EXECUTIVE COMMITTEE COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES

REPORT TO THE RIVERSIDE DIVISION
MAY 27, 2014

To be Adopted:

Proposed Changes to Mathematics

Present:

University Requirements
See Undergraduate Studies section.

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

Major Requirements for the Bachelor of Arts and Bachelor of Science in Mathematics

To fulfill the Natural Sciences requirement, the Department of Mathematics requires the following:

1. One of the year sequences
   a) BIOL 002, BIOL 003, BIOL 005C
   b) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC,
   c) PHYS 002A, PHYS 002B, PHYS 002C or PHYS 040A, PHYS 040B, PHYS 040C

2. Either one course in the physical sciences listed above if (a) above is completed or one course in the biological sciences if (b) or (c) above is completed

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

For the Bachelor of Arts

1. Lower-division requirements: MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046

2. Four (4) units of either CS 010 or one upper-division course in Statistics

3. A minimum of 36 units of upper-division

Proposed:

University Requirements
See Undergraduate Studies section.

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

Major Requirements for the Bachelor of Arts and Bachelor of Science in Mathematics

To fulfill the Natural Sciences requirement, the Department of Mathematics requires the following:

1. One of the year sequences
   a) BIOL 002, BIOL 003, BIOL 005C
   b) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC,
   c) PHYS 002A, PHYS 002B, PHYS 002C or PHYS 040A, PHYS 040B, PHYS 040C

2. Either one course in the physical sciences listed above if (a) above is completed or one course in the biological sciences if (b) or (c) above is completed

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

For the Bachelor of Arts

1. Lower-division requirements: MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046

2. Four (4) units of either CS 010 or one upper-division course in Statistics
mathematics, excluding courses in the MATH 190–199 series

For the Bachelor of Science

Lower-division requirements for all programs are MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046, CS 010 (CS 012 is recommended).

1. Pure Mathematics program (56 units)

a) Thirty-six (36) units of upper-division mathematics to include at least 24 units from MATH 131, MATH 132, MATH 145A, MATH 145B, MATH 151A, MATH 151B, MATH 151C, MATH 171, MATH 172

b) At least three courses from (a) above must be from MATH 145A, MATH 145B, MATH 151A, MATH 151B, MATH 151C

c) Courses in the MATH 190–199 series are excluded

d) Twenty (20) additional units of upper-division mathematics, upper-division computer science, or other related courses approved by the undergraduate advisor (For students who wish to pursue graduate work, courses in complex variables, differential equations, and probability may be particularly useful.)

2. Applied Mathematics programs

MATH 113 or MATH 131, MATH 132, MATH 146A, MATH 146B, MATH 146C and the courses in one of the following options:

3. A minimum of 36 units of upper-division mathematics, excluding courses in the MATH 190–199 series

For the Bachelor of Science

Lower-division requirements for all programs are MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046, CS 010 (CS 012 is recommended).

1. Pure Mathematics program (56 units)

a) Thirty-six (36) units of upper-division mathematics to include at least 24 units from MATH 131, MATH 132, MATH 145A, MATH 145B, MATH 151A, MATH 151B, MATH 151C, MATH 171, MATH 172

b) At least three courses from (a) above must be from MATH 145A, MATH 145B, MATH 151A, MATH 151B, MATH 151C

c) Courses in the MATH 190–199 series are excluded

d) Twenty (20) additional units of upper-division mathematics, upper-division computer science, or other related courses approved by the undergraduate advisor (For students who wish to pursue graduate work, courses in complex variables, differential equations, and probability may be particularly useful.)

2. Applied Mathematics programs

MATH 131, MATH 135A and MATH 135B, or MATH 149A and MATH 149B, MATH 146A, MATH 146B, MATH 146C and the courses in one of the following options:

a) General Applied Mathematics

(1) MATH 150A or MATH 151A

(2) MATH 168

(3) Students will select 16 units from MATH 120, MATH 121, MATH 126, MATH 141,
a) Biology option
   (1) BIOL 005A, BIOL 05LA, BIOL 005B, BIOL 005C
   (2) MATH 149A
   (3) Three courses from MATH 120, MATH 121, MATH 135A, MATH 135B, MATH 149B, MATH 149C
   (4) BIOL 102, BIOL 105, BIOL 108, BIOL 117
   (5) Four (4) additional units of upper-division biology

b) Chemistry option
   (1) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC
   (2) Either PHYS 040A, PHYS 040B, PHYS 040C (preferred); or PHYS 002A, PHYS 002B, PHYS 002C
   (3) Four courses from MATH 120, MATH 135A, MATH 135B, MATH 149A, MATH 149B, MATH 149C, MATH 165A, MATH 165B
   (4) CHEM 110A, CHEM 110B, CHEM 111, CHEM 113
   (5) Four (4) additional units of upper-division chemistry

c) Economics option
   (1) MATH 120, MATH 121, MATH 149A, MATH 149B, MATH 149C
   (2) Five upper-division economics courses (at least 20 units) to consist of ECON 102A and four courses to be

   MATH 147, MATH 148, MATH 149A, MATH 149B, MATH 149C, MATH 150B, MATH 151B, MATH 165A, MATH 165B.

d) Economics option
   (1) MATH 120, MATH 121, MATH 149A, MATH 149B, MATH 149C
   (2) Five upper-division economics courses (at least 20 units) to consist of ECON 102A and four courses to be chosen from ECON 102B, ECON 103A, ECON 103B,
chosen from ECON 102B, ECON 103A, ECON 103B, ECON 107, ECON 108, ECON 110, ECON 111, ECON 134/BUS 106, ECON 135, ECON 143A/ENSC 143A, ECON 143B/ENSC 143B, ECON 143C/ENSC 143C, ECON 156, ECON 206

d) Environmental Sciences option
   (1) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC
   (2) ECON 006/ENSC 006
   (3) GEO 001 is recommended
   (4) MATH 149A
   (5) Three courses from MATH 120, MATH 121, MATH 135A, MATH 135B, MATH 149B, MATH 149C, CS 177, STAT 155
   (6) ENSC 100/SWSC 100, ENSC 101, ENSC 102
   (7) Eight (8) additional units of upper-division environmental sciences

e) Physics option
   (1) MATH 135A, MATH 165A, MATH 165B
   (2) Either MATH 120 or MATH 171
   (3) PHYS 130A, PHYS 130B
   (4) Either PHYS 135A, PHYS 135B, PHYS 136 or PHYS 156A, PHYS 156B

f) Statistics option
   (1) MATH 120, MATH 149A, MATH 149B, MATH 149C
   (2) Either STAT 130 or STAT 146
   (3) STAT 161, STAT 170A, STAT 170B, STAT 171

3. Computational Mathematics program

3. Computational Mathematics program
Major Requirements for the Bachelor of Science in Mathematics for Secondary School Teachers

1. Lower-division Mathematics requirements (24 units)
   MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046

2. Upper-division Mathematics requirements (36 units)
   a) MATH 131, MATH 133, MATH 140, MATH 144, MATH 153
   b. MATH 150A or MATH 151A
   c. Three courses from: MATH 132, MATH 136, MATH 137, MATH 138A, MATH 145A, MATH 145B, MATH 149A, MATH 149B, MATH 149C, MATH 150B, MATH 151B, MATH 151C, MATH 171, MATH 172

3. Additional Mathematics and related disciplines requirements (12 units)
   a) CS 010
1. **A justification for adding Math 31 as a requirement for all of the math majors.**

- Courses like Math 31 are taught on many UC campuses. The title usually given to such courses is Applied Linear Algebra.
- Many Community Colleges have a linear algebra course, which by State rules is necessarily lower division. These courses will now articulate with Math 31, which will greatly facilitate transfer from Community Colleges to UCR.
- Replacing Math 113 by Math 31 means that Computer Science students can take Math 31 in their first year and use linear algebra much earlier in their program.
- With Math 31 students in the Applied Math program can take courses like Math 146ABC earlier in their program.
- Flexibility in scheduling is enhanced by the creation Math 31. Students coming from Math 113.
9B can now choose from Math 10A, Math 11, Math 31 and Math 46.

- The addition of Math 31 will prepare students for the theoretical parts of Math 131, and reduce the number of repeats.

  (This change was approved already for all majors except the BA, since Math 31 is now a prerequisite of Math 131)

2. **A justification for deleting Math 132 as a requirement for all of the applied math majors.**

   Applied Math majors would be required to take Math 31 + Math 131 instead of Math 131 + Math 132. Math 31 is a more appropriate course for applied math majors, and has the advantage that it can be taken sooner.

3. **A total unit count (including breadth requirements) for all of the math majors.**

   B.A. program requires 148-174 (current) and 153-179 (proposed).

   Pure Math requires 161-172 (no change)

   Applied Math, BIOL requires 162-169 (current) units and 158-165 (proposed)

   Applied Math, CHEM requires 176-186 (current) and 172-182 (proposed)

   Applied Math, ECON requires 165-181 (current) and 161-177 (proposed)

   Applied Math, ENSC 168-176 (current) and 162-172 (proposed)

   Applied Math, PHYS requires 157-172 (current) and 153-168 (proposed)

   Applied Math, STAT requires 161-172 (current) and 157-168 (proposed)

   Computational Math requires 173-184 (current) and 169-180 (proposed)

   Secondary School Teachers requires 178-192 (current) and 183-197 (proposed)

   Note: It was recently approved that Math 31 is a prerequisite for Math 131. Since all our programs except the BA require Math 131, the 5 units for Math 31 have been effectively already added. For the applied math programs, the removal of Math 132 means a **decrease** of 4 units. We're adding 5 units to all except applied math.

**APPROVALS:**

Approved by the faculty of the Department of Mathematics: 12/19/2012

Approved by the faculty of the College of Natural and Agricultural Sciences: 02/25/2014

Approved by the Executive Committee of the College of Natural and Agricultural Sciences: 03/26/2014