

CHEM 3331 Fundamentals of Biochemistry - Fall, 2018

CHEM 3331 LECTURE CLASS

Lecture Class Schedule

Sec	Day	Time	Instructor	Location
010	MWF	11:00 am - 11:50 am	Mr. Boudreaux	CAV 123

Faculty Information

Mr. Kevin Boudreaux

Office: CAV 207B

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Office Hours: MWF 10-11, TR 11-12, or by appointment

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 (4)	100 pts each*
Quizzes	100 pts*
Final	150 pts
Total	550 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 roll will be taken regularly, and the attendance policy described in the Undergraduate-Graduate 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.

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

Reserve Material

Most of the slides which are projected on the LCD/overhead projector will be available on my [faculty web page](#)¹, . Keys to quizzes and exams will be posted on the bulletin board outside my office.

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 Friday). 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 quiz grades will be dropped from the total; and the remaining quiz grades will be averaged together to obtain a 100 point grade. (The management reserves the right to have occasional pop quizzes as well.)

Exams

Four hour-long exams, each worth 100 pts., will be given on **September 21, October 12, November 9, and November 30**. (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 12 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.

Academic Honesty

Angelo State University expects its students to maintain complete honesty and integrity in their academic pursuits. Students are expected to work independently on homework assignment, quizzes, and exams. Cheating and/or plagiarism will not be tolerated. Students are responsible for understanding the Academic Honor Code, which is to be found in the [Student Handbook](#).²

Withdrawal from the course

Anyone dropping this class by **Thursday, November 1, 2018** will receive a grade of W. **No drops are allowed after this date**. If you need to drop the class, it is your responsibility to obtain the instructor's signature on any drop slip prior to that date.

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 2018

	Week of	Topics
1	8/27	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	9/03	<i>Mon. Sep. 5 Labor Day</i> Chapter 7, continued
3	9/10	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.
4	9/17	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. Fri., Sep. 21: Exam 1 (Chapter 7, 8)
5	9/24	Chapter 9, continued

	Week of	Topics
6	10/01	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	10/08	Chapter 10, continued Fri., Oct. 12: Exam 2 (Chapter 9, 10)
8	10/15	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	10/22	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.
10	10/29	Chapter 12, continued
11	11/05	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. Fri., Nov. 9: Exam 3 (Chapter 11, 12)
12	11/12	Chapter 13, continued
13	11/19	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. <i>Wed., 11/22 - Fri., 11/24 Thanksgiving Holiday</i>
14	11/26	Chapter 14, continued Fri., Nov. 30: Exam 4 (Chapter 13, 14)
15	12/03	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.
	12/12	Final Exam: CHEM 3331, Section 010, 10:30 am - 12:30 pm

¹ <http://www.angelo.edu/faculty/kboudrea>

² www.angelo.edu/cstudent/