

11/17/2014



Proposal to the Senate Educational Policy Committee

PROPOSAL TITLE: Changes in the requirements for majors in the Biochemistry Specialized Curriculum in the College of Liberal Arts and Sciences.

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BRIEF DESCRIPTION: The changes proposed to the Biochemistry Specialized Curriculum center around altering the current requirement of 10 hours of senior research (BIOC 492: Senior Thesis) and making this strongly recommended instead of an absolute requirement. Specifically, the following is proposed:

- 1) Eliminate the requirement of 10 hours of senior research (BIOC 492). Senior research will continue to be highly recommended to students by faculty and advisers, and students may still take up to 10 hours of BIOC 492, but it will no longer be required.
- 2) Increase the requirement of advanced technical electives from 6 to 10 hours. Students who choose to take BIOC 492 can use up to 7 hours of BIOC 492 towards this requirement (any additional hours of BIOC 492 can be used toward electives).

See Appendix II for current curriculum vs. proposed changes.

JUSTIFICATION:

The Biochemistry Specialized Curriculum is one of several Specialized Curricula within LAS, with the closest related being in Chemistry. Currently, there are 158 students enrolled in the Biochemistry Specialized Curriculum, compared to approximately 140 in the Chemistry Specialized Curriculum.

The changes proposed to the Specialized Curriculum in Biochemistry will be beneficial in several respects.

- 1) These changes recognize that there are numerous careers besides research which are accessible and attractive alternatives for those with training in Biochemistry. We continue to believe that research experience is valuable and, thus, will highly recommend it for all students and continue to require it for those students who wish

to graduate with distinction. However, the strict requirement of 10 hours of senior research (BIOC 492) leads to attrition in the number of majors which we would like to avoid. We also want to encourage our students to engage in research earlier by enrolling in BIOC 290 as sophomores and juniors, rather than waiting to take BIOC 492 in the senior year.

- 2) For those students who maintain an interest in research, the changes recognize the value of undergraduate research, allowing students to count up to 7 hours of BIOC 492, Senior Thesis, towards their Advanced Technical Electives.
- 3) The Biochemistry Specialized Curriculum currently requires a minimum of 84 hours of specified courses in the sciences plus another 6 hours of advanced technical electives. After students complete their general education courses, this typically leaves them only about 3 hours of free electives to graduate in LAS. The proposed changes should free up an additional 6 hours of electives (to a total of 9 hours). This enhanced elective freedom will make it easier for students to fulfill additional requirements or to simply take some non-science courses of interest. We expect that these changes will make the major more attractive to students.
- 4) The proposed changes bring the requirements for the Biochemistry Specialized Curriculum more in line with those of the Chemistry Specialized Curriculum. Senior research is also “highly recommended” for the Chemistry Specialized Curriculum but not required. The proposed changes reduce the minimum required hours of Core + Advanced science courses in the Biochemistry Specialized Curriculum from 90 to 84, which is closer to the 83 hours in the Chemistry Specialized Curriculum. By contrast, the requirements for the Molecular and Cellular Biology concentration in the Sciences and Letters major add up to 66 to 71 hours.

BUDGETARY AND STAFF IMPLICATIONS:. See [Appendix A](#) for questions required of new degree program proposals as well additional notes regarding budgetary and staff implications.)

- a. Additional staff and dollars needed - **None**
- b. Internal reallocations (e.g., change in class size, teaching loads, student-faculty ratio, etc.) - **None**
- c. Effect on course enrollment in other units and explanations of discussions with representatives of those departments - **None**
- d. Impact on the University Library - **None**
- e. Impact on computer use, laboratory use, equipment, etc. - **None**

DESIRED EFFECTIVE DATE: Fall 2014

STATEMENT FOR PROGRAMS OF STUDY CATALOG:

Major in Specialized Curriculum in Biochemistry

The typical program of courses required to satisfy this degree totals 126-131 hours as outlined below including up to 12 hours of non-primary language (if not completed in high school); in no case will a program totaling less than 120 hours qualify for graduation. To graduate, students must achieve 1) a minimum 2.0 cumulative academic grade point average and 2) a 2.5 academic grade point average in the chemistry, biochemistry, biology, mathematics, physics and advanced electives in science/engineering courses specified in this curriculum. All proposals for course substitutions must be approved by the academic advisor. This curriculum is intended for those students who desire a rigorous education in chemistry, biochemistry, and biology and the opportunity to engage in undergraduate research, and whose career objectives include graduate school, MD/PhD programs, or industry.

E-mail: biocug@life.uiuc.edu

Web address for department: <http://mcb.illinois.edu/departments/biochemistry/index.html>

Degree title: Bachelor of Science in Biochemistry

All students must complete the [General education](#) requirements.

Minimum hours required for graduation: 120 hours

Students who complete the requirements for the Specialized Curriculum in Biochemistry automatically complete a Chemistry minor. Students earning a degree in the Specialized Curriculum in Biochemistry may not earn a second degree in the Science and Letters Curriculum with a concentration in Molecular and Cellular Biology.

Departmental distinction: A student seeking distinction must satisfy the following:

- Complete a minimum of 6 credit hours of undergraduate research (BIOC 290 + BIOC 492) with a minimum of 4 credit hours of BIOC 492
- Earn at least a 3.25 grade-point average
- Present a senior thesis to the department

| Hours | Requirements |
|-------|---|
| 8-9 | General chemistry, select from: |
| | CHEM 202 - Accelerated Chemistry I; CHEM 203 - Accelerated Chemistry Lab I; CHEM 204 - Accelerated Chemistry II; and CHEM 205 - Accelerated Chemistry Lab II (preferred sequence) |
| | or |
| | CHEM 102 - General Chemistry I; CHEM 103 - General Chemistry Lab I; CHEM 104 - General Chemistry II; and CHEM 105 - General Chemistry Lab II (with advisor approval) |
| 8-9 | Organic chemistry, select from: |
| | CHEM 236 - Fundamental Organic Chem I; CHEM 237 - Structure and Synthesis; and CHEM 436 - |

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| | Fundamental Organic Chem II (preferred sequence) |
| | or |
| | CHEM 232 - Elementary Organic Chemistry I; CHEM 233 - Elementary Organic Chem Lab I; and CHEM 332 - Elementary Organic Chem II (with advisor approval) |
| 17 | Molecular and Cellular Biology |
| | MCB 150 - Molecular & Cellular Basis of Life |
| | MCB 250 - Molecular Genetics |
| | MCB 251 - Exp Techniqs in Molecular Biology |
| | MCB 252 - Cells, Tissues & Development |
| | MCB 253 - Exp Techniqs in Cellular Biology |
| | MCB 354 - Biochem & Phys Basis of Life |
| | or equivalent as approved by academic advisor |
| 7-8 | Physical chemistry, select from: |
| | CHEM 440-B - Physical Chemistry Principles (Biological Perspective Section) and BIOC 446 - Physical Biochemistry (preferred sequence) |
| | or |
| | CHEM 442 - Physical Chemistry I and CHEM 444 - Physical Chemistry II (with advisor approval) |

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| 11-12 | Mathematics |
| | MATH 220 - Calculus or MATH 221—Calculus I |
| | MATH 231 - Calculus II |
| | MATH 241 - Calculus III |
| 10-12 | Physics, select from: ³ |
| | PHYS 211 - Univ Physics, Mechanics; PHYS 212 - Univ Physics, Elec & Mag; PHYS 213 - Univ Physics, Thermal Physics; and PHYS 214 - Univ Physics, Quantum Physics (preferred sequence) |
| | or |

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| | PHYS 101 - College Physics, Mech & Heat, and PHYS 102 - College Physics, E&M & Modern Physics, or equivalent as approved by academic advisor (with advisor approval) |
| 13 | Biochemistry ⁴ : |
| | BIOC 455 - Techniqs Biochem & Biotech |
| | MCB 406 - Gene Expression (same as BIOC 406) |
| | BIOC 460 - Biochemistry Senior Seminar (satisfies Advanced Composition requirement) |
| | BIOC 445 - Current Topics in Biochemistry |
| 10 | Advanced Technical Electives (including up to 7 hours of BIOC 492 under (senior research): select courses from approved list ⁶) |
| variable | Nontechnical Requirements: ⁷ |
| | General education: |
| | Foreign language - three semesters of college study (or three years of high school study) in a single foreign language to satisfy the campus foreign language requirement |
| | Composition I writing requirement to satisfy the campus Composition I requirement |
| | Advanced Composition writing requirement (BIOC 460 is required) |
| | Humanities/Arts to satisfy the campus general education requirements |
| | Social/Behavioral sciences to satisfy the campus general education requirements |
| | Cultural Studies to satisfy the campus general education requirement |
| variable | Electives (not including any credit in satisfaction of the above requirements) |

1. Transfer credit must be approved by an advisor in biochemistry in order to be used to satisfy degree requirements.
2. A more detailed description of the requirements is listed in the *Biochemistry Curriculum Handbook*, available in room 419A of Roger Adams Laboratory.
3. PHYS 213 is not required if CHEM 442/444 sequence is taken.
4. Freshman orientation course is under development and will be required. See advisor for details.
5. An approved list of current courses will be updated annually in January/February for the coming year. Contact advisor.
6. The requirements for the Campus General Education categories of Natural Sciences and Technology, and Quantitative Reasoning I are fulfilled through coursework in the curriculum.

CLEARANCES:

Signatures:

Unit Representative:

Date:

College Representative:

Date:

Appendix I
Approved List of Advanced Technical Elective Courses
(For crosslisted courses- bold indicates controlling unit, Cross-listings in
parentheses)

MCB/BIOC Courses

MCB 300 Microbiology

MCB 314 Introduction to Neurobiology (NEUR 314)

MCB 316 Genetics and Disease

MCB 400 Cancer Cell Biology

MCB 401 Cell and Membrane Physiology

MCB 402 Systems and Integrative Physiology

MCB 403 Cell and Membrane Physiology Laboratory

MCB 404 Systems and Integrative Physiology Laboratory

MCB 408 Immunology

MCB 410 Developmental Biology

MCB 413 Endocrinology

MCB 419 Brain, Behavior & Info Process (BIOP 419, NEUR 419)

MCB 421 Microbial Genetics

MCB 424 Microbial Biochemistry

MCB 426 Bacterial Pathogenesis

MCB 428 Bacterial Pathogens Laboratory

MCB 431 Microbial Physiology

MCB 432 Computing in Molecular Biology

MCB 433 Virology & Viral Pathogenesis (**PATH 433**)

MCB 434 Food & Industrial Microbiology (**FSHN 471**)

MCB 435 Microbial Ecology and Evolution

MCB 442 Comparative Immunobiology (**ANSC 450**, PATH 410)

MCB 461 Cellular & Molecular Neuroscience (NEUR 461)

MCB 462 Integrative Neuroscience (NEUR 462)

MCB 481 Developmental Neurobiology (NEUR 481)

MCB 508 Intro to systems Neuroscience (**PSYC 508**)

BIOC 492 Senior Thesis (no more than 7 hours)

Non-MCB Courses

BIOE 461 Cellular Biomechanics (**TAM 461**)

BIOP 401 Introduction to Biophysics

BIOP 432 Photosynthesis (**IB 421**, CPSC 489)

CB 467 Fundamental Pharm Disc & Devel

CHBE 471 Biochemical Engineering

CHBE 472 Techniques in Biomolecular Engr.

CHBE 473 Biomolecular Engineering

CHEM 312 Inorganic Chemistry

CHEM 438 Advanced Organic Chemistry

CHEM 480 Polymer Chemistry (**MSE 457**)

CHEM 482 Polymer Physical Chemistry (**MSE 458**)

CHEM 534 Advanced Organic Synthesis

CS 466 Introduction to Bioinformatics

IB 302 Evolution

IB 360 Evolution and Human Health (**ANTH 360**)

IB 361 Ecology and Human Health (**ANTH 361**)

IB 364 Bioinformatics and the Human Genome

IB 402 Molecular Evolution

IB 420 Plant Physiology (CPSC 484)

IB 424 Plant Development

IB 426 Env. and Evol. Physl. of Animals

IB 445 Chemical Ecology

IB 485 Environmental Toxicology & Health (CHLH 461, ENVS 431)

IB 487 Math Modeling in Life Sciences (**ANSC 448**, STAT 458)

MATH 415 Applied Linear Algebra

MATH 453 Elementary Theory of Numbers

PHYS 404 Electronic Circuits

PHYS 420 Space Time & Matter (PHIL 420)

PSYC 403 Memory and Amnesia (NEUR 403)

PSYC 413 Psychopharmacology (NEUR 413)

STAT 400 Statistics & Probability I (MATH 463)

STAT 551 Theory of Probability I (MATH 561)

Appendix II
Biochemistry Specialized Curriculum Current vs Proposed changes

| Current Hours | Current Requirements | Proposed Hours | Proposed Requirements |
|----------------------|--|-----------------------|--|
| 8-9 | General chemistry | 8-9 | General chemistry |
| 8-9 | Organic chemistry | 8-9 | Organic chemistry |
| 17 | Molecular and Cellular Biology | 17 | Molecular and Cellular Biology |
| | MCB 150 - Molecular & Cellular Basis of Life | | MCB 150 - Molecular & Cellular Basis of Life |
| | MCB 250 - Molecular Genetics | | MCB 250 - Molecular Genetics |
| | MCB 251 - Exp Techniqs in Molecular Biology | | MCB 251 - Exp Techniqs in Molecular Biology |
| | MCB 252 - Cells, Tissues & Development | | MCB 252 - Cells, Tissues & Development |
| | MCB 253 - Exp Techniqs in Cellular Biology | | MCB 253 - Exp Techniqs in Cellular Biology |
| | MCB 354 - Biochem & Phys Basis of Life | | MCB 354 - Biochem & Phys Basis of Life |
| | or equivalent as approved by academic advisor | | or equivalent as approved by academic advisor |
| 7-8 | Physical chemistry | 7-8 | Physical chemistry |
| 11-12 | Mathematics | 11-12 | Mathematics |
| 10-12 | Physics | 10-12 | Physics |
| 23 | Biochemistry ⁴ | 13 | Biochemistry ⁴ : |
| | BIOC 455 - Techniqs Biochem & Biotech | | BIOC 455 - Techniqs Biochem & Biotech |
| | BIOC 406 - Gene Expression | | MCB 406 - Gene Expression (same as BIOC 406) |
| | BIOC 460 - Biochemistry Senior Seminar (satisfies Advanced | | BIOC 460 - Biochemistry Senior Seminar (satisfies Advanced |

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|----------|---|-----------|---|
| | Composition requirement) | | Composition requirement) |
| | BIOC 445 - Current Topics in Biochemistry | | BIOC 445 - Current Topics in Biochemistry |
| | BIOC 492 - Senior Thesis ⁵ | | |
| 6 | Advanced Science/Technical Electives: select from approved list ⁶ | 10 | Advanced Technical Electives (may include up to 7 hours of BIOC 492 (senior research): select courses from approved list ⁵ |
| variable | Nontechnical Requirements: ⁷ | variable | Nontechnical Requirements: ⁶ |
| | General education: | | General education: |
| | Foreign language - three semesters of college study (or three years of high school study) in a single foreign language to satisfy the campus foreign language requirement | | Foreign language - three semesters of college study (or three years of high school study) in a single foreign language to satisfy the campus foreign language requirement |
| | Composition I writing requirement to satisfy the campus Composition I requirement | | Composition I writing requirement to satisfy the campus Composition I requirement |
| | Advanced Composition writing requirement (BIOC 460 is required) | | Advanced Composition writing requirement (BIOC 460 is required) |
| | Humanities/Arts to satisfy the campus general education requirements | | Humanities/Arts to satisfy the campus general education requirements |
| | Social/Behavioral sciences to satisfy the campus general education requirements | | Social/Behavioral sciences to satisfy the campus general education requirements |
| | Cultural Studies to satisfy the campus general education requirement ⁸ | | Cultural Studies to satisfy the campus general education requirement |
| variable | Electives (not including any credit in satisfaction of the above requirements) | variable | Electives (not including any credit in satisfaction of the above requirements) |
| | 1. Transfer credit must be approved by an advisor in biochemistry in order to be used | | 1. Transfer credit must be approved by an advisor in biochemistry in order to be used to satisfy degree requirements. |

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| <p>to satisfy degree requirements.</p> <p>2. A more detailed description of the requirements is listed in the <i>Biochemistry Curriculum Handbook</i>, available in room 419A of Roger Adams Laboratory.</p> <p>3. PHYS 213 is not required if CHEM 442/444 sequence is taken.</p> <p>4. Freshman orientation course is under development and will be required. See advisor for details.</p> <p>5. BIOC 290 is strongly recommended.</p> <p>6. An approved list of current courses will be updated annually in January/February for the coming year. Contact advisor.</p> <p>7. The requirements for the Campus General Education categories of Natural Sciences and Technology, and Quantitative Reasoning I are fulfilled through coursework in the curriculum.</p> <p>8. The courses taken to satisfy Western and/or Non-Western Civilization requirements may also be used to satisfy non-technical and/or free elective categories.</p> | <p>2. A more detailed description of the requirements is listed in the <i>Biochemistry Curriculum Handbook</i>, available in room 419A of Roger Adams Laboratory.</p> <p>3. PHYS 213 is not required if CHEM 442/444 sequence is taken.</p> <p>4. Freshman orientation course is under development and will be required. See advisor for details.</p> <p>5. An approved list of current courses will be updated annually in January/February for the coming year. Contact advisor.</p> <p>6. The requirements for the Campus General Education categories of Natural Sciences and Technology, and Quantitative Reasoning I are fulfilled through coursework in the curriculum.</p> |
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