



TEXAS A&M UNIVERSITY
SAN ANTONIO

College of Arts & Sciences

Biological Chemistry I - CHEM 4341 Syllabus

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Office: STEM 311Y

Class Hours: M, W, F 2.00-2.50 PM

Class location: CAB 223

Office Hours: T, R 9 am to 12 pm (by appointment only)

Some guidelines for being on track with this class

- a) Come to class regularly. I understand that things happen, and you might miss one or two sessions, but DO NOT make it a habit.
- b) Use all materials provided to you by your instructor (textbook, slides, class notes, any handouts, etc.) rather than using unverified videos from the web.
- c) Talk to your instructor when you miss a class/assignment, irrespective of if you missed it for excused or unexcused reasons.
- d) Attend office hours from the start of the semester. Studies show that attending office hours/study sessions just before the exams is not effective.
- e) Study regularly. For a 3-credit course, students are expected to spend ~9 hours per week outside of the class preparing for the class.

Course objectives

Introduction to the important concepts, nomenclature and compounds of biochemistry with special emphasis on the chemical interpretation of the structures and function of biological macromolecules. TSI Restriction(s): Reading, Math, and Writing

Prerequisites: [CHEM 2325](#) with a C or better.

Course context as outlined by the American Chemical Society (ACS)



“In the belief that all professional chemists need to know some biochemistry, the ACS guidelines require that approved programs offer and certified majors graduate with the equivalent of three semester hours of biochemistry. Molecular aspects of biological structures, equilibria, energetics, and reactions should be covered in the required biochemistry experience for chemistry majors. Sufficient introduction should be presented so that students can obtain the flavor of modern biochemistry and an appreciation of the important applications in biotechnology” Conceptual topics as suggested by the ACS Biological Structures and Interactions

- Fundamental building blocks (amino acids, carbohydrates, lipids, nucleotides, and prosthetic groups)
- Biopolymers (nucleic acids, peptides/proteins, glycoproteins, and polysaccharides)
- Membranes
- Supramolecular architecture Biological Reactions
- Kinetics and mechanisms of biological catalysis
- Biosynthetic pathways and strategies/metabolic engineering
- Metabolic cycles, their regulation, and metabolomics
- Organic and inorganic cofactors

Biological Equilibria and Thermodynamics

- Acid-base equilibria
- Thermodynamics of binding and recognition
- Oxidation and reduction processes
- Electron transport and bioenergetics
- Protein conformation/allostery, folding, oligomerization, and intrinsically disordered proteins (IDPs).

Learning Objectives:

- Students will demonstrate knowledge of basic cellular structure and biological molecules
- Students will discuss special properties of water and how the aqueous environment influences the behavior of biological macromolecules
- Students will be able to carry out pH and buffer related calculations
- Students will be able to draw structures of amino acids and demonstrate their knowledge of their chemical properties and their organization into polypeptides and proteins
- Students will discuss and compare methods for isolating and characterizing proteins
- Students will demonstrate knowledge of protein structure and function
- Students will demonstrate knowledge of enzymes and enzyme kinetics and perform calculations related to enzyme kinetics
- Students will demonstrate knowledge of structure and chemistry of fundamental monosaccharides and polysaccharides
- Students will demonstrate knowledge of structure and basic function of nucleotides
- Students will demonstrate knowledge of structures of different classes of lipids and their roles in biological systems

Required Course Materials

Textbook: Biochemistry Concepts & Connections by Appling, Anthony-Cahill, Mathews, 2nd edition

Homework: Mastering Chemistry is required. To access it through blackboard, go to the homework folder. Click on the first assignment, which will prompt you to link an account to your blackboard course. Log in or create an account if it is the first time using Mastering. Use the access code described above. If there are any issues obtaining your access code, you can get a 2-week' temporary access while we sort your code with the bookstore.

Scientific calculator: Any brand scientific calculator for performing numerical calculations.



Classroom/Course policies

Communication: The best way to contact me is through email, sbanerjee@tamusa.edu. All correspondence between an instructor and a student must occur via university email. You must have Jaguar email account ready and working. If it is not working, contact the help desk at sahelp@tamusa.tamus.edu or at 210-784-4357. Students are expected to access Blackboard for updates on the course, announcements and other course materials. All students are strongly encouraged to come to office hours or make appointments at other times to discuss course material and answer questions.

**Emails should be professional (I am happy to explain this, but professional emails are NOT text messages), clear, and preferably sent within working hours (8 am-6 pm). If you do not hear back in 48 hours, please reach back again. **

Attendance Policy: All students are expected to attend lectures and actively engage in class discussion, activities, and online assignments. Attendance will be monitored and can be used to make decisions on cases of borderline grades. If you are absent, you are responsible for the material covered and are expected to get notes, announcements and any other material from another student in the class.

Absences will be excused if due to illness (medical excuse), death of a close family member, religious holiday, official university activity or cancellation of classes, military duties, pregnancy & related conditions and participation in legal proceedings. Students are STILL REQUIRED TO MAKEUP THE MISSED WORK DUE TO EXCUSED ABSENCE WITHIN SEVEN CALENDAR DAYS AFTER DISCUSSING WITH THE INSTRUCTOR.

Excessive absences (more than 3) and tardiness will not be tolerated. Accumulation of more than three unexcused absences can result in the student being dropped from the class or in one letter lecture grade decreased at the discretion of the instructor.

Missed assignment policy: If a student misses an assignment (in-class activity/test/homework) due to university excused reasons, they must provide the instructor with proper documentation and make a plan for making up the missed work within a week of the assignment's original date. Being absent due to excused reasons



does not automatically ensure getting a grade/exemption from assignments. One missed unit test/hourly exam grade will be replaced by the final exam grade.

Conduct and Behavior: As an instructor my goal is to create a safe and engaging learning environment for ALL. Class disruptions are unacceptable, asking questions to clarify material during class does not qualify as a disruption and is encouraged. Disruption of the learning environment means creating a situation where other students cannot learn and if such situations arise, the instructor reserves the right to ask the disruptive party to leave the classroom. This includes but is not limited to talking loudly about things not discussed in the class, physical or verbal hostility, texting, use of headphone/listening to music during the class, actively disrupting others or the instructor from learning/teaching.

Use of electronic devices during the class session is not allowed unless instructed by the instructor. During the exams all electronic and transmitting devices **MUST** be placed in the silent mode and stored in the bag.

Academic misconduct and attempts to cheat during the exam will be pursued according to Texas A&M-San Antonio code of conduct policy. If you need to use the restroom, ask and leave all electronic devices with the instructor.

Visitors: Only students enrolled in the course are allowed in the classroom. No visitors are allowed.

IMPORTANT. Each student receives this information during the first lecture. It is your responsibility to read this material and be familiar with the course content, procedures, and grading.

Grading. Your final grade will be assigned based on your performance in four areas: (1) three 100 points exams, (2) homework assignments, (3) a final examination. **Any extra credit opportunities (if any) will be announced in class during the semester.**

3 tests (each 100 points)	= 300 points
Final	= 100 points
Homework	= 50 points
Homework AI journal	= 50 points
Total	=500 points



% of Total Points: $\left(\frac{\text{You total points}}{500}\right) \times 100$

The letter grades will be assigned based on the following distribution:

Letter Grades:	A	B	C	D	E
% of Total Points	90.00 - 100%	80.00 - 89.99%	70.00 - 79.99%	60.00 - 69.99%	0 - 59.99%

Exams: If you miss a test due to illness, you must provide a doctor's note to the dean of students and notify the instructor immediately, within 24 hrs of the test date. You are allowed **one** make-up test due to illness. **Tests will be taken in-person when you are able to return to campus.** Should you have a question concerning the way that your examination was graded, or if you think that there was an error in calculating the exam score, then it is your responsibility to bring the matter to the attention of the instructor when you pick up your test. Corrections will not be granted after you leave the office.

AI use policy: Use of Generative AI Permitted Under Some Circumstances or With Explicit Permission

There are situations and contexts within this course where you may be asked to use artificial intelligence (AI) tools to explore how they can be used. Outside of those circumstances, you should not use AI tools to generate content (text, video, audio, images) that will end up in any student work (assignments, activities, discussion responses, etc.) that is part of your evaluation in this course. Any student work submitted using AI tools should clearly indicate with attribution what work is the student's work and what part is generated by the AI. In such cases, no more than 25% of the student work should be generated by AI. If any part of this is confusing or uncertain, students should reach out to their instructor for clarification before submitting work for grading. Use of AI-generated content without the instructor's permission and/or proper attribution in this course qualifies as academic dishonesty and violates Texas A&M-San Antonio's standards of academic integrity.



Guidelines for using AI for completing online homework

Students in this class can use AI to complete their online homework assignments and students are required to stick to this AI use guideline for completing their homework.

Using AI in any other manner/using AI and not adhering to the guidelines below is prohibited and if identified would be considered as violation of academic integrity code.

1. You can use multiple AI platforms (ChatGPT, Microsoft Copilot, etc.) for all homework assignments
2. The use of AI should not supersede any of the learning objectives (critical thinking, synthesis of scientific ideas, problem solving abilities, etc.) for this course. To ensure that, students are required to maintain an **AI journal** documenting the following **every time they use an AI to complete an assignment**. This journal must document—
 - a. What is the question asking for?
 - b. What information is given in the question that serves as clues to answer the question?
 - c. What scientific theory/idea is required to answer the question?
 - d. What are some possible ambiguities in information interpretation by AI that can lead to a different answer?
 - e. What are some ethical issues of using AI for this assignment that can interfere with the learning objectives of this course?
 - f. If there were any disagreements between different AI platforms and how that informed your decision to use AI.
3. The AI journaling must be done for each homework assignment and submitted on Blackboard as a Word/Wordx/PDF on designated dates before unit tests.
4. 50% of the homework grade is assigned to proper completion and submission of the AI journal to your instructor.

Chemistry tutor: Tutoring can be obtained at the academic learning center. To book an appointment, go to blackboard and click on *brainfuse live tutoring*. Under tutor match, select *science* as a *topic* and CHEM 1311 under subject. Click *Schedule* and choose your preferred date and time. Complete the require fields and select submit.

Visit the academic learning center website for more information:
<https://www.tamusa.edu/student-resources/Academic-Success-Center/tutoring-services/index.html>



Follow the academic learning center on Instagram: @tamusa_alc

Student Misconduct: Appropriate conduct is essential to the effective functioning of the University. University policy defines unacceptable conduct, both academic and non-academic misconduct, and penalties for such behavior in The Student Handbook and The Student Code of Conduct.

Key dates

Aug 24	First day of classes
Nov 14	Last day to drop with an automatic W
Nov 25	Last day to withdraw from the university
Dec 4	Last day of scheduled classes
Dec 11	Final exam 12.00-1.50 pm

The complete academic calendar is available online.

Midterm exam dates

Test number	Test date/location	Topics evaluated*
Test-1	09/18/26 (in class)	Organic and gen chem review, amino acids, protein structures, protein folding, nucleic acids
Test-2	10/16/26 (in class)	Protein methods
Test-3	11/20/26 (in class)	Enzymes

*Detailed topic list will be discussed in class.



Tentative pacing

Date	Topic	Chapter from the book
Aug. 24 th	AI journaling practice	NA
Aug. 26 th	Syllabus, introduction, scope of Biochemistry 1 lecture	NA
Aug. 28 th	Reviewing structural models for molecule formation in the context of biochemistry	Chapter 1
Aug. 31 st	Reviewing molecular polarity, IMF and their consequence in biochemistry	Chapter 2
Sep. 2 nd	Reviewing solubility rule and the thermodynamics of solubility with water as the biological solvent	Chapter 2, Chapter 3
Sep. 4 th	Reviewing pH, pKa, pKw	Chapter 2
Sep. 7 th	Structures, properties, and classification of essential amino acids	Chapter 5
Sep. 9 th	Peptide bonds (1° structure), geometry around peptide bonds, Ramachandran plot, post translational modification	Chapter 5
Sep. 11 th	pI calculation for free amino acids, peptides under different pH	Chapter 5
Sep. 14 th	2°, 3°, and 4° structures of proteins, IMF, ΔG , ΔH , ΔS	Chapter 5
Sep. 18 th	Test-1	Chapters 1, 2, 3, and 5