CHEM 3331 Fundamentals of Biochemistry — Fall, 2021

COURSE INFORMATION

Lecture Class Schedule

Sec	Day	Time	Instructor	Location
010	MWF	11:00 am - 11:50 am	Mr. Boudreaux	CAV 200

Faculty Information

Mr. Kevin Boudreaux
Office: CAV 207B
Phone: 486-6623
E-mail: Kevin.Boudreaux@angelo.edu
Office Hours: MWF 10-11, TR 11-12, or by appointment

Course Delivery

This course will be delivered in a traditional face-to-face setting with students expected to attend class in person. Some course materials will be available on the Blackboard[1] page for this course. In the event of the Covid-19 situation changing, the course may be transferred into a hybrid setting, in which face-to-face teaching is combined with remote instruction.

Required Textbook and Materials

- **Textbook:** S. L. Seager & M. R. Slabaugh, *Organic and Biochemistry for Today*, 8th ed (2014)

Course Description

A brief survey of biomolecules and their metabolism. Application to animal nutrition is made. Prerequisite: You **MUST** have passed CHEM 2353 to receive credit for this course!

Grading:

Category	Points Possible
Exams (3)	100 pts each*
Quizzes	100 pts*
Final	150 pts
Class Participation	50 pts
Total	**500 pts**

Grading Scale:

Grade	Percent	Points
A	90-100%	495-550 pts
B	80-89.9%	440-494 pts
C	70-79.9%	385-439 pts
D	60-69.9%	330-384 pts
F	<60%	0-229 pts

Attendance / Class Participation

Class roll will be taken regularly, and the attendance policy described in the Undergraduate-Graduate

* The lowest grade from among the four hour exams and the total quiz score will be dropped.

catalog will be followed. Make-ups for exams or quizzes which have been missed for valid reasons must be taken **no later than one week following the absence**. No makeup assignments will be given unless a valid excuse can be furnished. If you miss a class, it is your responsibility to find out what you missed. Two points will be taken off the 50-point Classroom Participation grade for each class missed.

Communication
I will hold regular office hours at the times listed at the beginning of this syllabus, and will also try to respond to e-mail or telephone messages within 24 hours during working hours Monday through Friday. If you send me a message on the weekend, I may not be able to respond until Monday. If you e-mail me, make sure to include the course number in your subject line.

Check your e-mail and the Blackboard page for this course frequently for announcements and policy changes. I will be sending out regular announcements via Blackboard; I usually send these announcements out via e-mail as well, but you should also be able to view these messages on the "Announcements" section on Blackboard.

Reserve Material
Most of the slides which are projected on the LCD/overhead projector will be available on the Blackboard page for this course.

Homework
Suggested homework problems from the textbook will be assigned regularly. These problems will not be graded, but they are a good preparation for the quizzes and exams.

Quizzes
Quizzes will be given every week, usually at the end of class on Fridays. They will be based on material presented since the previous quiz, and will be taken primarily from the problems in the textbook. There will be approximately 12 to 15 quizzes, worth 100 points each; the lowest two quizzes will be dropped from the total; and the remaining quiz grades will be averaged together to give a 100 point grade.

Exams
Three hour-long exams, each worth 100 pts., will be given during the regular class time on **Friday, Sept. 24**, **Friday, Oct. 22**, and **Friday, Nov. 19**. (The problems from the textbook and the quizzes will be a good preparation for these exams.)

Final Exam
The comprehensive (but not, I hope, incomprehensible) Final Exam for this course will be on **Wednesday, December 8 from 10:30 am to 12:30 pm**. About half of the questions on the final will be taken from the three hour exams and the previous quizzes. Students who must unavoidably miss the final exam at its regularly scheduled time must notify the instructor by noon of the day of the exam, otherwise no make-up provisions will be provided.

Withdrawal from the course
Anyone dropping this class by **Monday, November 22, 2020** will receive a grade of W. **No drops are allowed after this date.**

Modifications to the Syllabus
This syllabus, including grade evaluation and course schedules, is subject to modification. In particular, the COVID-19 pandemic may require significant changes in course delivery and content on potentially short notice.

Student Learning Outcomes

By the end of the semester the student should be able to:

- understand how stereochemistry applies to biological molecules
- understand the structures and major functions of carbohydrates (simple sugars and polysaccharides), lipids, amino acids, steroids, and proteins and be able to classify them
- understand the major features of cell membrane structure
- be able to write reactions to represent the formation of peptides and proteins
- understand the four levels of protein structure (primary, secondary, tertiary, and quaternary)
- describe the conditions that can cause proteins to hydrolyze or become denatured
- understand the general characteristics of enzymes, why enzymes are vital in body chemistry, and why enzymes catalyze specific reactions
- understand the structural characteristics of nucleotides, DNA, and RNA, and outline the process of DNA replication, RNA synthesis, and protein synthesis
- understand the role of macronutrients, vitamins, and minerals in the body
- understand the basic processes which occur in the metabolism of carbohydrates, lipids, and amino acids
- understand the chemical compositions of plasma, interstitial fluid, and intracellular fluid, the mechanisms of oxygen and carbon dioxide transport within the bloodstream, and how proper fluid, electrolyte, and acid-base balance is maintained in the body

CHEM 3331 LECTURE SCHEDULE — FALL 2021

	Week of	Topics
1	8/23	Introduction, syllabus. **Chapter 7 Carbohydrates.** Definition of carbohydrates. Classification as monosaccharides, disaccharides, or polysaccharides. Chiral carbon atoms. Fischer projections to represent D and L compounds. Optical activity. Classification of monosaccharides as aldoses and ketoses. Physical properties of the monosaccharides. Formation of pyranose and furanose rings, and the anomeric forms of the ring structures. Oxidation of monosaccharides with Benedict's reagent. Phosphate esters. Glycoside formation. Important monosaccharides. Formation of disaccharides. Important disaccharides. Polysaccharides. Starch, glycogen, cellulose. Chitin. Sugar substitutes.
2	8/30	Chapter 7, continued
3	9/06	**Chapter 8 Lipids.** Classification of lipids. Fatty acids. Saturated and unsaturated fatty acids. Triglycerides. Fats and oils. Hydrolysis, saponification, and hydrogenation of triglycerides. Waxes. Phosphoglycerides, lecithin, cephalins. Sphingolipids, glycolipids. Cell membrane structure. Steroids and steroid hormones. Prostaglandins. *Mon. Sep. 6 Labor Day*
4	9/13	Chapter 8, continued **Chapter 9 Proteins.** Amino acid structure and classification. Zwitterions and isoelectric points. Reactions of amino acids. Formation of disulfides. Formation of peptides and proteins. Important peptides. Characteristics and classification of proteins. Structure and functions of proteins. Characteristics and classification as fibrous or globular. Primary, secondary, tertiary, and quaternary structure of proteins. Hydrogen bonding and secondary structures. Side-chain interactions and tertiary structure. Protein hydrolysis and denaturation.
5	9/20	Chapter 9, continued **Fri., Sep. 24: Exam 1 (Chapter 7, 8, 9)**

	Week of	Topics
6	9/27	**Chapter 10 Enzymes**. General characteristics of enzyme catalysts. Catalytic efficiency. Specificity and regulation. Enzyme nomenclature and classification. Enzyme cofactors. The mechanisms of enzyme action (lock-and-key and induced fit theories). Enzyme activity. Factors affecting enzyme activity. Enzyme inhibition. Irreversible and reversible inhibitors. Competitive and noncompetitive inhibitors. Regulation of enzyme activity. Zymogens. Allosteric regulation. Genetic control. Medical applications of enzymes. Isoenzymes.
7	10/04	Chapter 10, continued
8	10/11	**Chapter 11 Nucleic Acids and Protein Synthesis**. Components of nucleic acids. Nucleotides. The primary structure of DNA and the double-helix. The 3D structure of DNA. History of the discovery of the DNA structure. DNA replication. The Polymerase Chain Reaction. RNA. Kinds of RNA. The flow of genetic information. The transcription of DNA to RNA. The genetic code. Translation and protein synthesis. Mutations. Recombinant DNA.
9	10/18	Chapter 11, cont. **Chapter 12 Nutrition and Energy for Life.** Macronutrients. Vitamins. Minerals. Metabolism and energy production. Catabolism of food. ATP. Mitochondria. Coenzymes in the common catabolic pathway. Coenzyme A. NAD and FAD. **Fri., Oct. 12: Exam 2 (Chapter 10, 11, 12)**
10	10/25	Chapter 12, continued
11	11/01	**Chapter 13 Carbohydrate Metabolism**. Blood glucose. Glycolysis. Glycolysis reaction pathways. Regulation of glycolysis. The fates of pyruvate. The citric acid cycle. The electron transport chain. Oxidative phosphorylation. Glycogen metabolism. Gluconeogenesis. Hormonal control of carbohydrate metabolism.
12	11/08	Chapter 13, continued
13	11/15	**Chapter 14 Lipid and Amino Acid Metabolism.** Blood lipids. Cholesterol in the blood. Fat mobilization and glycerol metabolism. The oxidation of fatty acids into acetyl CoA. Energy from fatty acids. Ketone bodies. Fatty acid synthesis. Amino acid metabolism. Transamination and deamination. The urea cycle. Amino acids in energy production. Biosynthesis of amino acids. **Fri., Nov. 19: Exam 3 (Chapter 12, 13, 14)**
14	11/22	Chapter 14, continued *Wed., 11/24 - Fri., 11/26 Thanksgiving Holiday*
15	11/29	**Chapter 15 Body Fluids.** Composition of body fluids. Blood and hemoglobin. Oxygen and carbon dioxide transport. Chemical transport to and from cells. Osmosis. Urine and fluid regulation. Acid-Base balance. Buffer and respiratory control of blood pH. Urinary control of blood pH. Acidosis and alkalosis.
16	12/06	**Final Exam:** CHEM 3331, Section 010, **Wed., Dec. 8, 10:30 am - 12:30 pm**

GENERAL POLICIES RELATED TO THIS COURSE

All students are required to follow the policies and procedures presented in these documents:

- Angelo State University Student Handbook[2]
- Angelo State University Catalog[3]

Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

The College of Science and Engineering adheres to the university's Statement of Academic Integrity.[4]

Accommodations for Students with Disabilities

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student's responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ADA@angelo.edu. For more information about the application process and requirements, visit the Student Disability Services website.[5] The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dr. Dallas Swafford
Director of Student Disability Services
Office of Student Affairs
325-942-2047
dallas.swafford@angelo.edu
Houston Harte University Center, Room 112

Incomplete Grade Policy

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 Grading Procedures[6] for more information.

Plagiarism

Plagiarism is a serious topic covered in ASU's Academic Integrity policy[7] in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft.

Student Absence for Observance of Religious Holy Days

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for Observance of Religious Holy Day[8] for more information.

Title IX at Angelo State University
Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault, sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex.

You are encouraged to report any incidents involving sexual misconduct to the Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator, Michelle Miller, J.D. You may submit reports in the following manner:

Online: Incident Reporting Form[9]
Face to Face: Mayer Administration Building, Room 210
Phone: 325-942-2022
Email: michelle.miller@angelo.edu

Note, as a faculty member at Angelo State, I am a mandatory reporter and must report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to someone in confidence about an issue, you may contact the University Counseling Center (325-942-2371), the 24-Hour Crisis Helpline (325-486-6345), or the University Health Clinic (325-942-2171).

For more information about resources related to sexual misconduct, Title IX, or Angelo State's policy please visit the Title IX website.[10]

Information About COVID-19
Please refer to ASU's COVID-19 (Coronavirus) Updates[11] web page for current information about campus guidelines and safety standards as they relate to the COVID-19 pandemic.

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[1] https://blackboard.angelo.edu/
[2] https://www.angelo.edu/current-students/student-handbook/
[3] https://www.angelo.edu/academics/catalog/
[4] https://www.angelo.edu/live/files/27603-student-handbook-2020-21#page=96
[5] https://www.angelo.edu/current-students/disability-services/
[6] https://www.angelo.edu/content/files/14197-op-1011-grading-procedures
[7] https://www.angelo.edu/live/files/27603-student-handbook-2020-21#page=96
[8] https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of
[9] https://www.angelo.edu/incident-form
[10] https://www.angelo.edu/title-ix
[11] https://www.angelo.edu/covid-19/