

**CHEM 514: Biochemistry****Instructor: Dr. Thomas West****Office:** STC 302**E-mail:** Thomas.West@tamuc.edu**Phone:** 903-886-5399**FAX:** 903-468-6020**Office Hours:** By appointment.**COURSE MATERIALS****Required Text Book:** Biochemistry by Berg, Jeremy M.; Gatto, Gregory J., Jr., Hines, Justin K.; Tymoczko, John L. and Stryer, Lubert. New York: W. H. Freeman and Co: 10th edition.**Recommended for additional reading**

Lehninger, Principles of Biochemistry, Eighth Edition

Biochemistry by Garrett and Grisham, Sixth Edition.

**COURSE DEFINITION**

This is a one-semester online 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 subfields 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 online lecture sessions and the topic covered will be given in detail 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 course, 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 relative to their 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 between structure and function of proteins.
- Understand the use of various techniques to separate and characterize proteins.
- Understand the function and structure of the major classes of biochemical precursors and macromolecules
- Interpret plots of enzyme kinetic data.
- Describe the primary metabolic pathways of the major molecular classes.
- Be able to summarize and analyze biochemistry journal articles for relevant content.
- Effectively analyze and interpret experimental results in biochemical terms to peers.

### ATTENDANCE POLICY

All students are expected to view the online lectures on a regular basis in D2L. 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 two equally weighted online exams given (25%) with the final comprehensive online exam (20%) being given at the final exam time (August 8). The students will be expected to be available and prepared for the exams at the specified times. ***Missing an online 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 online 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 (3) reading assignments composed of reading (3) journal articles. Each graduate student will provide a 1 page synopsis/analysis of each journal article (3 pages/assignment) uploaded under Assignments within the Activities tab. The reading assignments are as follows:

#### Reading Assignment 1 (due Monday, July 14):

Haber, E. and Anfinsen, C. B. (1962). Side-chain interactions governing the pairing of half-cystine residues in ribonuclease. J. Biol. Chem. 237:1839-1844.

O'Farrell, P. H. (1975) High resolution of two-dimensional electrophoresis of proteins. J. Biol. Chem. 250:4007-4021.

Go, Y.-M. and Jones, D. P. (2013) The redox genome. J. Biol. Chem. 288:26512-26520.

#### Reading Assignment 2 (due Monday, July 28):

Samaja, M., Rovida, E., Niggeler, M., Perrella, M. and Rossi-Bernard, L. (1987) The dissociation of carbon dioxide from hemoglobin intermediates. J. Biol. Chem. 262:4528-4533.

Schachman, H. (1988) Can a simple model for the allosteric transition of aspartate transcarbamoylase? J. Biol. Chem. 263:18583-18586.

Johnson, K. A. and Goody, R. S. (2011) The original Michaelis constant: translation of the 1913 Michaelis-Menten paper. Biochemistry 50:8264–8269.

**Reading Assignment 3 (due Monday, August 4):**

Lenzen, A. (2014) A fresh view of glycolysis and glucokinase regulation: History and current status. J. Biol. Chem. 289:12189-12194.

Clister, T., Mehta, S., and Zhang, J. (2015) Single-cell analysis of G-protein signal transduction. J. Biol. Chem. 290, 6681–6688.

Yang, Y., Lee, M. and Fairn, G. D. (2018) Phospholipid subcellular localization and dynamics. J. Biol. Chem. 293, 6230–6240.

**Each 3-page synopsis/analysis of the reading assignment will represent 10% of the final grade. Reading assignments not submitted on time will receive a grade of zero. There are 3 reading assignments so the reading assignments represent 30% of the final grade. Reading assignments are expected to be uploaded into myLeo Online (D2L) by the date assigned.**

**Your final grade will be based on your performance in 2 online exams (each exam 25%), 3 online reading assignments (total of 30%) and the online comprehensive final exam (20%).** 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 <sup>3</sup>70% and is precluded from completion of the course by a documented illness or family crisis. No make-up online exams will be allowed without a valid excuse. **NO extra credit assignments will be given during this course. The last day to drop with a Q grade is July 28, 2025.**

**Grading**

Reading Assignments	30 points
Two Exams	50 points
Final Exam	20 points
<b>Total Points</b>	<b>100 points</b>

**COURSE CALENDAR**

All dates and assignments are tentative and subject to change

<b>Date</b>	<b>Unit</b>	<b>Textbook Chapter</b>
Week 1 (Week of 7/7)	<b>Unit 1</b>	Chapter 1, Biochemistry in Space and Time
	<b>Unit 2</b>	Chapter 2, Protein Composition & Structure
	<b>Unit 3</b>	Chapter 3, Binding and Molecular Recognition
<b>First Reading Assignment</b>		<b>Due Monday, July 7/14</b>
Week 2 (Week of 7/14)	<b>Unit 4</b>	Chapter 4, Protein Methods
	<b>Unit 5</b>	Chapter 5, Enzymes: Core Concepts and Kinetics
	<b>Unit 6</b>	Chapter 6, Enzyme Catalytic Strategies
<b>Exam 1 (Thursday, July 17)</b>		
	<b>Unit 7</b>	Chapter 7, Enzyme Regulatory Strategies
Week 3 (Week of 7/21)	<b>Unit 8</b>	Chapter 8, DNA, RNA, and the Flow of Genetic Information
	<b>Unit 9</b>	Chapter 9, Nucleic Acid Methods
	<b>Unit 10</b>	Chapter 10, Exploring Evolution and Bioinformatics
	<b>Unit 11</b>	Chapter 11, Carbohydrates and Glycoproteins
<b>Second Reading Assignment</b>		<b>Due Monday, July 28</b>
Week 4 (Week of 7/28)	<b>Unit 12</b>	Chapter 12, Lipids and Biological Membranes
	<b>Unit 13</b>	Chapter 13, Membrane Channels and Pumps
	<b>Unit 14</b>	Chapter 14, Signal Transduction Pathways
	<b>Unit 15</b>	Chapter 15, Metabolism: Basic Concepts and Themes
<b>Exam 2 (Thursday, July 31)</b>		
<b>Third Reading Assignment</b>		<b>Due Monday, August 4</b>
Week 5 (8/4-8/6)	<b>Unit 16</b>	Chapter 16, Glycolysis & Gluconeogenesis
	<b>Unit 17</b>	Chapter 17, Pyruvate Dehydrogenase and Citric Acid Cycle
	<b>Unit 18</b>	Chapter 18, Oxidative Phosphorylation
<b>Final Exam (Thursday, August 7)</b>		

**TECHNOLOGY REQUIREMENTS****LMS**

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:

<https://community.brightspace.com/s/article/Brightspace-Platform-Requirements>

LMS Browser Support:

[https://documentation.brightspace.com/EN/brightspace/requirements/all/browser\\_support.htm](https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm)

YouSeeU Virtual Classroom Requirements:

<https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements>

## ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or [helpdesk@tamuc.edu](mailto:helpdesk@tamuc.edu).

**Note:** Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

## COMMUNICATION AND SUPPORT

The best way to communicate with the instructor is via e-mail: [thomas.west@tamuc.edu](mailto:thomas.west@tamuc.edu).

### Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

<https://community.brightspace.com/support/s/contactsupport>

## COURSE AND UNIVERSITY PROCEDURE/POLICIES

### COURSE SPECIFIC PROCEDURES

#### Syllabus Change Policy

The syllabus is a guide. Circumstances and events may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

### UNIVERSITY SPECIFIC PROCEDURES

#### Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable

behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the **Student Guidebook**.

<http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx>

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: <https://www.britannica.com/topic/netiquette>

### **TAMUC Attendance**

For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01.

<http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx>

<http://tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf>

### **Academic Integrity**

Academic Integrity Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

Undergraduate Academic Dishonesty 13.99.99.R0.03

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf>

Graduate Student Academic Dishonesty 13.99.99.R0.10

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf>

### **ADA Statement**

#### **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

Waters Library, Room 162

Phone: (903) 886-5150 or (903) 886-5835

Fax: (903) 468-8148

E-Mail: [StudentDisabilityServices@tamuc.edu](mailto:StudentDisabilityServices@tamuc.edu)

Website: Office of Student Disability Resources and Services

<http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/>

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

### **Counseling Services Statement**

The Counseling Center at A&M-Commerce, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit [www.tamuc.edu/counsel](http://www.tamuc.edu/counsel)

### **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.

### **Campus Concealed Carry**

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations. For a list of locations, please refer to

(<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>) and/or consult your event organizer). Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

### **AI Use Policy**

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course. Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism). Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. If no instructions are provided the student should assume that the use of such software is disallowed. In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty

13.99.99.R0.10 Graduate Student Academic Dishonesty