

New Undergraduate Program (Majors, Minors, Sequences) Proposal
Illinois State University - University Curriculum Committee

Program Department Chemistry

Initiator Jean Standard

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Coauthor(s) None

Title of New Program Major in Biochemistry

Submission Date Tuesday, May 31, 2011

Email standard@ilstu.edu

Campus Address 4160 Chemistry

Version 1

Proposed Starting Catalog Year 2014-2016

Associated Course Proposal(s):

Delete Course proposal CHE 370 titled *Physical Biochemistry*

New Course proposal CHE 372 titled *Physical Biochemistry*

New Course proposal CHE 373 titled *Physical Biochemistry Laboratory*

1. Proposed Action

- ✓ New Major **Major CIPS Code** 26.0202
- New Minor
- New Sequence
- More than 50% of courses in this program are Distance Education

Degree Type(s)

Bachelor of Science

2. Provide Undergraduate Catalog copy for new program.

Major in Biochemistry

- 45 hours required in Chemistry, including at least 37 hours in courses numbered 200 or higher.
- Required Chemistry courses (41 hours): CHE 140, 141, 215, 216, 230, 231, 232, 233, 250, 251, 342, 343, 344, 360, 361, 372, 373.
- 3 hours in advanced Chemistry courses required, selected from the following: CHE 315, 350.
- 1 hour in advanced Chemistry laboratory courses required, selected from the following: CHE 316, 351; one hour of undergraduate research (CHE 290 or 299) or coop/internship (CHE 398.01 or CHE 390.50) may substitute for one of these courses.
- 14 hours required in Biological Sciences: BSC 196, 197, 203, 219.
- 1 year of Physics, preferably PHY 110 and 111, and 1 year of Calculus (through MAT 146) must be completed prior to enrolling in CHE 360.
- Biochemistry electives: The department strongly recommends that students take at least 6 hours of advanced electives. Advising options for various career objectives are available from the department office and on the department web page.
- A course in the major may not be taken more than twice unless the course description states “may be repeated.” An exception may be requested once during a student’s undergraduate career if the GPA in the major plan and overall GPA is 2.00 or higher.
- A grade of C or better is required in the following Chemistry courses: CHE 140, 141, 215, 216, 230, 231, 232, 250, 251, 342, 360, 361.
- Students completing this degree program will earn an American Chemical Society Certified Degree.

3. Provide a description for the proposed program.

The coursework structure of the proposed Major in Biochemistry closely follows that of the recently approved revisions to the Major in Chemistry (approved 2011), requiring 45 hours in Chemistry, and will lead to certification by the American Chemical Society. Though the Major in Biochemistry as proposed shares a common set of foundation courses in Chemistry, it is distinct from the Major in Chemistry in its advanced course requirements, with a focus on biochemistry-related courses and additional Biological Sciences requirements.

The Major in Biochemistry requires the same set of coursework in Math and Physics as the Major in Chemistry and the current Major in Biochemistry/Molecular Biology (BMB): one year of Calculus (MAT 145 and 146) and one year of Physics (PHY 110 and 111 is recommended; PHY 108 and 109 may substitute). In addition, the coursework requirements in foundation Chemistry courses are the same for the proposed Major in Biochemistry as they are for the Major in Chemistry (and the current BMB program): one year of General Chemistry (CHE 140 and 141), one year of Organic Chemistry (CHE 230/231 and 232/233), and foundation lecture and laboratory courses in analytical chemistry (CHE 215/216), inorganic chemistry (CHE 250/251), physical chemistry (CHE 360/361), and one foundation lecture course in biochemistry: CHE 342.

At the advanced level, the Major in Biochemistry differs significantly in course requirements from the Major in Chemistry, requiring additional lecture and laboratory coursework in biochemistry (CHE 344 and 343) and physical biochemistry (CHE 372 and 373). In addition, the Major in Biochemistry requires 14 hours of coursework in Biological Sciences.

4. Provide a rationale of proposed program.

The proposed Major in Biochemistry is designed to replace a portion of the current Major in Biochemistry/Molecular Biology (BMB) that is administered jointly by the Department of Chemistry and School of Biological Sciences. The BMB program was initiated in 2000 in order to provide students with interests in biochemistry, molecular biology, and the medical sciences fields a strong background in course work and laboratory experience at the interface between chemistry and biology. About two years ago, two new sequences were created within the BMB program in addition to a General Sequence, a Biochemistry Sequence and a Molecular Biology Sequence, which are reflective of the increasing student interest in two distinct areas of inquiry. The current proposal to create a new Major in Biochemistry is the culmination of this progression, and has been designed to provide students with a strong set of course and laboratory experiences in biochemistry.

In conjunction with this proposal, the Department of Chemistry and the School of Biological Sciences have submitted a proposal to delete the Major in Biochemistry/Molecular Biology. Resources will be provided to continue to support the students currently enrolled in the BMB program; however, the goal is for the new Major in Biochemistry, along with a new Major in Molecular & Cellular Biology proposed by the School of Biological Sciences, to replace the BMB program.

5. Describe the expected effects of the proposed program on existing campus programs (if applicable).

The major effect associated with implementation of the new Major in Biochemistry will be the deletion of the Major in Biochemistry/Molecular Biology (BMB). In conjunction with the School of Biological Sciences, a proposal has been submitted for deletion of the BMB program. Students enrolled in the BMB program will continue to be supported for as long as necessary, unless they choose to switch to either the new Major in Biochemistry or Major in Molecular & Cellular Biology (proposed by the School of Biological Sciences), which may mean that the last student will not leave the BMB program until ~2015.

The course requirements in Biological Sciences proposed for the new Major in Biochemistry are slightly reduced compared with the current requirements for the BMB program: the proposed Major in Biochemistry requires 14 hours in Biological Sciences courses (BSC 196, 197, 203, and 219), compared with 17 hours for the Biochemistry Sequence and 19 hours for the General Sequence of the BMB program. As a result, our expectation is that there will be little or no change in enrollments in BSC 196, 197, 203, and 219 as a result of the implementation of the new Major in Biochemistry. There may be a slight drop in enrollment in BSC 220 and 350 as a result of implementation of the new major, since these courses will no longer be required; however, the impact is likely to be a change in enrollment of only a few students per semester.

The course requirements in Physics proposed for the new Major in Biochemistry are identical with the requirements for the current Major in Biochemistry/Molecular Biology: 2 semesters of Physics, either PHY 108/109 or 110/111. Thus, we expect that the proposed creation of the new Major in Biochemistry (along with the corresponding deletion of the BMB program) will have no significant impact on enrollments in introductory Physics courses, PHY 108/109 and 110/111.

The course requirements in Mathematics proposed for the new Major in Biochemistry also are identical with the requirements for the current Major in Biochemistry/Molecular Biology: 2 semesters of Calculus, MAT 145 and 146. Thus, we expect that the proposed creation of the new Major in Biochemistry (along with the corresponding deletion of the BMB program) will have no significant impact on enrollments in Mathematics courses.

Letters of support from the School of Biological Sciences, Department of Physics, and Department of Mathematics are included as part of the supporting documents.

6. Provide a sample four year plan of study demonstrating that a student could realistically complete the program requirements in a specific number of semesters.

A sample plan of study for the Major in Biochemistry is shown below.

Freshman Year, First Semester

Course	Sem. Hrs.
CHE 140, General Chemistry I	4
BSC 196, Biological Diversity	4
MAT 145, Calculus I	4
ENG 101 or COM 110	3
Total	15

Freshman Year, Second Semester

Course	Sem. Hrs.
CHE 141, General Chemistry II	4
BSC 197, Molecular and Cellular Biology	4
MAT 146, Calculus II	4
ENG 101 or COM 110	3
Total	15

Sophomore Year, First Semester

Course	Sem. Hrs.
CHE 230, Organic Chemistry I	3
CHE 231, Organic Chemistry Lab I	1
PHY 110, Physics for Science & Engineering I*	4
BSC 203, Cell Biology	3
Elective (Middle Core)	3
Total	14

Sophomore Year, Second Semester

Course	Sem. Hrs.
CHE 232, Organic Chemistry II	3
CHE 233, Organic Chemistry Lab II	2
CHE 250, Fundamentals of Inorganic Chemistry	3
CHE 251, Fund. Inorganic Chemistry Lab	1
PHY 111, Physics for Science & Engineering II*	4
Elective (Middle Core)	3
Total	16

Junior Year, First Semester

Course	Sem. Hrs.
CHE 215, Analytical Chemistry	3
CHE 216, Analytical Chemistry Lab	1
CHE 342, General Biochemistry I	3
BSC 219, Genetics	3
Electives (Middle Core)	6
Total	16

Junior Year, Second Semester

Course	Sem. Hrs.
CHE 360, Physical Chemistry I	3
CHE 361, Physical Chemistry Lab I	1
CHE 343, Biochemistry Lab	2
CHE 344, General Biochemistry II	3
Electives (Outer Core)	6
Total	15

Senior Year, First Semester

Course	Sem. Hrs.
CHE 372, Physical Biochemistry	3
CHE 373, Physical Biochemistry Lab	1
Biochemistry elective**	3
Elective (Outer Core)	3
Electives	4
Total	14

Senior Year, Second Semester

Course	Sem. Hrs.
CHE 315 or CHE 350	3
CHE 316 or CHE 351	1
Biochemistry elective**	3
Electives	8
Total	15

TOTAL = 120 hours

* PHY 108 and 109 (5 CH each) may be substituted, but PHY 110 and 111 are strongly preferred.

** Biochemistry electives are not required, but are recommended.

Summary:

Required Chemistry hours:	45
Required Biological Sciences hours:	14
Required Math/Physics hours:	16
Remaining General Education hours:	27
Other elective hours:	18
 Total:	 120

7. Describe the expected curricular changes required, including new courses. If proposals for new courses have also been submitted, please reference those related proposals here:

The major curriculum change associated with implementation of the new Major in Biochemistry is the deletion of the Major in Biochemistry/Molecular Biology in conjunction with the School of Biological Sciences, which has been previously discussed in this proposal.

In addition, two new biochemistry-related courses are planned as requirements in the new Major in Biochemistry: CHE 372 Physical Biochemistry and CHE 373 Physical Biochemistry Laboratory. These courses are briefly described below, and separate proposals for their creation have been submitted. Finally, one course that was an option in the BMB program, CHE 370, will be deleted and replaced by CHE 372 Physical Biochemistry.

CHE 372 Physical Biochemistry (new course) – CHE 372 will be a new 3 credit hour lecture course covering the thermodynamics, spectroscopy, and kinetics of biochemical systems.

CHE 373 Physical Biochemistry Laboratory (new course) – CHE 373 will be a new 1 credit hour laboratory course covering experimental applications of the thermodynamics, spectroscopy, and kinetics of biochemical systems.

CHE 370 Physical Biochemistry (deleted course) – CHE 370 is currently a 3 credit hour lecture course offered as an option to CHE 360 (Physical Chemistry I) for students in the BMB program. This course will be deleted and replaced by CHE 372.

8. Anticipated funding needs and source of funds.

The new Major in Biochemistry, along with the new Major in Molecular & Cellular Biology proposed by the School of Biological Sciences, will replace the existing Biochemistry/Molecular Biology (BMB) program, so the costs are not expected to change significantly. The existing BMB budget will be split and committed directly to each unit, Biological Sciences and Chemistry, with no overall change in budget due to the deletion process.

The new lecture course required in the Major in Biochemistry, CHE 372 Physical Biochemistry, is a replacement for an existing course (CHE 370), so the department already has the instructional capacity to offer CHE 372. The new required lab course, CHE 373 Physical Biochemistry, has been previously offered as a temporary course, CHE 389.03, so the facilities and instructional capacity for offering this course are already available within the department. All the other Chemistry courses needed for the Major in Biochemistry are already offered in the department.

9. **No** Does this program count for teacher education?

10. **No** Is this an Interdisciplinary Studies program?

11. **The following questions must be answered.**

- Yes** Have you confirmed that Milner Library has sufficient resources for the proposed program?
- No** Are more than 124 hours required to complete a degree with this major?
- No** Beyond General Education, does the major require more than 76 semester hours?
- No** Does this B.A., B.S., B.E.Ed. require more than 55 semester hours of major courses?
- Yes** Does this program stipulate specific general education courses offered in the major department/school as a part of the major requirements only if such courses serve as prerequisites for other courses required by the major?

Explain why specific general education courses are required.

CHE 140 General Chemistry I is an Inner Core Natural Science Alternative (IC-NSA) course in the General Education program and will be required for all Biochemistry majors as a replacement for the regular Inner Core science course. CHE 140 provides a more quantitative, technical approach to introductory chemistry that is necessary for later courses in the major.

- No** Is the proposed program intended to be longer than four years (as indicated by the plan of study)?
- Yes** Have letter(s) of concurrence from affected departments/schools been obtained?
A departments/school is affected if it has a program with significant overlap or if it teaches a required or elective course in the program.
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Major in Biochemistry 11/15/2011

12. Routing and action summary for New Program:**1. Chemistry Department Curriculum Committee Chair***Jean Standard (website)*

Jean Standard

5/31/2011 10:50:16 AM

SignaturePrint

Date

2. Chemistry Department Chair/School Director*John Baur (website)*

John Baur

7/6/2011 9:36:10 PM

SignaturePrint

Date

3. College of Arts & Science College Curriculum Committee Chair*Todd Stewart (website)*

Todd Stewart

9/14/2011 3:41:10 PM

SignaturePrint

Date

4. College of Arts & Science College Dean*Sally Parry (website)*

Sally Parry

9/20/2011 10:44:35 AM

SignaturePrint

Date

5. University Curriculum Committee Chair*Jean Standard (website)*

Jean Standard

10/25/2011 6:31:35 PM

SignaturePrint

Date

All new programs (majors, minors, sequences) are routed by the U.C.C. to the Academic Senate
