar programs at other schools, including the experience of some of our own faculty, recent graduates tend to become important contributors and resources for the programs within months of completion of their graduate degrees. The Master of Supply Chain & Logistics Management program will facilitate development of stronger relationships with the corporate and professional communities. It is anticipated that most students in the program will be recruited for important positions after graduation.

§ 7.0 GRADUATE STUDENT SUPPORT
The Master of Supply Chain & Logistics Management program will offer graduate student support by reserving 15% of the gross fee revenue for student financial aid. As the program grows we anticipate increasing the allocation to financial aid as shown in the Financial Projection in Exhibit II. In addition, the SoBA Development officers will strive to attain donor commitments for scholarships for the Master of Supply Chain & Logistics Management graduate students.

§ 8.0 GOVERNANCE
The program will be directed by the Faculty of the School of Business Administration through its Executive Committee and a Graduate Programs Committee, which have oversight responsibility for all Graduate Programs offered by SoBA. Several firms in the sector in our geographical area have expressed keen interest in working together with the school. We can harness this interest by inviting senior executives of prominent firms in the area to serve on the advisory board for the program. The resulting coordination will lead to a closer relationship with future employers of graduates of the program. These senior executives serving on the advisory board will be available for events such as formal talks, and occasional classroom visit for a case discussion or
select topic on real-world experience. These events will enrich the experience of students in all programs offered at the school.

§ 9.0 CHANGES IN SENATE REGULATIONS
The Master of Supply Chain & Logistics Management program will require adding the new degree objective to the Senate bylaws.
EXHIBIT I
COURSE DESCRIPTIONS OF REQUIRED AND SELECTED ELECTIVE COURSES

Required Courses available to Master of Supply Chain & Logistics and MBA students:

MGT 201. Quantitative Analysis (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): MGT 403 or equivalent; familiarity with Microsoft's Excel spreadsheet software. Addresses the process of generating decision-making information from data and solving management problems using common computer tools. Covers problem identification and formulation, model selection and use, and interpretation of the results of statistical analysis. Topics include estimation, hypothesis testing, analysis of variance, simple and multiple regression, time series, and forecasting. May not be taken for degree credit by students in statistics undergraduate or graduate programs.

MGT 203 Economics for Management (4) Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 403 or equivalent. A study of the use of microeconomics and macroeconomics in managerial decision making. Topics include demand and supply, production and cost functions, competition, labor supply, national income accounting, aggregate output, interest rates, fiscal and monetary policy, inflation, economic growth, and business cycles.

MGT 207 Operations Management for Competitive Advantage (4) Lecture, 3 hours; outside projects and extra reading, 3 hours per week. Prerequisite(s): MGT 201, spreadsheet skills. Focuses on managing the activities involved directly in the creation of products and services, such as design, production, and distribution. Provides managers with the skills and tools to analyze, optimize, and improve production processes for competitive advantage. Explores issues through lectures, cases, and videos pertaining to various industries.

MGT 255 Procurement and Strategic Sourcing (4) Lecture, 3 hours; discussion, 1 hour. Basic concepts and processes in purchasing and sourcing management are introduced in this course. It teaches global sourcing techniques and the application of various management tools and quality tools in purchasing. Focus is on the proactive and planned analysis of supply markets and the selection of suppliers, with the objective of delivering solutions to meet pre-determined and agreed upon organizational needs.

MGT 256 Business Analytics for Management (4) Lecture, 3 hours; written work, 1 hour; extra reading, 1 hour; practicum, 1 hour. Prerequisite(s): MGT 201 or consent of instructor. Provides the fundamental concepts and tools needed to understand the emerging role of business analytics in organizations and apply basic business analytics tools in a spreadsheet environment. Makes extensive use of data, statistical and quantitative analysis, exploratory and predictive models, and fact-based management to drive decisions and actions.

MGT 258 Logistics and Supply Chain Management (4) Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Studies the integration of value-creating elements in supply, procurement, manufacturing, distribution, and logistics processes, using information technologies as a main enabler. Topics include distribution networks, demand
management, sourcing, transportation, pricing, supply chain coordination, information technology, and e-business.

**MGT 271 Quantitative Decision Making and Analysis (4)** Lecture, 3 hours; discussion, 1 hour. This course covers many approaches to solving business problems from managerial point of view. Various optimization techniques are surveyed with an emphasis on the why and how of these types of models. Spreadsheet Solvers are used to accomplish the mathematical manipulations. Emphasis is placed on input requirements and interpretation of results.

**MGT 275 Transportation and Logistics Management (4)** Lecture, 3 hours; discussion, 1 hour. The course provides deep insight into the key functional areas related to transportation and logistics management within supply chain operations. Focus will include the role of transportation systems; managerial and economic aspects of various transportation modes, transport, storage/handling, and facility location decisions with applications to both domestic and international operations.

**Required Courses to be developed for the Master of Supply Chain & Logistics students:**

**MGT ??? Supply Chain Integration (4)** Lecture, 3 hours; discussion, 1 hour. This course draws on the concepts, theories and techniques, specifically emphasizing the role of the supply chain manager in implementing and accomplishing project plans and objectives. Students may draw on topics from their workplace or may choose from projects provided by companies in our local area requesting consulting services in developing feasibility studies and project proposals. Note that the ability to assign such a "real world" project depends on the availability of companies interested in such analyses at the time.

**Example Elective Courses**

**MGT 205 Information Systems (4)** Lecture, 3 hours; laboratory, 1 hour; outside projects and extra reading, 2 hours. Prerequisite(s): graduate standing; familiarity with basic computer operations and software packages. Examines the operation and management of information systems as applied to the business environment. Topics include hardware, software, databases, decision support, and systems analysis. Software packages are used to integrate information systems concepts and business applications.

**MGT 209 Marketing Management (4)** Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 403 or equivalent. Analyzes the marketing process, the environment within which it operates, institutions involved, and the functions performed. Examines the relationships and trends in a market-based economic system. Develops concepts and terms applied to marketing decisions from the perspective of a manager.

**MGT 210 Human Resources Management (4)** Lecture, 3 hours; outside projects and reading, 3 hours. Prerequisite(s): MGT 200. Introduces methods for managing the firm’s human resources within the context of regulatory and economic conditions and changing workforce demographics. Topics include recruitment and selection, compensation and reward systems, employee development and appraisal, and information systems for meeting HRM objectives.
MGT 215 International Comparative Management (4) Lecture, 3 hours; outside projects and readings, 3 hours. Prerequisite(s): graduate standing. Comparative analysis of significant management practices. The impacts of cultural, political, social, and economic factors on decision making within the international arena are examined.

MGT 221 Decision Making Under Uncertainty (4) Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Introduces basic tools for using data to make informed managerial decisions under uncertainty. Addresses modeling, performance evaluation, and optimization of systems with uncertain parameters. Topics include Markov chains, Markov decision processes, and probabilistic linear and dynamic programming. Applications are drawn from operations, finance, marketing, and other management fields.

MGT 224 Managing for Quality Improvement (4) Lecture, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 201 or consent of instructor. Discusses the operational aspects of quality improvement in manufacturing and service organizations. Focuses on the broader issues of total quality management, statistical process control, and the difficulties in implementing quality efforts in organizations.

MGT 230 Databases for Management (4) Lecture, 3 hours; outside projects and readings, 3 hours. Prerequisite(s): MGT 205. Examines the features and capabilities of database management systems, including database classification, data structures, file organizations, evaluation, and management of database systems.

MGT 231 Corporate Finance (4) Lecture, 3 hours; extra reading, 1.5 hours; outside problem sets, 1.5 hours. Prerequisite(s): MGT 202. An intensive analysis of the effects of corporate financial policy decisions on firm value. Examines the interrelation of firm value, financing policy, investment decisions, and other considerations. Provides an understanding of the theoretical issues involved in the choice of these policies.

MGT 233 Marketing Research (4) Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 209; or consent of instructor. Examines how marketing-related data is gathered from individuals and organizations. Explores the importance of integrating problem formulation, research design, questionnaire construction, and sampling so as to yield the most valuable information. Also studies the proper use of statistical methods and the use of computers for data analysis.

MGT 236 Decision Making Under Certainty (4) Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Introduces basic tools for using data to make informed managerial decisions under certainty. Covers modeling and solution methods in network optimization, integer and nonlinear programming, and multiple criteria decision analysis. Examines applications and case studies in operations, logistics, finance, and marketing.

MGT 239 Simulation for Business (4) Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 205. Introduces computer simulation as a tool for
analyzing complex decision problems. Analyzes and discusses the theory and practice of modeling through simulation. Topics include modeling uncertainty and collecting input data, basic simulation principles, Monte Carlo simulation techniques, model verification and validation, and analysis of simulation output. Examines applications in manufacturing, finance, health services, and public policy.

**MGT 250 Marketing Channels and Sales Force (4)** Lecture, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 209. Examines decisions related to distribution channels and sales force. Discusses how to select the most appropriate marketing channel. Channel management topics include distribution intensity, power, control, and channel conflict. Covers issues in sales-force management, compensation, structure, and size.

**MGT 266 Project Management (4)** Seminar, 3 hours; extra reading and project, 3 hours. Prerequisite(s): MGT 207 or equivalent. Addresses issues of project planning and control. Topics include differences between projects and production systems; project selection; project teams; breakdown structures of organization and work; scheduling and budgeting; resources management; project control and evaluation; and current project management software.

**MGT 267 Applied Business Forecasting (4)** Seminar, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 201 or equivalent. Provides experience in developing forecasting models and applying them to problems in marketing, production, inventory management, business economics, and other fields. Discusses issues in data acquisition, data analysis, modeling of relations between variables, trend analysis, and seasonal forecasting. Uses case studies and applications from a variety of management areas.

**MGT 280 Business Issues in Electronic Commerce (4)** Seminar, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 205 or consent of instructor. Provides an understanding of the various business strategies, management issues, and pertinent technologies related to electronic commerce. Explores several of the problems surrounding electronic commerce including security issues, privacy, encryption, safeguarding of intellectual property rights, acceptable use policies, and legal issues.
### EXHIBIT II: FINANCIAL PLANNING

#### Master of Supply Chain & Logistics Management

**Budget Projection**

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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<tbody>
<tr>
<td><strong>FTE ENROLLMENT</strong></td>
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<tr>
<td>Year 1</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>15</td>
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<tr>
<td>Year 2</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>10</td>
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<tr>
<td><strong>Total Year-average Program Enrollment</strong></td>
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<td>10</td>
<td>15</td>
<td>20</td>
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<tr>
<td><strong>REVENUE</strong></td>
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<tr>
<td>1 Program Unit Fee Per Student</td>
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<tr>
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<tr>
<td>3 Year 2 - 16 Units</td>
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<td>$96,000</td>
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<td><strong>TOTAL PROGRAM REVENUE</strong></td>
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<td>$384,000</td>
<td>$672,000</td>
<td>$768,000</td>
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<td><strong>COSTS</strong></td>
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<td>A. Program Direct Costs</td>
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<tr>
<td>3 Faculty Salaries w/benefits</td>
<td>$211,590</td>
<td>$163,800</td>
<td>$171,990</td>
<td>$180,590</td>
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<td>B. Program Indirect Costs</td>
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<tr>
<td>9 MBA/Career Services Staff &amp; Operations</td>
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<td><strong>TOTAL ADMIN &amp; FACULTY INDIRECT COSTS</strong></td>
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<td>$4,715</td>
<td>$4,843</td>
<td>$4,974</td>
<td>$5,109</td>
<td>$5,247</td>
</tr>
<tr>
<td><strong>TOTAL PROGRAM INDIRECT COSTS</strong></td>
<td>$60,928</td>
<td>$124,625</td>
<td>$191,189</td>
<td>$260,722</td>
<td>$333,328</td>
</tr>
<tr>
<td><strong>ANNUAL COST PER FTE STUDENT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Direct Costs</td>
<td>$67,977</td>
<td>$34,524</td>
<td>$29,667</td>
<td>$25,341</td>
<td>$24,300</td>
</tr>
<tr>
<td>Program Indirect Costs</td>
<td>$12,186</td>
<td>$12,462</td>
<td>$12,746</td>
<td>$13,036</td>
<td>$13,333</td>
</tr>
<tr>
<td><strong>TOTAL COST PER FTE STUDENT</strong></td>
<td>$80,163</td>
<td>$46,986</td>
<td>$42,413</td>
<td>$38,377</td>
<td>$37,633</td>
</tr>
<tr>
<td><strong>TOTAL PROGRAM COST</strong></td>
<td>$400,815</td>
<td>$469,861</td>
<td>$536,191</td>
<td>$767,536</td>
<td>$940,822</td>
</tr>
<tr>
<td><strong>SURPLUS (DEFICIT)</strong></td>
<td>($112,815)</td>
<td>($85,861)</td>
<td>$35,809</td>
<td>$464</td>
<td>$115,178</td>
</tr>
<tr>
<td><strong>SURPLUS (DEFICIT) PER HEADCOUNT STUDENT</strong></td>
<td>($22,563)</td>
<td>($8,586)</td>
<td>$2,387</td>
<td>$23</td>
<td>$4,607</td>
</tr>
</tbody>
</table>

Faculty FTE should be based on the FTE reported in Table 4 with faculty paid on overload counted based on the number of courses taught, relative to a normal teaching load for that title code. For example, a ladder-rank faculty member teaching one course on overload in the self-supporting program would be counted as 0.25 FTE, based on a normal four course load.
<table>
<thead>
<tr>
<th>Explanation:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tuition @$1,200 per unit was based on the current Master of Finance program at UCR School of Business. The plan is to keep the cost level for the first five years to support growth in the program.</td>
</tr>
<tr>
<td>2</td>
<td>Per proposal, the Master of Supply Chain and Logistics Management Program will be a 64-credit unit curriculum. Normal student will complete in 16 months.</td>
</tr>
<tr>
<td>3</td>
<td>Faculty cost for the 4 courses specifically designed for the Master of Supply Chain and Logistics Management Program. Based on average cost per Graduate course. Year 1 includes cost to develop program.</td>
</tr>
<tr>
<td>4</td>
<td>Program Director salary based on current SSP program managers - PSOE appointment at 2/3 teaching &amp; 1/3 Program Director</td>
</tr>
<tr>
<td>5</td>
<td>UCR School of Business policy for a Reader is 1 reader hour per student per week. FY17-18 rate is $15.78/hour. 10 academic weeks per quarter. 4 courses per student</td>
</tr>
<tr>
<td>6</td>
<td>Financial Award budgeted at 20% of the projected revenue.</td>
</tr>
<tr>
<td>7</td>
<td>UCOP Assessment based on prior year as follows: 1/3 on current fund actual expenditures, 1/3 on total student FTE and 1/3 on total academic and staff FTE.</td>
</tr>
<tr>
<td>8</td>
<td>UCR In-Direct Overhead based on prior year expenditures for Infrastructure, UCR Administration, Student Support &amp; Academic/Research allocated at 6.80% per new budget model.</td>
</tr>
<tr>
<td>9</td>
<td>Graduate Program &amp; Career Center staff &amp; operations based on a per student average based on FY16-17 enrollment in all graduate programs.</td>
</tr>
<tr>
<td>10</td>
<td>Graduate Course Support &amp; Instructional Databases</td>
</tr>
<tr>
<td>11</td>
<td>Based on number of students enrolled in School of Business Graduate Programs.</td>
</tr>
<tr>
<td>12</td>
<td>Based on number of students enrolled in the School of Business Graduate and Undergraduate Programs.</td>
</tr>
</tbody>
</table>
EXHIBIT III
COURSE SCHEDULE AND COURSE STATUS

Sample Program (full-time)

Quarter 1
MGT 201 Quantitative Analysis MBA Core Course
MGT 207 Operations Management for Competitive Advantage MBA Core Course
MGT 271 Quantitative Decision Making and Analysis MSCLM Core Course
Elective

Quarter 2
MGT 203 Economics for Management MBA Core Course
MGT 258 Logistics and Supply Chain Management MBA Core Course
Elective
Elective

Quarter 3
MGT 256 Applied Business Analytics MBA Course
MGT 275 Transportation and Logistics Management MSCLM Core Course
Elective
Elective

Summer Internship
MGT 298I

Quarter 4
MGT 255 Procurement and Strategic Sourcing MSCLM Core Course
MGT ??? Supply Chain Integration MSCLM Core Course
MGT 298I Internship (retroactive credit) MBA Core Course
Elective
EXHIBIT IV
ACADEMIC DEGREE PROGRAM PROPOSALS: INFORMATION REQUIRED BY CPEC

1. **Name of Program:**
   Master of Supply Chain & Logistics Management

2. **Campus:**
   University of California Riverside

3. **Degree/Certificate:**
   Master's Degree

4. **CIP Classification:** (to be completed by the Office of the President)

5. **Date to be started:**
   September 1, 2018 or sooner, if feasible

6. **If modification of existing program, identify that program & explain changes.**
   Not Applicable.

7. **Purpose (academic or professional training) and distinctive features (how does this program differ from others, if any, in California?)**

   **Program Differentiation**

   There is a large and increasing demand and professional need for specialized masters programs in Supply Chain & Logistics Management. Southern California is greatly underserved in graduate supply chain management education. Whereas Schools on the East Coast and east of the Mississippi are in the forefront of development and introduction of specialized graduate degrees in supply chain management & logistics, the University of Southern California (USC) is the only school in Southern California that currently offers an advanced degree in supply chain management. The USC program, Master’s in Global Supply Chain Management, is a joint program between the Vitebri school of Engineering and the Marshal School of Business. It is fundamentally different from the proposed program and targets a different market. It is only a matter of time before our local competitors will introduce such programs, making UCR’s introduction of the program at this time partly defensive. UCR will be unique in the UC system in offering a Master of Supply Chain & Logistics Management. The Master of Supply Chain & Logistics Management will provide a comprehensive overview of the entire field of supply chain management, with an emphasis on analytical methods and applications using business analytics tools. The specific positioning of this degree is for students who desire a more specialized graduate education than is provided by an MBA, with substantially more depth in supply chain and logistics management. The program is designed to develop sophisticated supply chain and logistics management expertise including modeling, analysis, decision making, and supply chain planning.

8. **Type(s) of students to be served:**

   The Master of Supply Chain & Logistics Management will be offered as a 16-month program (64 units) for graduates of a baccalaureate degree in a field that provides sufficient quantitative background to enable successful completion of the program. Appropriate undergraduate majors include business, economics, engineering, mathematics, statistics, and physics, among others. Students admitted to the program will have an academic profile somewhat different from those likely to be admitted to other master's level programs in the Anderson Graduate School of Management. In particular, the Master’s in Supply Chain and Logistics Management places substantially greater emphasis on quantitative background as reflected in undergraduate degree, courses taken, and scores on quantitative portions of admissions tests. Compared to the MBA, the Master of Supply Chain & Logistics Management places
less emphasis on work experience, though over time we expect that the cohort will include individuals with significant relevant work experience.

9. If program is not in current campus academic plan give reasons for proposing program now:
There are at least eight compelling reasons why the School of Business Administration and the Anderson School should launch this new degree program at this time:
• Supply Chain and Logistics executives require increasingly high levels of specialized expertise for professional advancement.
• The regional market is underserved.
• The Master of Supply Chain & Logistics Management will be an immediate source of net revenue.
• The program will enable us to build critical mass in the faculty.
• The program will increase the prospects for earning supply chain management accreditation from The Association to Advance Collegiate Schools of Business (AACSB International).
• The program is consistent with the UCR and SoBA strategic plans.
• Graduates of the Master of Supply Chain & Logistics Management program have the potential to become influential and supportive alumni soon after they complete their degree.
• The Program will meet an untapped demand for under-represented minority graduates.

10. If program requires approval of licensure board, what is the status of such approval?
Not Applicable

11. Please list special features of the program:
• Specialized graduate level supply Chain management and logistics education
• Significant complementarities with existing programs of SoBA

12. List all courses required:
The majority of the courses are currently offered by the SoBA

Quarter 1
MGT 201 Quantitative Analysis
MGT 207 Operations Management for Competitive Advantage
MGT 271 Quantitative Decision Making and Analysis
Elective

Quarter 2
MGT 203 Economics for Management
MGT 258 Logistics and Supply Chain Management
Elective
Elective

Quarter 3
MGT 256 Applied Business Analytics
MGT 275 Transportation and Logistics Management
Elective
Elective
15. List any related program offered by the proposing institution and explain relationship.
We anticipate that the program will help us to attract good candidates to the School’s Ph.D. program in management.

16. Summarize employment prospects for graduates of the proposed program.
The program will educate individuals for employment in all types of organizations in particular the logistics and supply chain sector. The experience of our faculty with other programs is that opportunities for professional employment are excellent and that it is possible to develop a virtuous cycle where recent graduates who are placed become ambassadors for the program, helping to place subsequent graduates.

17. Give estimated enrollment for the first 5 years and state basis for estimate.
We project 5 students in the first year, increasing by 5 per year to reach 25 in five years.

18. Give estimates of the additional cost of the program by year in each of the following categories: FTE Faculty, Library Acquisitions, Computing, Other Facilities, Equipment. Provide brief explanation of any of the costs where necessary.
Exhibit II of the full proposal (reproduced below) contains our financial projections. FTE Faculty, Library Acquisitions, Computing, Facilities and Equipment are considered by SoBA to be “in-direct costs” and are allocated across all graduate programs and the undergraduate program based on the projected student credit hours in each program. The projected budget uses the current 90% undergraduate student credit hours, with the remaining 10% graduate student credit hours allocated over the individual graduate program.
An increase in faculty FTE is shown by the increase in costs allocated to the Master of Supply Chain & Logistics Management, however, it is not possible to state an accurate FTE proration since the faculty teach in all area. Library acquisitions and computing are allocated in the line “Instructional Databases, IT & Course Materials. There will be no facilities cost as we will use available capacity in existing classrooms. Also we do not have specific equipment needs for the Master of Supply Chain & Logistics Management program.

Direct costs for the Master of Supply Chain & Logistics Management program include: UCOP Assessment at 1.7% of gross revenue, stipend for the Academic Program Director (faculty), marketing and financial aid at 15% of gross revenue.

19. How and by what agencies will the program be evaluated.
The program will be evaluated by the AACSB at UCR's next accreditation review. An initial campus level review will occur after 3 years and normal campus-level reviews will occur periodically thereafter.
EXHIBIT V

LETTER FROM SCHOOL OF BUSINESS ADMINISTRATION DEAN

September 17, 2015

Courses and Programs Sub Committee of the Graduate Council
University of California, Riverside
Riverside, CA 92521

RE: Master in Supply Chain and Logistics Management

Dear Committee Members:

I am writing to endorse the proposed Master in Supply Chain and Logistics Management. This is a well-designed program to expand SoBA’s self-supporting program offerings. Over the last decade, the industry demand for business graduates has been shifting from the general Master for Business Administration (MBA) to specialized Masters. By offering the Master in Supply Chain and Logistics Management, SoBA will continue to build up capacity to meet the industry demand. The program will provide a stream of revenue to strengthen the School’s financial stability.

Like our faculty, I enthusiastically support the program.

Sincerely

Yunzeng Wang
Dean
EXHIBIT VI

LETTERS FROM LOCAL LOGISTICS COMMUNITY REPRESENTATIVES

July 16, 2015

Yunzeng Wang, Ph.D.
Dean, University of California, Riverside School of Business Administration
Anderson Hall 0122
Riverside, CA 92521

Dear Dean Wang:

I am writing to offer my support for the proposed Master's Degree of Supply Chain and Logistics Management at the University of California, Riverside. Our industry is in need of qualified professionals who have demonstrated their skills and understanding by achieving a master's degree in this field.

Our organization would welcome the opportunity to hire a future graduate of this program. I anticipate the continued growth of the logistics industry in the Southern California region, and your program would be instrumental in supporting that growth through the education of highly trained logistics professionals.

Best Regards,

George Hynes
President
Logistic Edge, LLC

2091 Raymer Avenue Unit A-B
Fullerton, California 92833
(714) 997-0570 (888) 305-3343
(714) 908-2010 fax
www.logisticedge.com
July 6, 2015
Dean Yunzeng Wang
Dean UCR School of Business Administration (SoBA)
Anderson Hall 0122
Riverside, CA 92521

Dear Dean Wang:

This letter is sent in support of the proposed Master of Supply Chain and Logistics Management at the University of California, Riverside. The logistics industry needs programs like this to enable us to provide better services through better trained professionals. We endorse the program and would look forward to the potential long term benefit to our industry.

As a senior Logistics executive in the inland southern California region, I would be pleased to hire Supply Chain and Logistics professionals graduating from the Master degree program at the University of California, Riverside.

Sincerely,

[Signature]

James Lin
CEO
Logistics Team
July 30, 2015

Yunzeng Wang, Ph.D.
Dean
School of Business Administration
University of California, Riverside
900 University Avenue
Riverside, California 92521

Dear Dean Wang,

On behalf of Yamato Transport U.S.A., Inc. (Secaucus, NJ)—a fully owned subsidiary of Yamato Holdings Co., Ltd., the number one company in the parcel express home delivery service in Japan—I support and endorse the proposed Master of Arts in Supply Chain and Logistics program in the School of Business Administration at the University of California, Riverside.

The Inland Southern California region’s economy is driven to a significant degree by the supply chain and logistics industries. A large component of the area’s working population are involved in the various sectors that make up supply chain and logistics, from transportation to commercial real estate to the Long Beach and L.A. ports, and would benefit from a specialized degree in supply chain and logistics.

Also, the Southern California region is underserved in graduate supply chain and logistics education and this new program will enable the University of California, Riverside to address a regional market need. In addition, the program will allow existing supply chain and logistics executives to gain the specialized training required for professional advancement.

As a senior supply chain and logistics executive located in the Southern California region, I would welcome high-quality professionals graduating from the Master of Arts degree program at UC Riverside.

Sincerely,

Koji Ogura
President and Chief Executive Officer,
Yamato Transport U.S.A., Inc.
July 24, 2015

Yunzeng Wang, Ph.D.
University of California, Riverside
School of Business Administration
Anderson Hall 0122
Riverside, California 92521

Dear Dr. Wong,

Please accept this letter in support of a proposed Master’s Degree Program in Supply Chain and Logistics Management at the University of California, Riverside.

I have been diligently working with individuals responsible for educational endeavors within the grocery industry for the past year in an attempt to get support for such a program as there is a real need in our area for it. There are numerous programs for individuals seeking to advance their education in Retail Management, but not such a program for individuals involved in Supply Chain and Logistics Management.

The Inland Empire is a hub of supply chain and logistics for the entire Southern California region. It makes a great deal of sense that the University of Riverside would lead the way in developing and offering a Master’s Degree program in this area.

Our company would be supportive of this program and would have several individuals who we would encourage to attend in furtherance of their careers with Stater Bros. Markets.

Sincerely,

STATER BROS. MARKETS

George A. Frahm
Executive Vice President
Administration/Distribution

GAF/amz
EXHIBIT VII

LETTERS FROM UNIVERSITY OF CALIFORNIA SCHOLARS

Los Angeles, September 26, 2017

To whom it may concern,

This brief letter serves to express my support for the proposed Master of Supply Chain and Logistics Management, to be offered by the Anderson Graduate School of Management at UC Riverside. I had written a brief generic note of support previously (on September 6, 2016), at which time I had not seen the proposal. I have now seen the proposal, and hence can offer a few more specific comments in support.

The design of the program is sensible, starting with basics in quantitative methods, data models and decisions, and operations management, before introducing the main topics such as supply chain management, logistics, transportation, and outsourcing. Allowing some flexibility in the timing of the internship should also help with finding good internships. The program appears to exhibit a nice synergy with the existing MBA program, building on several courses that are already offered there and that are appropriate for students in the new MSCLM program as well.

I agree with the premise of the proposal, which is that the Southern California region (or perhaps the Western US in general) is underserved with respect to programs focusing on supply chain management, especially given the large role of supply chains and logistics in the Western US.

Finally, supply chain management is well-aligned with the interests and expertise of the Operations and Supply Chain Management faculty, which suggests that they would be able to design and deliver a solid program.

Sincerely,

Charles
September 8, 2016

Professor Yunzeng Wang
Dean, School of Business Administration
University of California, Riverside
Riverside, CA 92521

Dear Yunzeng,

I am writing to offer my support of the proposed Master Program in Supply Chain and Logistics Management from your School of Business Administration at UCR.

With two of the largest container ports in Los Angeles and Long Beach, Southern California is a major international logistics hub for global trade, especially between the U.S. and Asia-Pacific region. In addition, the Inland Empire has a large number of warehouses and storage facilities for many logistics firms. As such, I believe there is a high demand for professionals with adequate supply chain and logistics management knowledge in the Southern California area.

I think the proposed program curriculum provides a good set of important knowledge and skills that can help to develop professionals for the supply chain and logistics industry. Also, your School has several faculty members who are active researchers in the operations/supply chain management area and are capable of delivering high-quality courses in the proposed program.

Therefore, I believe your School is well positioned to offer a good Master Program in Supply Chain and Logistics Management to meet the local demand in this functional area.

Regards,

Rick So
Professor and Area Coordinator
Operations and Decision Technologies Group
October 1, 2017

Professor Mohsen El Hafsi  
School of Business Administration  
University of California at Riverside  
134 Anderson Hall  
900 University Avenue  
Riverside, CA 92521  

Dear Mohsen:  

I am writing to provide a letter of support for your proposal to launch a Master’s level degree program in the area of Supply Chain and Logistics Management. Although the material that you provided to me did not include detailed syllabi, the mix of course topics in the proposed curriculum seems appropriate and I believe that you and the other faculty members in the Operations and Supply Chain Management group at your School are well-qualified to teach the pertinent courses. In view of Riverside’s proximity to the ports of Los Angeles and Long Beach, termini of major railroads, and large numbers of major warehouses for retail and industrial goods, your proposed program seems to be well-designed to address the needs of the regional business community.

Please note that this represents my personal viewpoint, as there was insufficient time for me to solicit the views of other faculty or the Haas School of Business as a whole. Nevertheless, I hope this is helpful in some way.

If you or your colleagues or campus administrators need further information, please feel free to contact me.

Sincerely,

[Signature]

Candace Arai Yano  
Associate Dean for Academic Affairs, Gary and Sherron Kalbach Professor of Business Administration and Professor of Operations & Information Technology Management,  
Haas School of Business  
Professor, Department of Industrial Engineering and Operations Research
EXHIBIT VIII
CURRICULUM VITA OF SELECTED PARTICIPATING FACULTY
MOHSEN ELHAFSI

School of Business Administration
University of California, Riverside CA 92521
Phone: (951) 827-4557
Fax: (951) 827-3970
E-mail: mohsen.elhafsi@ucr.edu
Web site: http://agse.ucr.edu/directory/faculty.html?netid=melhafsi

My research interest is in the general area of Operations and Supply Chain Management. It includes using optimization in the design, planning and control of large-scale industrial processes and service operations. My focus is on developing analytical models of complicated systems, developing solution procedures using quantitative techniques, and drawing managerial insights from the analysis of these models.

EDUCATION

<table>
<thead>
<tr>
<th>Degree</th>
<th>Field</th>
<th>Institution</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D.</td>
<td>Industrial Engineering</td>
<td>University of Florida</td>
<td>1995</td>
</tr>
<tr>
<td>M.S.</td>
<td>Industrial Engineering</td>
<td>University of Florida</td>
<td>1995</td>
</tr>
</tbody>
</table>

PROFESSIONAL EXPERIENCE

2009 – present Full Professor
A. Gary Anderson Graduate School of Management, University of California, Riverside

2007 – 2010 Associate Dean of MBA Program & Graduate Advisor
A. Gary Anderson Graduate School of Management, University of California, Riverside

2002 – 2006 Associate Professor
A. Gary Anderson Graduate School of Management, University of California, Riverside

2006 – 2007 Visiting Professor
Ecole Centrale de Lille, France
Fulbright Fellow

1997 – 2002 Assistant Professor
A. Gary Anderson Graduate School of Management, University of California, Riverside

1996 – 1997 Visiting Professor
A. Gary Anderson Graduate School of Management, University of California, Riverside

1995 – 1996 Post Doctoral fellow
Dept. of Industrial and Systems Engineering, University of Florida
1988 – 1990  Project Manager  Institut Regional des Science  
              Informatiques et des Télécumunication,  
              Tunisia

FIELDS OF INTEREST

Operations and Supply Chain Management  
Design and Management of Manufacturing and Service Systems  
Mathematical Modeling and Operations Research

COURSES TAUGHT

Undergraduate Level
Production and Operations Management  
Decision Analysis & Management Science  
Supply Chain Management  
Practical Business Forecasting

Graduate Level
Operations Management for Competitive Advantgage  
Logistics and Supply Chain Management  
Introduction to Management Science  
Statistics for Management  
Applied Business Forecasting  
Operations Planning and Control  
Management Synthesis

AWARDS AND HONORS

First $10,000 Committee on Research (COR) Fellowship Award, University of California, Riverside, 2007-2008  
Fulbright Fellowship Award (Ecole Centrale de Lille, France), 2006-07  
Regents Faculty Fellowship Award: University of California, Riverside, 2000-01  
ΦΚΦ Honor Graduate, 1995  
Teaching Assistantship: ISE Department, the University of Florida, 1994 –95
Research Assistantship: ISE Department, the University of Florida, 1991 – 94
High Honors Qualified Engineer Diploma: IE Department, Ecole Nationale d’Ingénieurs de Tunis, 1988
High honors Baccalaureate Diploma, 1982

LANGUAGES

English (Fluent)
French (Fluent, education language)
Russian (Two-year Certificate)

SERVICES AND PROFESSIONAL ACTIVITIES

School and Campus Wide Services
Elected Member: Senate Committee on Committees, 2014-2017
Elected Member: SoBA Executive Committee, 2014-2016
Member: Finance Recruiting Committee, 2014-2015
Member: Steffy Chair Marketing Recruiting Committee, 2013-2014, 2014-2015
Member: SoBA Undergraduate Committee, 2014-2016
Chair: OSCM Recruiting Committee, 2013-2014
Member: Academic Senate Research Committee (09/2013-09/2014)
Member: SoBA Committee on Research (01/2012-01/2014)
Member: Special Committee on International Activities (03/2009-09/2010)
Member: SoBA Executive Committee (09/2010-09/2012)
Member: Academic Senate Graduate Council (2010-2013)
Member: Courses and Programs Subcommittee (2010-2013)
Chair: MS/OM Recruiting Committee, 2010-2011
Member: Academic Senate Courses Committee (2009-2010)
Chair: Research Committee (2010)
Graduate Advisor: 2007-2010
Chair: Graduate Program Committee, 9/2007-9/2010
Chair: Recruiting Committee (two senior positions in Supply Chain Management), 2007-2008
Member: Internal Strategic Planning Steering Committee, 2007-2008
Member: Academic Senate Research Committee, 2007-2008
Member: Interdisciplinary Teams and Networks Grants Program Committee 09/2007-09/2010
Chair: Recruiting Committee for Dean’s Academic Appointment, 2004-2005
Chair: “Management Department: The Economic Approach”, 2003-04
Member: Strategic Planning Committee, 2003-04
Chair: MS/OM Recruiting Committee, 2002-03
Member: Steffy Chair Recruiting Committee, 2002-03
Member: Graduate Program Committee, 1997-2000, 2002-03
Member: Research Committee, 2000-2001
Member: MIS Recruiting Committee, 1997-1998
Member: Center for Research in Intelligent Systems (CRIS), 1996-present
Member: Ad hoc committee for 5th year appraisal evaluation 2002-2003
Member: Several Ph.D. Oral Examination, Statistics Department, 1999-2006

Editorial Board Membership

Member of the IFAC (International Federation of Automatic Control) Technical Committee on Manufacturing Modeling for Management and Control (since 2015)

Asia Pacific Journal of Mathematics (since 2014)
Statistics, Optimization & Information Computing (since 2013)
Open Journal of Optimization (since 2012)
The International Journal of Mathematics in Operational Research (since 2008)
International Journal of Commerce and Management (since 2009)

Session Chair

2014 Production and Operations Management Society, Annual Conference, Atlanta, Georgia, May 9-12, 2014.

2013 INFORMS Annual Conference, Minneapolis, October 6-9, 2013.


2002 33rd Annual DSI Meeting, San Diego, California, Nov. 23-26, 2002

2001 National INFORMS Meeting, Miami, FL, November 4-7, 2001

2001 International Conference, Academy of Business and Administrative Sciences, Brussels, Belgium

2000 International Conference, Academy of Business and Administrative Sciences, Prague, Czech Republic


5th Industrial Engineering Research Conference, Minneapolis, MN, May 18-21, 1996

Proposal Assessor

"Information and Decision Dynamics in Manufacturing", Executive Board of the Austrian Science Fund, 2014

Hong Kong Research Grants Council (RGC), 2000

Grants to Enhance and Advance Research (GEAR) Program, University of Houston, 2006.

Journals Refered


PROFESSIONAL AFFILIATIONS
The Institute for Operations Research and Management Science, since 1991
The Manufacturing and Service Operations Society, since 1997
The Production and Operations Management Society, since 1993
The Institute of Industrial Engineering, since 1992
The Honor Society of Phi Kappa Phi, since 1995
The Fulbright Association, since 2007

PUBLICATIONS

ARTICLES IN JOURNALS (TECHNICAL, REFEREED)


ARTICLES IN PROCEEDINGS (TECHNICAL, REFEREED)


36. ElHafsi, M., H. Camus, E. Craye, "Optimal Control of a Production System with Information on the Production and Demand Status: Application to Vendor Managed Inventory" Proceedings of the 8th ENIM IFAC International Conference


Submitted ARTICLES (TECHNICAL, REFEREED)


Working Papers

44. M. Elhafsi, W. Zhou, and S. Benjaafar, "Optimal Production and Inventory Control of a Multi-Class Demand, Assemble-to-Order System with Backorders" To be submitted to Productions and Operations Management.

45. M. Elhafsi "Optimal Dynamic Pricing for a Multi-Product Nested ATO system with Heterogeneous Demand" To be submitted to Manufacturing & Service Operations Management.

46. M. Elhafsi, "Efficient Heuristics for Managing Multi-Product ATO Systems" To be submitted to Computers and OR.

INVITED TALKS AT UNIVERSITIES

ESSEC Business School, Operations Management Area, Paris, France, 2014

University of Waterloo, Management Science Department, Canada, 2009
University of Geneva, College of Business (HEC), Switzerland, 2006
Ecole Centrale de Lille, France, 2006 (1)
Ecole Centrale de Lille, France, 2006 (2)
University of Neuchâtel, College of Business (HEC), Switzerland, 2006
University of Montreal, Business School (HEC), Canada, 2005

CONFERENCE PARTICIPATION-PAPER PRESENTATIONS

20th Conference of the International Federation of Operational Research Societies – IFORS (Managing an Assemble-to-Order System with After Sales Market for Components), Barcelona, Spain, July 13-18, 2014
POMS Annual Meeting (An Assemble to Order System with Product and Components Demand with Lost Sales), Atlanta Georgia, May 9-12, 2014
INFORMS Annual Meeting (Optimal Control of an Inventory System with Stochastic Leadtimes), Minneapolis Minnesota, October 6-9, 2013
POMS Annual Meeting (Managing an Integrated Production-Inventory System with Multiple Production Facilities), Denver Colorado, May 3-6, 2013
INFORMS Annual Meeting (Optimal Control of Production-Inventory Systems with Multiple Facilities), Phoenix Arizona, October 14-17, 2012
International Annual Conference of the German OR Society (A Production-Inventory System with both Patient and Impatient Demand Classes), Hanover Germany, September 4-7, 2012
23rd Production and Operations Management Society Annual Conference (Managing an Integrated Production Inventory System with information on the Production and Demand Status), Chicago Illinois, April 20 – 23, 2012
22nd Production and Operations Management Society Annual Conference (A Production-Inventory System with both Patient and Impatient Demand Classes), Reno Nevada, April 29 – May 02, 2011
International Annual Conference of the German OR Society, (Managing a Production System with Information on the Production and Demand Status and Multiple Non-Unitary Demand Classes), Munich, Germany, September 1-3, 2010
2010, 11th Workshop on Optimal Control, Dynamic Games and Nonlinear Dynamics (Optimal Control of a Production-Inventory System with both Backorders and Lost Sales), University of Amsterdam, May 31 – June 2, 2010
2008, 15th International Annual EUROMA Conference, (Production and Inventory Control of a System with Multiple Sources of Supply), University of Groningen, the Netherlands, June 15 – 18, 2008

2008, Production and Operations Management Society (POMS) Conference (Optimal Control of a Production-Inventory System with both Backorders and Lost Sales), San Diego, CA, May 9 – 12, 2008

2007 National INFORMS Conference (Optimal Control of a Production-Inventory System with both Backorders and Lost Sales), Seattle, WA, Nov. 3 – 7, 2007

2007, Production and Operations Management Society (POMS) Conference (Optimal Control of an Assembly Systems with Multiple Stages and Multiple Demand Classes), Dallas, TX, May 4 – 7, 2007

International Conference on Service Systems and Service Management (ICSSSM’06), (Optimal Control of Inventory Systems with Multiple Supply Sources”), University of Technology of Troyes-France, October 25 – 27, 2006

2005 National INFORMS Conference (Optimal Control of Inventory Systems with Multiple Supply Sources), San Francisco, CA, Nov. 13-16, 2005

Operations Research 2005, International Scientific Annual Conference (Optimal Production and Inventory Control of Assemble-to-Order Systems with Multiple Customer Classes), Bremen, Germany, September 7-9, 2005

2005, Production and Operations Management Society (POMS) Conference (Optimal Control of an Assemble-to-order Systems), Chicago, IL, April 29-May 3, 2005


2004, 2nd World Conference and 15th Annual POMS Conference (Demand Allocation in Multiple-Product, Multiple-Facility Make-To-Stock Production Systems), Cancun, Mexico, April 30- May3, 2004

OR2003 - SYMPOSIUM ON OPERATIONS RESEARCH (Assignment and Loading of Liquid Chemicals to Ship Compartments), University of Heidelberg, Germany, September 3 – 5, 2003

Eighth Viennese Workshop on Optimal Control, Dynamic Games and Nonlinear Dynamics: Theory and Applications in Economics and OR/MS Vienna (Dynamic Loading of Liquid Chemicals to Ship Compartments), Austria, May 14-16, 2003

OR2002 - International Conference on Operations Research (Demand Allocation in Multiple-Product, Multiple-Facility Make-To-Stock Production Systems), University of Klagenfurt, Austria, September 2 - 5, 2002

2001 National INFORMS meeting (Transporting and Managing Inventories of Liquid Chemical products Using Oceangoing Vessels” and Demand Allocation in Multiple-Product, Multiple-Facility Make-To-Stock Production Systems), Miami Beach, Florida, Nov. 4-7, 2001
2001 International Conference, Academy of Business and Administrative Sciences, Brussels (Demand Allocation in Multiple-Product, Multiple-Facility Make-To-Stock Production Systems), Belgium, July 23-25, 2001


17th European Conference on Operational Research (Assignment and Loading of Liquid Chemicals to Oceangoing Vessels), Budapest, Hungary, July 16-19, 2000

2000 International Conference, Academy of Business and Administrative Sciences (Optimal Lead-Time Planning in Serial Production Systems with Earliness and Tardiness Costs), Prague, Czech Republic, July 10-12, 2000

National INFORMS Meeting ("Assignment and Loading of Liquid Chemicals to Oceangoing Vessels" and "The Use of Flowlines to Simplify Routing Complexity in Two-Stage Flowshops"), Salt Lake City, UT, May 7-10, 2000

11th Annual Meeting of the Production Operations Management Society (Scheduling of a Multi-Item-Single-Facility System with Time Varying Demands and Inventory and Backorder Costs), San Antonio, TX, April 1-4, 2000

National INFORMS Meeting (Scheduling of a Multi-Item-Single-Facility System with Time Varying Demands and Inventory and Backorder Costs), Philadelphia, PA, November 7-10, 1999

9th International Conference on Flexible Automation and Intelligent Manufacturing, Tilburg University, The Netherlands, (A Production Planning Model for an Unreliable Production Facility: Case of Finite Horizon and Single Demand) June 23-25, 1999

National INFORMS Meeting, (A Production Planning Model for an Unreliable Production Facility: Case of Finite Horizon and Single Demand), Cincinnati, OH, May 2-5, 1999


National INFORMS Meeting (Optimal and Near Optimal Control of a Two-Part-Type Stochastic Manufacturing System with Dynamic Setups), Dallas, TX, October 26-29, 1997

National INFORMS Meeting (Multi-Period Production Planning and Control with Demand and Cost Fluctuations), San Diego, CA, May 4-7, 1997

Production and Operations Management Society, Eighth Annual Meeting (Scheduling of an Unreliable Manufacturing System with Nonresumable Setup Changes), Miami, FL, April 12-15, 1997
National INFORMS Meeting (The Common Cycle Economic Lot Scheduling Problem with Backorders: Benefits of a Controllable Production Rate), Atlanta, GA, November 3-6, 1996

5th Industrial Engineering Research Conference (Production and Setup Control in a Stochastic Manufacturing System), Minneapolis, MN, May 18-21, 1996

National INFORMS Meeting (Production Scheduling in a Price Competition) New Orleans, LO, October 29 – November 1, 1995

National INFORMS Meeting (Optimal Production and Setup Control of a Dynamic Two-Product Manufacturing System: Analytical Solution), Los Angeles, CA, April 23-26, 1995

National ORSA/TIMS Meeting (Optimal Production Control of a Dynamic Two-Product Manufacturing System with Setup Costs and Setup Times), Boston, MA, April 24-27, 1994
Long Gao
221 Anderson Graduate School of Management, University of California, Riverside, CA 92521

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Email: long.gao@ucr.edu
URL: longgao.wordpress.com

Research Interests
Revenue Management, Inventory Control, Supply Risk, Contracting, Transportation
Mechanism Design, Dynamic Programming

Education
• M.S. in Engineering Physics, Tsinghua University, China 2000-2002
• B.S. in Engineering Physics, Tsinghua University, China 1996-2000

Academic Appointments
• Assistant Professor, AGSM, UC, Riverside July ’08-Present
• Assistant Professor, University of Dayton August ’07- May ’08
• Visiting Scholar, The University of Sydney June ’11
• Visiting Scholar, Tsinghua University June ’08
• Research Assistant, Penn State University Spring ’05- Summer ’07

Journal Publications

Other Publications

Invited Seminars
10. "Optimal Inventory Control with Retail Pre-packs," Purdue University, Feb. 15, 2007.

Conferences and Presentations


Teaching Experience
- MGT 201: Quantitative Analysis (MBA core), UCR Winter '09, '10, '11, '12, '14
- MGT 207: Operations Management (MBA core), UCR, Spring '12, '14
- MGT 226: Simulation for Business (MBA elective), UCR Spring, Fall '03, Fall '09, '11, '12, '13, Spring '14
- MGT 291: Directed Studies (MBA elective), UCR Winter, Spring '10, Spring '11
- BUS 125: Simulation for Business, UCR Spring Fall '10
- DSC 210: Statistics for Business I, University of Dayton Fall '07, Spring '08
- Introduction to Statistics for Business, Spring '05
  Demand Fulfillment (MBA), TA Summer '05
  Introduction to Statistics for Business, TA Spring '06
  Spring '07, Fall '08

Honors & Grants
- SoBA’s favorite Professor list, Highlander Guide, UCR, 2014
- Academic Senate Regents Award, UCR, 2012
- Finalist, Dilwyn Paiste, III Teaching Award, 2005
- Smeal Dissertation Research Award, 2005
- Smeal Graduate Fellowship, Pennsylvania State University, 2002
- Guanghua Scholarship, Tsinghua University, 2001
- Academic Excellence Scholarship, Tsinghua University, 1998, 1999

Professional Activities
- Senior Editor, Survey in Operations Research and Management Science, 2013–Now
- Member, Graduate Program Committee, AGSM, UCR, 2013–Present
- Member, Recruiting Committee, AGSM, UCR, 2012, 2014
- Member, Seminar Committee, AGSM, UCR, 2012–Present
- Chair, Scholarship Committee, AGSM, UCR, 2006, 2011
- Member, Doctoral Committee, Statistics, UCR, 2012
- Vice president, Penn State University INFORMS student chapter, 2005–2007
- Member, The Institute of Operations Research and Management Sciences (INFORMS)
- Member, Manufacturing and Service Operations Management Society (M&SOM)
- Member, Production and Operations Management Society (POMS)
- Member, Applied Probability Society (APS)

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Adem Orsdemir

University of California Riverside
School of Business Administration
Anderson Hall
Riverside, CA 92521

Curriculum Vitus, January, 2015
919.928.3353
E-mail: orsdemiradem@gmail.com

RESEARCH INTERESTS

- Sustainable Operations Management
- Operations/Marketing Interface

EDUCATION

- PhD Business Administration, 2014
  Kenan-Flagler Business School: Operations Area
  University of North Carolina at Chapel Hill
- MS in Statistics and Operations Research, 2014
  University of Rochester
- MS in Electrical and Computer Engineering, 2009
  University of Rochester
- BS in Electrical and Electronics Engineering, 2006
  Bilkent University, Turkey

PROFESSIONAL EXPERIENCE

Assistant Professor, 2014-Present
University of California Riverside
- Research Assistant, 2009-2014
  University of North Carolina at Chapel Hill
- Research Assistant, 2006-2009
  University of Rochester
- Summer Intern, 2005
  Ohio State University

RESEARCH

*Presented at MSOM Sustainable Operations Special Interest Group 2012


Orsdemir, A.; B. Hu, V. Deshpande. Responsible Sourcing via Vertical Integration. (Working Paper)


OTHER RESEARCH (ENGINEERING)


Adem Orsdemir


Seminars & Talks


Teaching Experience

Instructor, University of North Carolina (Fall 2013)
Busi 403 Operations Management
Class Enrollment: 38
Overall Rating: 4.2/5

Teaching Assistant, University of North Carolina (Fall 2011, Fall 2012)
For Course: Busi 403, Busi 410. Conducted recitations, held office hours, designed and graded problem sets.

Teaching Assistant, University of Rochester (Fall 2006, Spring 2007)
For Course: Signals and Systems, Circuits and Signals. Conducted recitations, held office hours, designed and graded problem sets and laboratory projects.

Service

Reviewer: Decision Sciences, Naval Research Logistics

Honors & Awards

INFORMS 2013 Future Academician Colloquium Participant
Awarded full-tuitionship for graduate studies by University of Rochester
Listed as high honor student at Bilkent University
Ranked 369th at University Entrance Examinations in Turkey

Personal Info Activities

Languages: Turkish (native), English (fluent), German (beginner)

Student Reviewer: IEEE ICIP, IEEE ICASSP, EUSIPCO
Clubs: President of Turkish Students Association in University of Rochester
Elodie Adida (Goodman)

School of Business Administration
University of California at Riverside
Anderson Hall Room 225
900 University Ave., Riverside, CA 92521

Office: (951) 827-7882
Cell: (617) 959-1419
http://faculty.ucr.edu/~elodiep/
elodie.goodman@ucr.edu

Professional Appointments
2012 – present University of California at Riverside, School of Business Administration, Riverside CA
Assistant Professor of Operations and Supply Chain Management

2006 – 2012 University of Illinois at Chicago, Mechanical and Industrial Engineering, Chicago IL
Assistant Professor of Industrial Engineering

Education
Ph.D. in Operations Research
Dissertation: Dynamic Pricing and Inventory Control: Uncertainty and Competition
Advisor: Dr. Georgia Perakis

1999 – 2001 Ecole Centrale Paris, France
MS in Engineering (Diplôme d'Ingénieur)

Publications
Published Peer-Reviewed Journal Articles


Submitted Peer-Reviewed Journal Articles


Working Papers


Other – Refereed Conference Proceedings


Adida, E., N. Bakshi, V. DeMiguel. 2013. Supply Chain Intermediation when Retailers Lead. Proceedings of MSOM Supply Chain Special Interest Group (SIG), INISTAC.


Adida, E., V. DeMiguel. 2009. Efficiency and Coordination in a Supply Chain with Competing Manufacturers and Retailers. Proceedings of MSOM, MIT.

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Other – Book Publication

Invited Talks
University College London, Management Science and Innovation, 2012, London UK.
University of California - Riverside, Anderson Graduate School of Management, 2012, Riverside CA.
San José State University, College of Business, 2012, San José CA.
Illinois Institute of Technology, Stuart School of Business, 2012, Chicago IL.
Illinois Institute of Technology, Stuart School of Business, 2011, Chicago IL.
Massachusetts Institute of Technology, Sloan School of Management, 2011, Cambridge MA.
Northwestern University, Industrial Engineering and Management Sciences, 2010, Evanston IL.
University of California at Irvine, The Paul Merage School of Business, 2009, Irvine CA.
University of Chicago, Graduate School of Business, 2007, Chicago IL.
Purdue University, Biomedical Engineering, 2007, West Lafayette IN.
Northwestern University, Kellogg School of Management and Industrial Engineering and Management Sciences, 2007, Evanston IL.
University of Illinois at Chicago, Mechanical and Industrial Engineering, 2006, Chicago IL.
University of Washington in St. Louis, Olin School of Business, 2006, St. Louis MO.
University of Texas at Dallas, School of Management, 2006, Dallas TX.
IBM Research T.J. Watson Labs, 2004, Hawthorne NY.

Conference Presentations
"Bundled Payments vs. Fee-for-Service: Impact of Medicare's Payment Scheme on Treatment Level, Participation and Social Welfare"
INFORMS Healthcare Conference, Nashville TN, July 2015
MSOM Annual Conference, University of Washington Seattle, June 2014.

"Competition and Coordination in a Two-Channel Supply Chain."
 IFORS Conference, Barcelona, Spain, July 2014.
POMS Annual Conference, Atlanta GA, May 2014.
INFORMS Annual Meeting, Minneapolis MN, October 2013.
INFORMS Annual Meeting, Phoenix AZ, October 2012.

"Managing Long-Term Supplier Relationship under Changing Productivity."
POMS Annual Conference, Atlanta GA, May 2014.
INFORMS Annual Meeting, Minneapolis MN, October 2013.

"Supply Chain Intermediation When Retailers Load."
INFORMS Annual Conference, Supply Chain Management SIG, INSEAD, France, July 2013.
INFORMS Annual Meeting, Phoenix AZ, October 2012.
MSOM Annual Conference, Columbia University, June 2012.
POMS Annual Conference, Chicago IL, April 2012.

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“Operational Issues and Network Effects in Vaccine Markets.”
INFORMS Annual Meeting, Phoenix AZ, October 2012.
MSOM Annual Conference, Columbia University, June 2012.
POMS Annual Conference, Chicago IL, April 2012.

“Consignment Contracts with Retail Competition.”
INFORMS Annual Conference, Chicago IL, April 2012.
POMS Annual Meeting, Charlotte NC, November 2011.

“Public Policy Implications for a Vaccine Supply Chain: Operational Issues and Negative Network Effects.”
INFORMS Annual Meeting, Charlotte NC, November 2011.

“Supply Chain Intermediation: A Three-Tier Competition Model.”
INFORMS Annual Meeting, Charlotte NC, November 2011.

“Vaccine Market: Operational Issues and Externality Effect.”
INFORMS Annual Meeting, Charlotte NC, November 2011.
INFORMS Healthcare Conference, Montreal, Canada, June 2011.

“An Investigation in Real-Time Bus Holding Policy.”
Hong Kong Society for Transportation Studies Conference, Hong Kong, December 2010.

“Economics of Vaccine Coverage and Public Policy Implications.”
INFORMS Annual Meeting, Austin TX, November 2010.

“Integrating Exposure and Epidemiological Models to Select Non-Pharmaceutical Interventions for Influenza”
Joint Conference of International Society of Exposure Science & International Society for Environmental Epidemiology (poster), Seoul, Korea, August 2010.

“Hospital stockpiling for disaster preparedness.”
IIIE Annual Conference, Cancun, Mexico, June 2010.

“Efficiency and Coordination in a Supply Chain with Competing Manufacturers and Retailers.”
Behavioral and Quantitative Game Theory Conference, Newport Beach CA, May 2010.
International Symposium on Mathematical Programming, Chicago IL, August 2009.
MSOM Annual Conference, MIT, June 2009.
INFORMS Revenue Management and Pricing Conference, Northwestern University, June 2009.
Optimization Applications in Engineering and Applied Sciences Conference, UIUC, March 2009.

“Hospital Stockpiling for Influenza Pandemics with Pre-set Response Levels.”
IEEE Conference on Service Operations, Logistics and Informatics (SOLI), Chicago IL, July 2009.

“Inventory Stockpiling and Sharing for Disaster Preparedness.”

“A Game Theoretical Approach for Hospital Stockpile in Preparation for Pandemics.”

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"The Strategic Role of Capacity in a Joint Inventory Management and Pricing Game."
INFORMS Midwest Regional Conference, Northwestern University, August 2007.

"Dynamic Pricing and Inventory Control under Uncertainty."
EURO XXI, Prague, Czech Republic, July 2007.
INFORMS Annual Meeting, Pittsburgh PA, November 2006.

"Dynamic Pricing and Inventory Control: Uncertainty and Competition through Robust Optimization and Quasi-Variational Inequalities."
International Symposium on Mathematical Programming, Rio de Janeiro, Brazil, August 2006.

"Dynamic Pricing and Inventory Control with no Backorders: Uncertainty and Competition."
IFORS Triennial, Honolulu HI, July 2005.

"A Robust, Nonlinear Fluid Model of Dynamic Pricing and Inventory Control with no Backorder."
INFORMS Annual Meeting, Atlanta GA, October 2003.

Awards and Distinctions

Research awards
UCR Research and Travel Award: $1700, 2014–15
UCR Academic Senate Regents Fellowship: $4400, 2013–14
UCR Research and Travel Award: $1650, 2013–14
First author of the IEEE Transactions article Hospital Stockpiling for Disaster Planning selected to be highlighted in the IEEE Magazine of May 2011.
UIC Faculty Scholarship Support award: $1,000, 2012
UIC Faculty Scholarship Support award: $1,000, 2011
UIC Faculty Scholarship Support award: $1,000, 2010
UIC Faculty Scholarship Support award: $1,000, 2009
UIC Women in Science and Engineering Research award: $6,000, 2010
UIC Women in Science and Engineering Research award: $1,000, 2009
UIC Women in Science and Engineering Research award: $5,000, 2008

Service awards
IEEE Regional Outstanding Faculty Advisor Award, 2012
Outstanding reviewer for the journal IEEE Transactions on Automatic Control, 2007

Other
Participant, INFORMS Doctoral Colloquium, Pittsburgh PA, 2006
Georges Besse Foundation Fellowship, 2001
Jean Gaillard Memorial Fellowship, 2001
Hoschot Prize, 2000–01

Teaching
Decision-Making Under Uncertainty MGT 221, UCR, Spring 2013, Spring 2014, Fall 2014
Elective MBA course. Introduces computer-based models for business decision-making under

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Quantitative Analysis MGT 201, UCR, Winter 2013, Fall 2014, Winter 2015
Core MBA / Master of Finance course. Introduces statistics for management. Introduces fundamental statistical tools for managerial decision-making. Basics of data analysis, probability, sampling theory, estimation, hypothesis testing, regression analysis. Enrollment: 1 or 2 sections of 50-60.

Operations Research IE 471, UIC, Fall 2004, Fall 2008, Fall 2009, Fall 2010, Fall 2011
Undergraduate and Masters course. Introduction to operations research, formulation of linear programming problems, simplex methods, duality theory, sensitivity analysis, network models, and integer linear programming formulations. Enrollment: 15-30.

Probability and Statistics for Engineers IE 342, UIC, Fall 2006, Spring 2007, Summer 2010, Fall 2010, Spring 2012

Financial Engineering IE 201, UIC, Fall 2007, Spring 2008, Fall 2009, Spring 2009
Undergraduate course. Principles and techniques of economic analysis in engineering and management science. Time value of money, interest rates, present worth analysis, rate of return analysis. Enrollment: 100.

Nonlinear Optimization IE 576, UIC, Fall 2009, Fall 2011
Masters and PhD course. Convex analysis, linear search techniques, unconstrained and constrained optimization, optimality conditions, duality, convex and non-convex optimization, interior point methods, and real-world applications. Enrollment: 14-17.

Professional Service
Panel participation
Invited panelist at INFORMS 2014 Doctoral Student Colloquium, 2014

Organization of Sponsored/Invited Sessions in International Conferences
Session Chair, INFORMS, 2014
Session Chair, IFORS, 2014
Session Chair, INFORMS, 2013
Session Chair, INFORMS, 2009
Session Chair, Optima, 2009
Session Chair, IFORS, 2008
Session Chair, EURO, 2007
Session Chair, ICCOPT/MOPTA, 2007
Session Chair, INFORMS, 2007

Judging service for paper competitions
Judge of POMS College of Healthcare Operations Management Best Paper Competition, 2012
Judge of MSOM Student Paper Competition, 2009

Refereeing service for conferences
Reviewer for ISB-POM Workshop paper submissions, 2014
Reviewer for MSOM Conference paper submissions, 2014
Reviewer for MSOM Conference paper submissions, 2012
Reviewer for MSOM Conference paper submissions, 2011

Refereeing service for grant proposals
Panel Reviewer for National Science Foundation, Service Enterprise Systems program, 2011
Panel Reviewer for National Science Foundation, Service Enterprise Systems program, 2010

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Panel Reviewer for National Science Foundation, Computational Mathematics program, 2010

Refereeing service for journals

Other
Affiliated Faculty Member of the Transportation Center at Northwestern University, 2010 – present. Faculty Advisor, UIC Student Chapter of the Institute of Industrial Engineers, 2009–12.

Academic Service
UCR SoBA School Research Committee member, 2014–present
UCR SoBA Graduate Academic Committee member, 2014–present
UCR SoBA Management Faculty Search Committee member, 2014–present
UCR SoBA Interdepartmental Graduate Program in Management Faculty member, 2012 – present
UCR SoBA School Research Committee Chair, 2014
UCR SoBA Undergraduate Academic Committee member, 2012–14
UCR SoBA Operations and Supply Chain Management Faculty Search Committee member, 2013–14
UCR SoBA Finance and Marketing Endowed Chairs Search Committee member, 2013–14
UIC Honors College Fellow, 2010–12
UIC Honors Students Faculty Advisor, 2010–12
UIC MIE Department Advisory Committee member 2010–11
UIC MIE Department IE Recruiting Committee member, 2009–10, 2011–12
UIC MIE Department Outreach and Publicity Committee member, 2009–11
UIC MIE Department Faculty Secretary, 2006–08
UIC IE Seminar coordinator, 2000–09
UIC IE thesis committee member of 9 Masters/PhD students, 2006–12
UIC IE undergraduate recruiting committee, 2007–12

Graduate student advising
MBA Thesis Committee member for Kevin Straight, UCR, 2013–14
PhD Thesis committee Chair for Amy David, UIC, 2010–12 (2014 placement: Purdue University, Krannert School of Management)
PhD Thesis committee Chair for Nantaporn Ratiosoontorn, UIC, 2009–12 (placement: UIC, MIE)
PhD co-advisor, Qin Chen, UIC, 2009–12
Undergraduate advisor for 4 undergraduate students, UIC, 2007–09
Masters advisor, Pradhnya Joshi, UIC, 2007–08

Memberships
Institute for Operations Research and the Management Sciences (INFORMS)
Health Applications Society
MSOM Society
Women In ORMS Forum

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