

**EXECUTIVE COMMITTEE  
COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES**

**REPORT TO THE RIVERSIDE DIVISION  
MAY 23, 2017**

To be adopted:

Proposed Changes to Chemistry Undergraduate Program

**PRESENT:**

**Change of Major Criteria**

**General requirement:**

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 008B~~ or MATH 009A.

If student has completed between 45 and 90 units (second year students), then

- Completion of ~~MATH 008B~~ or 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

- Completion of all lower-division math requirements (~~MATH 008B~~ or MATH 009A, MATH 009B, MATH 009C, MATH 010A for B.A. program; and

**PROPOSED:**

**No change**

**No Change.**

**No Change**

No Change

- Completion of CHEM 001A, CHEM 01LA, MATH 009A.

No Change

- Completion of MATH 009A, MATH 009B, MATH 009C.
- 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

~~MATH 008B~~ or 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 112A, CHEM 112B, CHEM 112C).
- 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 008B~~ or MATH 009A, MATH 009B, MATH 009C, MATH 010A for B.A. program; and ~~MATH 008B~~ or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046 for B.S. program).
- Completion of all lower-division chemistry courses (CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 005, CHEM 112A, CHEM 112B, CHEM 112C).
- Completion of all lower-division physics requirements (PHYS 040A, PHYS 040B, PHYS 040C or PHYS 002A, PHYS

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).
- 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 all lower-division 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).
- No Change

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)

### 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 professional academic advisor at the CNAS Advising Center, 1223 Pierce Hall.

### 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 (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 12A, CHEM 12B, CHEM 12C (or CHEM 12HA, CHEM 12HB, 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,

- No Change

No Change

No Change

No Change

#### 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 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
  - a) No Change

and either CHEM 111 or CHEM 140 or CHEM 166

- b) Ten (10) additional upper-division units

### 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 12A~~, CHEM 12B, CHEM 12C (or CHEM 12HA, CHEM 12HB, 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 114 or 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 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 12A, CHEM

- b) No Change

### 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 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

- a) No Change

- b) No Change

- c) No Change

- d) No Change

### No Change

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

12B, CHEM 12C (or CHEM 12HA, CHEM 12HB, CHEM 12HC)

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 041A, PHYS 041B, PHYS 41C or PHYS 040A, PHYS 040B, PHYS 040C, and PHYS 041C

b) No Change

c) No Change

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.

2. No Change

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

a) No Change

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

b) No Change

- c) Nine (9) additional units in physical chemistry

c) No Change

### **Environmental Chemistry Option**

**No Change**

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

No Change

1. Lower-division requirements (84 units)

1. Lower-division requirement (84-85 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 12A, CHEM 12B, CHEM 12C (or CHEM 12HA, CHEM 12HB, CHEM 12HC)

- 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, BIOL 005B, BIOL 005C

b) No Change

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

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

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|---|---|
| <p>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.</p> <p>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 114 or CHEM 140, CHEM 150A, CHEM 166, CHEM 191</p> <p>b) One course from ENSC 104/SWSC 104 or GEO 137</p> <p>c) One course from BCH 100, BCH 110A or CHEM 143</p> <p>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)</p> | <p>2. No Change</p> <p>a) No Change</p> <p>b) No Change</p> <p>c) No Change</p> <p>d) No Change</p> |
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**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.

**No change.**

Freshman Year	Fall	Winter	Spring
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)	4,1	4,1	4,1
PHYS 040A, PHYS 040B		5	5
MATH 008B or MATH 009A, MATH 009B, MATH 009C	4	4	4
ENGL 001A, ENGL 001B, ENGL 001C	4	4	4
Elective (optional)	4		
Total Units	17	18	18
Sophomore Year	Fall	Winter	Spring
<del>CHEM 112A, CHEM 112B, CHEM 112C</del>	4	4	4
PHYS 040C	5		
MATH 010A, MATH 010B, MATH 046	4	4	4
CHEM 005		5	
Electives		4	8
Total Units	13	17	16
Junior Year	Fall	Winter	Spring
CHEM 110A, CHEM 110B, CHEM 113	4	4	4
Biological Science w/ Lab			4
CHEM 150A, CHEM 150B	4	4	4
CHEM 125	5		
CHEM 143		3	
CHEM 191			1
Electives	4	4	8
Total Units	17	15	17
Senior Year	Fall	Winter	Spring
CHEM 111, CHEM 140		4	4
CHEM 166			4
Electives	12	8	4
Total Units	12	12	12

Freshman Year	Fall	Winter	Spring
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)	4,1	4,1	4,1
PHYS 040A, PHYS 040B		5	5
MATH 008B or MATH 009A, MATH 009B, MATH 009C	4	4	4
ENGL 001A, ENGL 001B, ENGL 001C	4	4	4
Elective (optional)	4		
Total Units	17	18	18
Sophomore Year	Fall	Winter	Spring
CHEM 008A, CHEM 008B, CHEM 008C, CHEM 08LA, CHEM 08LB, CHEM 08LC	4	4	4
	5		
MATH 010A, MATH 010B, MATH 046	4	4	4
CHEM 005		5	
Electives		4	8
Total Units	13	17	16
Junior Year	Fall	Winter	Spring
CHEM 110A, CHEM 110B, CHEM 113	4	4	4
Biological Science w/ Lab			4
CHEM 150A, CHEM 150B	4	4	4
CHEM 125	5		
CHEM 143		3	
CHEM 191			1
Electives	4	4	8
Total Units	17	15	17
Senior Year	Fall	Winter	Spring
CHEM 111, CHEM 140		4	4
CHEM 166			4
Electives	12	8	4
Total Units	12	12	12

### **Justification:**

Change of Major criteria:

Math Dept. has removed MATH 008B from their curriculum.

Organic Chemistry LEC and LAB have been separated into two courses per Undergraduate Studies Committee recommendation. Key benefits include: Department resources will not have to be used to instruct students who have previously performed adequately in the lab component of the course. For the students who fail the lab and pass the lecture, there is no pedagogical change from the earlier practice of de facto separation of labs and lectures. The new structure could potentially improve the effectiveness of the labs. This new structure would allow for a separate faculty instructor to be assigned to the course who can devote more time to incorporating new activities and/or overseeing safety aspects of the lab.

Renumbering of organic chemistry was to comply with UCR course policy of having a zero in front of the number in order for BANNER to recognize the course as a lower division course.

BIOL 020 (2 Units) was added per Biology Dept. request to the Environmental Chemistry Option. It matches the curriculum of BIOL 05LA. Units range has been updated to include BIOL 020.

**APPROVALS:**

Approved by the faculty of the Department of Chemistry:

November 30, 2016

Approved by the Executive Committee of the College of  
Natural and Agricultural Sciences:

January 10, 2017

Approved by the Committee on Educational Policy:

May 3, 2017