

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

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

To be adopted:

Proposed changes to the undergraduate major requirements in Biochemistry.

PRESENT:

Biology Emphasis

1. Lower-division requirements (~~68~~-units)
 - a) BCH 095 or equivalent
 - b) BIOL 005A, BIOL 05LA, BIOL 005B, BIOL 005C
 - c) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 12A, CHEM 12B, CHEM 12C

d) MATH 009A, MATH 009B, MATH 046

e) PHYS 002A, PHYS 002B, PHYS 002C, PHYS 02LA, PHYS 02LB, PHYS 02LC

2. ~~Statistics requirement (5 units): STAT 100A~~

3. Upper-division requirements (47-53 units)

- a) ~~BCH 101~~, BCH 110A, BCH 110B, BCH 110C, BCH 162, BCH 184
- b) At least ~~7~~ units from BCH 111, BCH 120, BCH 153/BIOL 153/BPSC 153, BCH 180 (E-Z), BCH 183/BPSC 183, BCH 186, BCH 187, BCH 210, BCH 211, BCH 212
- c) BIOL 102
- d) CHEM 109 or CHEM 110A
- e) Choose ~~three~~ biological science courses from the following:

(1) BCH 111, BCH 120, BCH 153/BIOL 153/BPSC 153, BCH 180 (E-Z), BCH 183/BPSC 183, BCH 186, BCH 187, BCH 210, BCH 211, BCH 212

PROPOSED:

Biology Emphasis

1. Lower-division requirements (71 units)
 - a) BCH 095 or equivalent, BCH 015
 - b) BIOL 005A, BIOL 05LA or BIOL 020, BIOL 005B, BIOL 005C
 - c) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 008A and CHEM 08LA or CHEM 08HA and CHEM 8HLA or CHEM 12A, CHEM 008B and CHEM 08LB or CHEM 08HB and CHEM 8HLB or CHEM 12B, CHEM 008C and CHEM 08LC or CHEM 08HC and CHEM 8HLC or CHEM 12C
 - d) MATH 007A or MATH 009A, MATH 007B or MATH 009B, MATH 046
 - e) No Change

2. Upper-division requirements (45-46 units)

- a) BCH 110A, BCH 110B, BCH 110C, BCH 162, BCH 184
 - b) At least 3 units from BCH 111, BCH 120, BCH 153/BIOL 153/BPSC 153, BCH 180 (E-Z), BCH 183/BPSC 183, BCH 186, BCH 187, BCH 210, BCH 211, BCH 212
 - c) No Change
 - d) No Change
 - e) STAT 100A
 - f) Choose two biological science courses from the following:
- (1) No Change

(2) BIOL 105, BIOL 108, BIOL 114, BIOL 117, BIOL 121/MCBL 121, BIOL 121L/MCBL 121L, BIOL 123/MCBL 123/PLPA 123, BIOL 124/MCBL 124, BIOL 128/CBNS 128, BIOL 151, BIOL 155/BPSC 155, BIOL 157, BIOL 159/NEM 159, BIOL 160, BIOL 161A, BIOL 161B, BIOL 171, BIOL 171L, BIOL 173/ENTM 173, BIOL 175

(3) BIOL 104/BPSC 104, BIOL 132/BPSC 132, BIOL 143/BPSC 143, BIOL 148/BPSC 148, BIOL 155/BPSC 155, BPSC 135

(4) BIOL 100/ENTM 100, BIOL 173/ENTM 173, ENTM 128

(5) CBNS 101, CBNS 106, CBNS 116, CBNS 120/PSYC 120, CBNS 120L/PSYC 120L, CBNS 124/PSYC 124, CBNS 125/PSYC 125, CBNS 150/ENTX 150, CBNS 169

(6) ENSC 100

(7) ENTX 101, CBNS 150/ENTX 150

3. BCH 190 or BCH 197 are available as elective courses. Enrollment requires upper division standing and written permission of the supervising faculty member. No more than 9 units of courses numbered 190-199 may be counted towards the major.

Chemistry Emphasis

1. Lower-division requirements (73-units)

a) BCH 095 or equivalent

b) BIOL 005A, BIOL 05LA, BIOL 005B, BIOL 005C

c) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 005, CHEM 12A, CHEM 12B, CHEM 12C

d) MATH 009A, MATH 009B, MATH 046

e) PHYS 002A, PHYS 002B, PHYS 002C, PHYS 02LA, PHYS 02LB, PHYS 02LC

2. Statistics requirement (5-units): STAT 100A

(2)BIOL 105, BIOL 108, BIOL 114, BIOL 117, BIOL 119, BIOL 121/MCBL 121, BIOL 121L/MCBL 121L, BIOL 123/MCBL 123/PLPA 123, BIOL 124/MCBL 124, BIOL 128/CBNS 128, BIOL 151, BIOL 155/BPSC 155, BIOL 157, BIOL 159/NEM 159, BIOL 160, BIOL 161A, BIOL 161B, BIOL 171, BIOL 171L, BIOL 173/ENTM 173, BIOL 175

(3)No Change

(4)No Change

(5)No Change

(6) No Change

(7) No Change

3. BCH 190 or BCH 197 are available as elective courses. Enrollment requires upper division standing and written permission of the supervising faculty member. No more than 9 units of courses numbered 190-199 may be counted towards the major.

Chemistry Emphasis

1. Lower-division requirements (76-units)

a) BCH 095 or equivalent, BCH 015

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

c) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 005, CHEM 008A and CHEM 08LA o CHEM 08HA and CHEM 8HLA or CHEM 12A, CHEM 008B and CHEM 08LB or CHEM 08HB and CHEM 8HLB or CHEM 12B, CHEM 008C and CHEM 08LC or CHEM 08HC and CHEM 8HLC or CHEM 12C

d) MATH 007A or MATH 009A, MATH 007B or MATH 009B, MATH 046

e) No Change

3. Upper-division requirements (~~46-47~~-units)
- ~~BCH 101~~, BCH 110A, BCH 110B, BCH 110C, BCH 162, BCH 184
 - At least 7-units from BCH 111, BCH 120, BCH 153/BIOL 153/BPSC 153, BCH 180 (E- Z), BCH 183/BPSC 183, BCH 186, BCH 187, BCH 210, BCH 211, BCH 212

- BIOL 102
- CHEM 109 or CHEM 110A

- Two courses from CHEM 110B, CHEM 113, CHEM 125, CHEM 150A, CHEM 150B, CHEM 166 (Other graduate courses may be substituted by students with a GPA of 3.00 or better with permission of the instructor and the faculty advisor.)

4. BCH 190 or BCH 197 are available as elective courses. Enrollment requires written permission of the supervising faculty member. No more than 9 units of courses numbered 190-199 may be counted towards the major.

5.

Medical Sciences Emphasis

- Lower-division requirements (~~66~~-units)
 - BCH 095 or equivalent
 - BCH 096, ~~BCH 098-I~~
 - BIOL 005A, BIOL 05LA, BIOL 005B, BIOL 005C
 - CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 12A, CHEM 12B, CHEM 12C

- MATH 009A, MATH 009B

- PHYS 002A, PHYS 002B, PHYS 002C, PHYS 02LA, PHYS 02LB, PHYS 02LC

2. ~~Statistics requirement (5 units): STAT 100A~~

- Upper-division requirements (~~48~~-units)
 - ~~BCH 101~~, BCH 110A, BCH 110B, BCH 110C, BCH 120, BCH 162, BCH 184
 - BIOL 102

2. Upper-division requirements (45-46 units)

- BCH 110A, BCH 110B, BCH 110C, BCH 162, BCH 184
- At least 3 units from BCH 111, BCH 120, BCH 153/BIOL 153/BPSC 153, BCH 180 (E- Z), BCH 183/BPSC 183, BCH 186, BCH 187, BCH 210, BCH 211, BCH 212, BIOL 119

- No Change
- No Change
- STAT 100A

- Two courses from CHEM 110B, CHEM 113, CHEM 125, CHEM 150A, CHEM 150B, CHEM 166 (Other graduate courses may be substituted by students with a GPA of 3.00 or better with permission of the instructor and the faculty advisor.)

3. No Change

Medical Sciences Emphasis

- Lower-division requirements (69 units)
 - BCH 095 or equivalent, BCH 015
 - BCH 096, BCH 098I
 - BIOL 005A, BIOL 05LA or BIOL 020 BIOL 005B, BIOL 005C
 - CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC, CHEM 008A and CHEM 08LA or CHEM 08HA and CHEM 8HLA or CHEM 12A, CHEM 008B and CHEM 08LB or CHEM 08HB and CHEM 8HLB or CHEM 12B, CHEM 008C and CHEM 08LC or CHEM 08HC and CHEM 8HLC or CHEM 12C

- MATH 007A or MATH 009A, MATH 007B or MATH 009B

- No Change

2. Upper-division requirements (45-46 units)

- BCH 110A, BCH 110B, BCH 110C, BCH 120, BCH 162, BCH 184
- No Change

- c) CHEM 109 or CHEM 110A
- d) CBNS 101

- e) At least ~~8~~ units from BCH 183/BPSC 183, BIOL 121, BIOL 161A, BIOL 161B, BIOL 171, CBNS 106, CBNS 150/ENTX 150.

- c) No Change
- d) No Change
- e) STAT 100A
- f) At least 3 units from BCH 183/BPSC 183, BIOL 119, BIOL 121, BIOL 161A, BIOL 161B, BIOL 171, CBNS 106, CBNS 150/ENTX 150.

Graduate and upper-division courses can be substituted with permission of the instructor and the faculty advisor. Graduate courses require a GPA of 3.0 or greater in the sciences.

(No change)

Students should be aware that CHEM 005 is often a requirement for admission to professional schools.

(No change)

Justification:

To bring the Biochemistry BA and BS majors in compliance with the UCOP mandate to decrease our upper division units to 45 or to a number that can be taken in one year.

Justification for adding BIOL 119: This material covered in this new course in Genomics and Bioinformatics is highly relevant to modern biochemical research.

The course content of BIOL 002 is not recommended for science majors, and has no prerequisites (e.g. Chemistry). Hence, the rigor and expectations for the lecture and laboratory portions of BIOL 002 are not as high as for BIOL 20, which is for life science majors. In BIOL 20, students perform Polymerase Chain Reaction (PCR), do bioinformatics analysis, and open-ended experiments in genomics research. BIOL 20 is 6 hours/week, whereas BIOL 002 lab is 3 hours/week. Hence, the content, detail and expectations are much lower for BIOL 002. Finally, BIOL 002 includes the laboratory and lecture together in one course, whereas BIOL 20 is a standalone laboratory course that can substitute for BIOL 05LA for credit in BIOL 005A. The inclusion of the laboratory component in BIOL 002 allows some students who do not pass the laboratory portion to pass the entire course. This is not possible with BIOL 20 as a separate course from the lecture/discussion course BIOL 005A.

BCH 101 is currently an upper division course that is targeted at sophomore Biochemistry majors and is being renumbered to BCH 015 as the material is more appropriate for sophomores. Its curriculum is that of an introductory course that (1) provides students with basic laboratory skills that facilitate their entry into faculty research laboratories as sophomores and (2) introduces students to simple graphical methods for visualizing biological macromolecules before they enter the initial quarter of upper division Biochemistry (BCH 110A), taken during Fall of the junior year. BCH 015 (101) builds on the structures, nomenclatures, and chemistry of biological macromolecules covered in the first quarter of organic chemistry (CHEM 12A, taken by sophomores). Hence CHEM 12A is a prerequisite that may be taken concurrently. When BCH 101 was first created, it given upper division numbering only because its prerequisite, CHEM 12A, was then an upper-division course (CHEM 112A). Again, the Biochemistry Faculty believe that the content and level of presentation of the material covered in BCH 015 (101) is more appropriate for sophomores. Making this change also assisted in satisfying the 45 UD requirement

for our major, though not the primary reason.

The Department of Chemistry has moved forward to separate Organic Chemistry courses into two courses (LEC and LAB) per the Undergraduate Studies Committee's recommendation for 2017 FALL. Also, renumbering the courses to "008" for the Organic Chemistry Lecture Series (CHEM 008A, CHEM 008B, CHEM 008C,) and "08" for the Honors Organic Chemistry Lecture (CHEM 08HA, CHEM 08HB, CHEM 08HC) and Organic Chemistry Labs (CHEM 08LA, CHEM 08LB, CHEM 08LC, CHEM 08HA, CHEM 08HB, CHEM 08HC, CHEM 08HLA, CHEM 08HLB, CHEM 08HLC) in order to comply with BANNERS system requirements

The Mathematics Department created a new track of first-year calculus that runs parallel to Math 009A and 009B and has the same placement criteria as well as prerequisites. MATH 007A/B will be considered equivalent in terms of program requirements, and in the progression of the first-year calculus sequence. The content of Math 007A/B significantly overlaps with Math 009AB so that credit is only awarded for either Math 007A or Math 009A.

Approvals:

Approved by the faculty of the Department of Biochemistry:	October 4, 2016
Approved by the Executive Committee College of Natural and Agricultural Sciences:	December 16, 2016
Approved by the Committee on Educational Policy:	May 10, 2017