CHEM 514: Biochemistry

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Office Hours: T, R, 9:30 am-12 pm
Class Meetings: Mon, Wed and Fri 1:00-1:50 PM; Location: STC 123

COURSE MATERIALS
Recommended for additional reading
Lehninger, Principles of Biochemistry, Fourth Edition
Biochemistry by Garrett and Grisham.
Biochemistry by Mathews and Van Holde

COURSE DEFINITION
This is a one-semester graduate-level course in biochemistry that will develop mastery in the nomenclature and function of the major classes of molecules associated with living organisms. The subject matter is appropriate to prepare students for doctoral programs in chemistry, biochemistry, or molecular biology. Emphasis will be given to learning the underlying physical and chemical principles that control enzyme catalyzed reactions important in basic metabolic pathways. The structure and function of proteins and nucleic acids will also be covered at a level that will give students an appreciation of the modern subfield of “genomics” and “proteomics”.

CREDITS: 3 Course Credits for Class

PREREQUISITES: Consent of instructor.

COURSE DESCRIPTION
This course in biochemistry is intended to provide graduate students with a foundation and in depth knowledge of biochemistry. This course will be covering many aspects of biochemistry, including: biomolecules and metabolism. The course consists of lectures sessions and the topic covered will be given in details in the course schedule.

STUDENT LEARNING OUTCOMES
The main objectives of this course are to provide a basic foundation and understanding of the principles of modern biochemistry necessary for further work in the biochemical/ biomedical areas. Unlike much earlier chemistry the material is often conceptually complex and not yet amenable to straightforward mathematical interpretation. Accordingly, the students may find the material more heavily descriptive than in their earlier chemical studies. By the end of this course the students will have a better understanding of the structure and function of the biological macromolecules its metabolism and biosynthesis.
Student Learning Outcomes (SLO)
At the completion of this course students will be able to:

- Identify the levels of structure in proteins and explain the structural stabilization.
- Describe the relationship of structure and function of proteins.
- Interpret plots of enzyme kinetic data.
- Describe the primary metabolic pathways of major molecular classes.
- Perform various techniques to separate, characterize and quantitate proteins.
- Perform techniques to characterize and quantitate lipids.
- Communicate experimental results to the peers.
- Be able to summarize and analyze biochemistry journal articles for relevant content.
- Be able to develop and write a research paper on a topic in biochemistry with a bibliography that should help them prepare to write a journal article for publication.

ATTENDANCE POLICY
All students are expected to attend classes on a regular basis. According to the TAMU-Commerce Procedure A13.02, if a student has excessive absences, the instructor may drop the student from the course. The instructor will only excuse an absence if the student provides, with appropriate document, an excusable reason allowed by the TAMU-Commerce Procedure A13.02.

COURSE REQUIREMENTS
Exams
There will be four equally weighted exams given, three during the course and the fourth at the final exam time. The students will be expected to be available and prepared for the exams at the specified times. *Missing an exam will result in a 0 score for that exam unless due to illness as documented by a doctor's note and the student notifies the instructor of the illness before the exam (e-mail, phone message, etc.).* Make-up exams will not be given ordinarily. The exams will contain a mix of objective and subjective question (multiple choice questions, true-false questions, long (explanation) questions, short (formulas and definitions) questions and graphical/diagrammatic questions.

Reading assignments
There will be (4) reading assignments composed of reading (2) journal articles. Each graduate student will provide a 1 page synopsis/analysis of each journal article (2 pages/assignment). The reading assignments are as follows:

Reading Assignment 1 (due September 25):


Reading Assignment 2 (due October 19):


**Reading Assignment 3 (due November 16):**


**Reading Assignment 4 (due December 11):**


Each 2 page synopsis/analysis of the reading assignment will represent 3% of the final grade.

**Research paper**

The required research paper for CHEM 514 (10 pages including references) will explore an area of biochemistry and its impact upon society (topic must be approved by instructor by October 1). The research paper will be due on Friday, December 11.

**Grading**

For students enrolled in CHEM 514, your final grade will be based on your performance in 3 exams (each exam 20%), 4 reading assignments (total of 12%) a research paper (13%) and the final exam (15%). Grading will be based on a standard percentage scale: 100-90 = A; 89-80 = B; 79-70 = C; 69-60 = D; 59-below = F. Dishonest scholarship will earn an automatic zero (0) and initiate prosecution to the fullest extent. Incomplete grades may be given only if the student has a current average ≥70% and is precluded from completion of the course by a documented illness or family crisis.

**COURSE CALENDAR**

All dates and assignments are tentative and subject to change

**Date-Topic(s)-Chapter(s)**

**August**

31-Biochemistry, an Evolving Science-Chapter 1

**September**

2-Biochemistry, an Evolving Science-Chapter 1
4- Water and biological buffers-Chapter 1
7-No Class (Labor Day)
9-Water and biological buffers-Chapter 1
11-Protein Composition & Structure-Chapter 2
14-Protein Composition & Structure-Chapter 2
16-Protein Composition & Structure-Chapter 2
18-Exploring Proteins & Proteomes-Chapter 3
21-Exploring Proteins & Proteomes-Chapter 3
23-Exploring Proteins & Proteomes-Chapter 3
25-Review
**28-FIRST EXAM**
30-Nucleic Acids-Chapters 4, 5, 6

**October**
1-Nucleic Acids-Chapters 4, 5, 6
5-Enzymes-Chapters 8, 9, 10
7-Enzymes-Chapters 8, 9, 10
9-Enzymes Chapters 8, 9, 10
12-Enzymes Chapters 8, 9, 10
14-Hemoglobin-A Protein in Action-Ch. 7
16-Hemoglobin-A Protein in Action-Ch. 7
19-Review
**21-SECOND EXAM**
23-Carbohydrates-Chapter 11
**26-No Class (Welch Conference)**
28-Carbohydrates-Chapter 11
30-Lipids & Cell Membranes-Chapter 12

**November**
2-Channels & Pumps-Chapters 13, 14
4-Channels & Pumps Chapters 13, 14
6-Metabolism–cofactors, energy-Chapter 15
9-Metabolism–cofactors, energy-Chapter 15
11-Glycolysis and Gluconeogenesis-Chapter 16
13-Glycolysis and Gluconeogenesis-Chapter 16
16-Review
**18-THIRD EXAM**
20-Citric Acid Cycle-Chapter 17
23-Citric Acid Cycle-Chapter 17
25-No Class (Thanksgiving Holiday)
27-No Class (Thanksgiving Holiday)
30-Oxidative Phosphorylation-Chapter 18

**December**
2-Oxidative Phosphorylation-Chapter 18
4-Fatty Acid Metabolism-Chapter 22
7-Fatty Acid Metabolism Chapter 22
9-Urea Cycle, Protein/Amino Acid Catabolism-Chapter 23
11-Review
WEEK OF DECEMBER 14-18-CUMULATIVE FINAL EXAM

STUDENT CONDUCT POLICY
All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment (see Student’s Guidebook, Policies and Procedures, Conduct). Any student engaging in disruptive behavior will be dismissed from class on a first offense. A second offence may constitute dismissal from the course with a failing grade.

ACADEMIC MISCONDUCT
Academic cheating, plagiarism and other types of academic misconduct may result in the student being removed from the class with a failing grade. Extreme cases of academic misconduct may result in suspension or expulsion from the University as described in the Code of Student Conduct section of the Student’s Guidebook.

STUDENTS WITH DISABILITIES
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library, Room 132
Phone: (903) 886-5150 or (903) 886-5835
Fax: (903) 468-8148
E-Mail: StudentDisabilityServices@tamuc.edu

Please advise the instructor of any special problems or needs at the beginning of the semester.

NONDISCRIMINATION NOTICE
Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity or gender expression will be maintained.