Biochemistry I: Structure and Function of Macromolecules
CHEM 3501 section 01, Fall 2019, CRN 83297

Instructor: Prof. Thomas Leeper, SL3006, tleeper@kennesaw.edu, (470) 578-2258

Office Hours: Mondays and Thursdays 11am-noon or by appointment: https://thomas-leeper.youcanbook.me

Location: Science Building 215 **Days & Times:** MWF 10:10 – 11:00am

Prerequisite: CHEM 3362 (Modern Organic Chemistry II) with minimum grade of C.

Description: Chemistry and biochemistry of macromolecules: proteins, carbohydrates, lipids, and nucleic acids. Introduction to enzymes. Lecture. STEM weighted course.

Learning Objectives:
1) Students will be able to describe the chemical properties of water, pH, and buffering and perform related calculations. **2)** Students will be able to explain how amino acid, peptide, and protein structure affects chemical reactivity. **3)** Students will be able to compare and contrast the four levels of protein structure and explain the forces that cause a protein to fold. **4)** Students will be able to describe the molecular structure and chemical properties of the components of nucleic acids and explain how these features affect function. **5)** Students will be able to identify the roles that enzymes play in DNA replication and transcription and explain the mechanisms that promote the fidelity of these processes. **6)** Students will be able to list the key tools of recombinant DNA technology and explain how they are used to clone DNA and analyze genomes. **7)** Students will be able to compare and contrast the enzyme catalysis of a reaction, the thermodynamic of the reaction, and the formation of the transition state. **8)** Students will be able to calculate and evaluate rate constants and other values useful in comparing enzymes and their substrates as well as types of enzyme inhibition and activation. **9)** Students will be able to describe the molecular structure and chemical properties of mono-, di-, and polysaccharides and how these features modulate function. **10)** Students will be able to relate the structures of fatty acids and their derivatives to their functions. **11)** Students will be able to identify the major lipids and describe their biochemical functions. **12)** Students will be able to describe and diagram signal transduction pathways.

Textbook: *Biochemistry,* Berg, Tymoczko, Gatto Jr., Stryer, 9th edition,* Chapters 1-14.
*-you are welcome to use the older 6th to 8th editions, but the order of content may have changed between editions and it is your responsibility to reconcile the two editions.

Disability: Any student with a documented disability needing accommodations is requested to notify the instructor as early in the semester as possible. Verification from KSU disAbled Student Support Services is required (see Student Center room 267). All discussions will remain confidential.

Student athletes: Student athletes are required to contact their course instructor during the first week of class with their schedule of planned events that are away from campus.

Academic honesty: The policy on academic honesty is given in the college catalog and the student handbook. It is summarized below. Students failing to adhere to this policy will be held accountable. Cheating--in any form--is considered a serious offense and will be treated as such.

Academic Integrity Statement (Required): Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section II of the Student Code of Conduct addresses the university's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to university materials, misrepresentation/falsification of university records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the Department of Student Conduct and Academic Integrity (SCAI), which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement. See also http://www.kennesaw.edu/scai/content/ksu-student-code-conduct.

Disruption of Campus Life Statement: It is the purpose of the institution to provide a campus environment, which encourages academic accomplishment, personal growth, and a spirit of understanding and cooperation. An important part of maintaining such an environment is the commitment to protect the health and safety of every member of the campus community. Belligerent, abusive, profane, threatening and/or inappropriate behavior on the part of students is a violation of the Kennesaw State University Student Conduct Regulations. Students who are found guilty of such misconduct may be subject to immediate dismissal from the institution. In addition, these violations of state law may also be subject to criminal action beyond the University disciplinary process.

Schedule:

August 19th	Syllabus & Chapter 1 (Introduction and review)
August 21st	Chapter 1 (pH, pKa, and water)
August 23rd and 26th	Chapter 2 (Amino acids and primary structures of proteins)
August 28th to Sept. 4th	Chapter 2 (Secondary and tertiary structure)
September 2nd	*No Classes – Labor Day holiday*
Sept. 6th	Chapter 7 (Globin proteins).
September 9th and 11th	Chapter 3 (Exploring Proteins and Proteomes).
September 13th	**Exam 1 (Chapters 1-3, 7).**
Sept.16th to 20th	Chapter 4 (DNA, RNA, and the Flow of Genetic Information)
Sept. 23rd and 25th	Chapter 5 (Exploring Genes and Genomes)
Sept. 27th and 30th	Chapter 6 (Exploring Evolution and Bioinformatics)
Oct. 2nd	Make up day and/or special topics TBD
Oct. 4th	**Exam 2 (Chapters 4-6)**
Oct. 7th to 11th	Chapter 8 (Enzymes: Basic Concepts and Kinetics).
Oct. 14th to 18th	Chapter 9 (Catalytic Strategies)
Oct. 21st to 25th	Chapter 10 (Regulatory Strategies)
Oct. 28th	**Exam 3 (Chapters 7-10)**
Oct. 30th to Nov. 1	Chapter 11 (Carbohydrates)
Nov. 4th to 8th	Chapter 12 (Lipids and Membranes)
Nov. 11th to 13th	Chapter 13 (Membrane Channels and Pumps)
Nov. 18th to 20th	Chapter 14 (Signal Transduction Pathways)
Nov. 22nd	**Exam 4 (Chapters 11-14)**
Nov. 25th to 29th	*Fall Break*
December 2nd to 9th	TBD – probably review and/or case studies.
December 16th	**Comprehensive Final Exam (10:30 am to 12:30 pm)**

Grading Policy:
80% of grade determined by four exams and the final (16% each)
6% quizzes and attendance
10% homework
4% group problem solving
Final examination can be substituted for one or more (if multiple missed) exams.

Grading scale: A (90.00%), B (78.00%), C (65.00%), D (50.00%), F (<50%).

Rounding up? Not usually. However, if you are within 1% of the transition then I will consider rounding your grade to the next level if you worked all the homework assignments, attended nearly every class (>96%), came to multiple office hours seeking my help, and did better on the final exam than your overall grade.

Exam makeup policy: ***There will be no exam "makeups."***
If an exam is missed then the grade from the final exam can be used in place of the missed exam. For approved university activities, e.g. military service or athletic events, exam proctoring proximal to the event by the responsible advisor, typically a coach or CO, is *possible* if arrangements are made well in advance.