



Syllabus for BIOE135-01: Biochemistry for Engineers

Spring 2019

Instructor: Eva de Alba Bastarrechea

Designation:	BIOE 135: Biochemistry for Bioengineers
Catalog Description:	Biochemistry involves the characterization of the macromolecules of life from both structural and functional standpoints. An in-depth understanding of the chemical, structural, and functional properties of biomolecules is an essential step towards comprehending the molecular basis of Biology and being able to design and implement the engineering solutions to biological and biomedical problems that are at the core of Biological Engineering. Students in this course will learn the fundamental concepts of biomolecular structure and function, the chemical and structural properties of proteins, nucleic acids, lipids and carbohydrates, the mechanisms for their assembly and function, and the tools/approaches used in their isolation and characterization. The emphasis of BIOE135 is on meeting the specific educational needs of bioengineering majors and thus focuses on the more analytical and quantitative aspects of the discipline.
Text Books and Other Required Materials:	Fundamentals of Biochemistry 5th Edition by Donald Voet, Judith G. Voet & Charlotte W. Pratt. (2016) Wiley ISBN: 978-1118918401.
Course Objectives/ Student Learning Outcomes:	<ol style="list-style-type: none">1. Describe, understand and use the fundamental tools and techniques employed for the structural and functional analysis of biomolecules.2. Learn the basic concepts of biomolecular structure and function and their connection with their biological roles.3. Describe, understand and rationalize the different types of biomolecules, their chemical and structural properties, and how are those properties utilized in performing their biological function.4. Show mastery of fundamental topics in biochemistry, including sequence/structure/function relationships; physical factors determining biomolecular structure, folding and stability; methods and techniques for structural and functional analysis of biomolecules; enzymatic catalysis and regulation; ligand binding and cooperativity; lipids and membranes, biomolecular transport; conformational changes. At the end of the course, the students should be able to converse with scientists and read technical literature about all these topics.5. Articulate the scientific vocabulary used in communicating scientific information in biochemistry and biomolecular engineering.
Program Learning Outcomes:	
Prerequisites by Topic:	MATH 21, PHYS 9 or 19, CHEM 8 and 10
Course Policies:	

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1. Attendance is mandatory. Scientific calculator will be needed for the review sessions. No recording devices are allowed in class.

2. Discussion Sections: Discussion sections are provided to help the student learn and understand the material from lectures. Students need to come to Discussion sections prepared with questions and participate actively on them to get their full value. During most Discussion, the TA will either give a quiz or assign a homework set. There are no make-up quizzes or homework sets. Work must be shown for homework assignments, and these cannot be turned in late.

Academic Dishonesty Statement:

- a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work.
- b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action.
- c. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.

Disability Statement:

Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.

Topics:

1. Chemical and Physical Properties of Water
2. Amino Acids
3. Proteins Primary Structure, Working with Proteins
4. Proteins Three-Dimensional Structure
5. Protein Function (Ligand Binding and Cooperativity)
6. Carbohydrates
7. Lipids and Biological Membranes
8. Membrane Transport
9. Enzyme Catalysis
10. Enzyme Kinetics, Inhibition, and Control
11. Nucleotides, Nucleic Acids, and Genetic Information
12. Nucleic Acid Structure
13. DNA Replication, Repair and Recombination
14. Transcription and RNA Processing
15. Protein Synthesis

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Class/laboratory Schedule:	Lecture: Mondays and Wednesdays (9:00 am to 10:15 am). COB 114. From January 16th to May 4th/Discussion Sessions: Mondays (10:30-11:20 am). COB 261.
Midterm/Final Exam Schedule:	Final Exam: May 16th; 11:30 am – 2:30 pm; SSM 104
Course Calendar:	
Professional Component:	
Assessment/Grading Policy:	<p>60% Exams: Midterm Exam – 30% Final Exam – 30%</p> <p>20% Class Participation (Students will be quizzed regularly. The students will be informed of their cumulative score to date from class participation before the midterm exam and two weeks before the final exam)</p> <p>20% Quizzes and Homework from Recitation Sections</p>
Coordinator:	Professor Eva de Alba
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Office Hours:	Tuesdays and Fridays (9:00 am-10:30 am). S&E Building 2. Rm 382.