

Eastern Illinois University
Revised Course Proposal
CHM 3450, Biochemistry I

Agenda Item #16-96
Effective Fall 2017

Banner/Catalog Information (Coversheet)

1. ☐ New Course or ☒ Revision of Existing Course
2. Course prefix and number: CHM 3450
3. Short title: Biochemistry I
4. Long title: Biochemistry I
5. Hours per week: 3 Class 0 Lab 3 Credit
6. Terms: ☒ Fall ☐ Spring ☒ Summer ☐ On demand
7. Initial term: ☒ Fall ☐ Spring ☒ Summer Year: 2017
8. **Catalog course description:** A comprehensive introduction to the chemical structure and biochemical functions of proteins, lipids, carbohydrates, and nucleic acids and enzymology as well as an introduction to the central energy metabolic pathways of glycolysis, the tricarboxylic acid cycle, and oxidative phosphorylation.
9. **Course attributes:**

General education component: _____

☐ Cultural diversity ☐ Honors ☐ Writing centered ☐ Writing intensive ☐ Writing active
10. **Instructional delivery**
Type of Course:

☒ Lecture ☐ Lab ☐ Lecture/lab combined ☐ Independent study/research
☐ Internship ☐ Performance ☐ Practicum/clinical ☐ Other, specify: _____
Mode(s) of Delivery:

☒ Face to Face ☒ Online ☐ Study Abroad
☐ Hybrid, specify approximate amount of on-line and face-to-face instruction _____
11. Course(s) to be deleted from the catalog once this course is approved. None
12. **Equivalent course(s):** None
 - a. Are students allowed to take equivalent course(s) for credit? ☐ Yes ☒ No
13. **Prerequisite(s):** CHM 2840 (Organic Chemistry II)
 - a. Can prerequisite be taken concurrently? ☐ Yes ☒ No
 - b. Minimum grade required for the prerequisite course(s)? C
 - c. Use Banner coding to enforce prerequisite course(s)? ☒ Yes ☐ No

d. Who may waive prerequisite(s)?

☐ No one ☒ Chair ☒ Instructor ☐ Advisor ☐ Other (specify) _____

14. Co-requisite(s): None _____

15. Enrollment restrictions

a. Degrees, colleges, majors, levels, classes which may take the course: All

b. Degrees, colleges, majors, levels, classes which may not take the course: None _____

16. Repeat status: ☒ May not be repeated ☐ May be repeated once with credit

17. Enter the limit, if any, on hours which may be applied to a major or minor: N/A

18. Grading methods: ☒ Standard ☐ CR/NC ☐ Audit ☐ ABC/NC

19. Special grading provisions:

☐ Grade for course will not count in a student's grade point average.

☐ Grade for course will not count in hours toward graduation.

☐ Grade for course will be removed from GPA if student already has credit for or is registered in: _____

☐ Credit hours for course will be removed from student's hours toward graduation if student already has credit for or is registered in: _____

20. Additional costs to students:

Supplemental Materials or Software None _____

Course Fee ☒ No ☐ Yes, Explain if yes _____

21. Community college transfer:

☐ A community college course may be judged equivalent.

☒ A community college may not be judged equivalent.

Note: Upper division credit (3000+) will not be granted for a community college course, even if the content is judged to be equivalent.

Rationale, Justifications, and Assurances (Part I)

1. X Course is required for the major(s) of Chemistry BS (Chemistry and Biochemistry Concentrations)

___ Course is required for the minor(s) of _____

___ Course is required for the certificate program(s) of _____

X Course is used as an elective

2. **Rationale for proposal:** This course has been traditionally offered face-to-face once a year and hereafter it will be offered twice a year: fall – face to face and summer – online. Offering additional online section(s) will help serve increased demand for the course following changes in MCAT coverage. Additionally, minor changes to the catalog course description have been made to more accurately depict the course content.

3. **Justifications for (answer N/A if not applicable)**

Similarity to other courses: N/A

Prerequisites: Comprehensive knowledge of organic functional groups, organic chemical reactions of biochemically relevant functional groups, and organic reaction mechanisms are necessary to understand the concepts of biochemistry.

Co-requisites: N/A

Enrollment restrictions: N/A

Writing active, intensive, centered: N/A

4. **General education assurances (answer N/A if not applicable)**

General education component: N/A

Curriculum: N/A

Instruction: N/A

Assessment: N/A

5. **Online/Hybrid delivery justification & assurances (answer N/A if not applicable)**

Online or hybrid delivery justification: Currently CHM 3450 is offered in the fall semester face to face. The revised Medical College Admission Test (MCAT) format implemented in 2015 has increased the Biochemistry content significantly, thus increasing the demand for the CHM 3450 course that covers most of the MCAT biochemical content. Online offering of CHM 3450 would allow students who complete the Organic Chemistry II prerequisite in the fall or spring to take CHM 3450 without waiting until the subsequent fall semester. Additionally, online offering would open up the course to students outside EIU.

Instruction: This course will be delivered asynchronously through EIU's *Desire2Learn* (D2L) online course delivery system. Course content will be delivered using voice-over PowerPoint lectures, videos, and discussion forums, and will be available at times that are convenient to students. All faculty who will deliver this course online are/will be OCDI (or approved equivalent) trained.

Integrity: All exams and quizzes will be taken using the Respondus Lockdown Browser (EIU recommended method) to help prevent academic dishonesty. This browser system prevents the user from using their computer for anything other than completing the test during the allotted time period. Also, any essay type answers will be submitted via Turnitin.com (EIU recommended method) to help prevent plagiarism.

Interaction: Students will be required (as part of their course grade) to lead and participate in discussions mediated through Desire2Learn (D2L). Instructor-student interactions will be available through discussion boards, email, and telephone. For office hours synchronous visual technologies (by appointment) may be used.

Model Syllabus (Part II)

Please include the following information:

1. Course number and title.
CHM 3450; Biochemistry I
2. Catalog description:
A comprehensive introduction to the chemical structure and biochemical functions of proteins, lipids, carbohydrates, and nucleic acids and enzymology as well as an introduction to the central energy metabolic pathways of glycolysis, the tricarboxylic acid cycle, and oxidative phosphorylation.
3. Learning objectives (Learning Goals)
Upon successful completion of the course, the student should
 - A. demonstrate understanding of the molecular level buildup of the unit of life: the cell. (CT-1)
 - B. apply knowledge of physical and chemical properties of water and its influences in the behavior of biological macromolecules. (CT-3, QR-1)
 - C. conceptualize basic thermodynamic principles and how biological processes are governed by thermodynamic laws. (CT-1, WR-2)
 - D. be able to recognize the structures and the chemical properties of amino acids and their organization into polypeptides and proteins. (CT-3)
 - E. analyze protein primary, secondary, tertiary and quaternary structure and functional influence of these structural organizations. (CT-3)
 - F. demonstrate understanding of the structures and the chemical properties of carbohydrates, lipids, and nucleic acids and their function as biomolecules. (CT-1)
 - G. be able to recognize different membrane compositions and identify different membrane transport modes. (CT-1)
 - H. demonstrate comprehensive understanding of basic enzymology concepts, mechanisms and regulations. (CT-1, CT-2, QR-1)
 - I. be able to distinguish the key principles of energy metabolism: glycolysis, citric acid cycle and oxidative phosphorylation. (CT-1, WR-2)
4. Course materials.
Text: *Biochemistry*, 5th Edition, Garrett and Grisham, Thomson-Brooks/Cole, 2013. Scientific calculator for use during lecture, quizzes, and exams.
5. Weekly outline of content
Below is an outline for a 3-0-3 face-to-face section of the course with 150 minutes per week of class time. The overall time commitments for the on-line and face to face sections of the course will be equivalent. The online sections will be a 6 weeks summer session and the topics will be divided over this period to best reflect the variety of topics covered in the course.

EIU Learning Goals Subsets covered by this course

CT - Critical Thinking: CT-1: Asking essential questions and engaging diverse perspectives;

CT-3: Understanding, interpreting, and critiquing relevant data, information, and knowledge.

WR - Writing and Critical Reading: WR-1: Creating documents appropriate for specific audiences, purposes, genres, disciplines, and professions; WR-2: Understanding, questioning, analyzing, and synthesizing complex textual, numeric, and graphical sources.

QR – Quantitative Reasoning: QR-1: Performing basic calculations and measurements.

15-Week (Fall)	6-Week (Summer)	Topic	Chapter
1	1	Introduction to Living Organisms, Biomolecules	1
2	1	Properties of Water, Acid-Base Chemistry, Introduction to Biochemical Thermodynamics	2, 3
3	1	Amino Acids	4
4	2	Protein Structure and Functions	5
5	2	Protein Structure and Functions	6
6	3	Carbohydrate Structure and Functions	7
7	3	Lipid Structure and Functions	8
8	3	Membrane Structure and Functions	9
9	4	Introduction to Nucleic Acid Structure and Functions	10
10	4	DNA, RNA Structure, Functions and Recombinant DNA Technology	11, 12
11	5	General Concepts of Enzymology	13
12	5	Enzyme Mechanisms	14
13	5	Enzyme Regulations	15
14	6	Introduction to Energy Metabolism: Glycolysis and Citric Acid Cycle	17, 18, 19
15	6	Introduction to Energy Metabolism: Oxidative Phosphorylation	20
16	6	Final Exam	

6. Assignments and evaluation, including weights for final course grade.

Exams (3-4 hourly exams throughout the semester and a two-hour final) 65%

Quizzes (5 in class and attendance quizzes) 15%

Problem Set (5) 10%

Integrated Activity* 10%

(Critical Review Report/ Molecular Visualization / Discussion forum)

Total 100%

7. Grading scale: A = 90 to 100 %, B = 80 to 89%, C = 70 to 79%, D = 60 to 69%, F < 60%

8. Correlation of learning objectives to assignments and evaluation. #

Learning Objective (from II.3)	Exams (65%)	Quizzes (15%)	Problem Set (10%)	Integrated Activity* (10%)	University Learning Goals®
A	X	X	X		CT-1
B	X	X	X		CT-3, QR-1
C	X	X	X		CT-1, WR-2
D	X	X	X	X	CT-3
E	X	X	X	X	CT-3
F	X	X	X	X	CT-1
G	X	X	X	X	CT-1
H	X	X	X	X	(CT-1, CT-2, QR-1)
I	X	X	X		(CT-1, WR-2)

Since the Learning Objectives are content oriented, all the assignments and evaluations assess the achievement of the objectives on specific topics.

* Integrated activity will evaluate student's ability to encompass broad biochemical concepts to analyze a specific biochemical topic. The topic may vary semester to semester depending on the current interest in the field.

@ CT - Critical Thinking; WR - Writing and Critical Reading; QR – Quantitative Reasoning

Date approved by the department or school: October 28, 2016

Date approved by the college curriculum committee: November 4, 2016

Date approved by the Honors Council (*if this is an honors course*):

Date approved by CAA: December 8, 2016 CGS: Not applicable