To be adopted:
Proposed changes to the B.S. degree in Chemistry

**PRESENT:**

**Major Requirements**
The major requirements for the B.A. and the B.S. degree in Chemistry are as follows:

**Bachelor of Arts**

1. Lower-division requirements (51-53 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
   - b) MATH 008B or 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 (38 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 112A, CHEM 112B, CHEM 112C, CHEM 113, CHEM 125, CHEM 150A, CHEM 191, and either CHEM 111 or CHEM 166
     - b) Ten (10) additional upper-division units in Chemistry if the year of organic chemistry is taken at a community college

**Bachelor of Science**

1. Lower-division requirements (64-66 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

**PROPOSED:**

**Major Requirements**
The major requirements for the B.A. and the B.S. degree in Chemistry are as follows:

**Bachelor of Arts**

1. Lower-division requirements (51-53 units)
   - a) (no change)
   - b) (no change)
   - c) (no change)

2. Upper-division requirements (38-48 units)
   - A minimum grade of “C-” for any upper-division course used to fulfill the requirements for the B.A. degree.
     - a) (no change)
     - b) (no change)

**Bachelor of Science**

1. Lower-division requirements (59-60 units)
   - a) (no change)
2. Upper-division requirements (50 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 112A, CHEM 112B, CHEM 112C, CHEM 113, CHEM 125, CHEM 150A, CHEM 191
   b) Two laboratory courses from CHEM 140, CHEM 166, BCH 102
   c) One course from BCH 110A, CHEM 135/ENSC 135/ENTX 135, CHEM 136/ENSC 136/ENTX 136, SWSC 136, CHEM 150B

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

1. Lower-division requirements (64-66 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
   b) MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046
   c) PHYS 040A, PHYS 040B, PHYS 040C, PHYS 040D

2. Upper-division requirements (74 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 112A, CHEM 112B, CHEM 112C, CHEM 113, CHEM 140, CHEM 150A, CHEM 150B, CHEM 191
   b) Twenty-four (24) units of upper-division

2. Upper-division requirements (53-54 units)
A minimum grade of “C-” for any upper-division course used to fulfill the requirements for the B.S. degree.
   a) (no change)
   b) Two laboratory courses from CHEM 114 or CHEM140, CHEM 166, BCH 102
   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 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 (67-69 units)
   a) (no change)
   b) (no change)
   c) PHYS 041A, PHYS 041B, PHYS41C or PHYS 040A, PHYS 040B, PHYS 040C, and PHYS 041C

2. Upper-division requirements (72 units)
A minimum grade of “C-” for any upper-division course used to fulfill the requirements for the Chemical Physics option.
   a) (no change)
   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.

1. Lower-division requirements (72–73 units)
   a) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM01LB, CHEM 01LC (or CHEM 01HA and CHEM 1HLA, CHEM 01HB and CHEM 1HLC), CHEM 005
   b) MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046
   c) PHYS 040A, PHYS 040B, PHYS 040C, PHYS 040D
   d) BIOL 005A, BIOL 05LA, BIOL 005B, BIOL 005C

2. Upper-division requirements (66–67 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 112A, CHEM 112B, CHEM 112C, 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) Two additional courses from CHEM 150B, CHEM 197, CHEM 199, ENSC 100, ENSC 101, ENSC 102, ENSC 104/SWSC 104, ENSC 140/SWSC 140, ENSC 142, ENSC 155, ENSC 163, ENTX 101, GEO 132, GEO 137, 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

(no change)
Chemistry faculty, their Chemistry advisor, or check: or.ucr.edu/undergradresearch/

**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.

<table>
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<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>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)</td>
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<tr>
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<th>Sophomore Year</th>
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<th>Winter</th>
<th>Spring</th>
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<tr>
<td>PHYS 040C, PHYS 040D</td>
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<td>CHEM 005</td>
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<tr>
<td>Electives</td>
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<td><strong>Total Units</strong></td>
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<th>Spring</th>
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<tbody>
<tr>
<td>CHEM 110A, CHEM 110B, CHEM 113</td>
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<td>CHEM 150A, CHEM 150B</td>
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Rationale for Course Changes

1. Physics is eliminating PHYS 40D which was previously a requirement for the BS degree. As a result we have removed this course from the BS and BS – Environmental Option. For the BS – Chemical Physics Option, we are substituting the new, 8 credit course PHYS41C for PHYS40D. Alternatively, students can choose the 24 unit, 3 course sequence PHYS41A,B,C. These choices were made in consultation with Physics chair Harry Tom. The units of additional upper division physics or math coursework required by the BS - Chemical Physics Option have been reduced from 24 to 21 to compensate for the increase in lower division physics units.

2. Changes made to the American Chemical Society (ACS) Guidelines for Undergraduate Chemistry programs require minor changes in our BS curriculum to maintain ACS approval.
   a. The ACS guidelines now require that students have coursework in each of the chemistry foundation areas (analytical, biochemistry, inorganic, organic, physical). Previously BCH110A was an optional course for the BS degree. We now require that students following the BS or BS-Environmental option to take either BCH100, BCH110A or CHEM143 to satisfy exposure to biochemistry coursework. Even though this is a new requirement that increases the upper division units by 4 or 3 units, the overall units required for the major has decreased slightly since PHYS40D, a 5 unit course, is no longer required. Many of our Chemistry majors do not take sufficient biology to satisfy the prerequisites for BCH 100 or BCH110A, but they will be eligible for CHEM143. This change has not been made to the BS – Chemical Physics Option, and students following this track will be eligible for ACS certification if they take either BCH100, BCH110A or CHEM143 as an elective course.
   b. The ACS guidelines now require that students have laboratory exposure to 4 of the 5 Chemistry foundation areas. By taking either CHEM166 (inorganic) or BCH102 (biochemistry), students can satisfy this requirement for ACS certification. Chem114 and Chem140 are advanced chemistry labs offered in the spring quarters of alternate years. The department has been allowing students to satisfy their advanced chemistry lab requirement using either course, and proposed changes to the curriculum codify this practice.

3. In the latest external review of our undergraduate program, the review team suggested that we more evenly distribute our upper-division courses over the fall, winter and spring quarters. In response to that suggestion, we have changed the offering of CHEM 005 from fall to the winter quarter and Chem125 from winter quarter to fall. The changes to the Sample Program reflect this change.
4. In many sections, the number of units has changed from what is listed in the present catalog copy even when no changes were made to the curriculum. Apparently the unit numbers in the catalog had not been properly updated to accommodate changes in course units.

5. We expect that the proposed changes will not impact the number of B.S. Chemistry majors. The Biochemistry courses were an option in the previous B.S. requirements, and the Biochemistry Department has been consulted about the proposed changes. We do not expect that the small increase in Biochemistry enrollments that might result from these changes will negatively impact those courses.

APPROVALS:

Approved by the faculty of the Department of Chemistry: 4/25/10
Approved by the Executive Committee of the College of Natural and Agricultural Sciences: 5/18/10
Approved by the Committee on Educational Policy: (Received 6/11/10) 6/16/10
Approved on behalf of the Division by the Executive Council: (Received 6/16/10) 7/12/10