

Biochemistry- Chem 4711
Fall 2019, TR 9:30-10:50; TLC 2105

Instructor: Dr. Vickie Geisler

Email: vgeisler@westga.edu

Office: TLC 2120

Office Hours:

M, W 10-12, T, R 1-3, W 2-4

Text: *Essential Biochemistry*, by Pratt and Cornely, 4th edition

Students can also consider purchasing access to "wileyplus" - though it is not required for the course but it does contain some additional resources students might find helpful throughout the semester

Required Equipment: I>clicker. Bring your clicker to class every day! You are responsible for keeping your clicker working. I will count only 20 clicker grades so you will not be penalized if you forget your clicker, miss class, or your clicker does not work. If you are caught with a remote other than your own or have votes in a class that you did not attend, you will forfeit all clicker points and may face additional disciplinary action.

Course Objectives: CHEM 4711 is a semester-long biochemistry course designed for chemistry, premed and pre-professional students. Material covered during this course includes structure and function of proteins, carbohydrates, lipids, nucleic acids, enzyme kinetics, and intermediary metabolism.

Learning Outcomes: Recognize the structures of biological molecules and relate structure to function, identify the levels of structure in proteins and describe the stabilization of these structures, explain how enzymes function as catalysts, measure enzymes effectiveness and how they can be inhibited, describe how information is processed at the molecular level (DNA, RNA), describe the primary catabolic pathways pertaining to carbohydrates and identify the key regulatory points, the energetics of the reactions and the chemical transformations involved. Increase process skills such as: communication of scientific concepts, group dynamics and teamwork, time-management and self-assessment.

Evaluation: The final grade will be based on:

Four Exams - 9/10, 10/8, 10/31, 11/21	400 points
Clicker Questions	25
Quizzes	40
PS	35
Paper - Due 12/3	75
ACS Final Exam - 12/12 8:00-10:00 am	100
<hr/> Total	<hr/> 675 pts

Grading: 100-85% = A; 84-75% = B; 74-60% = C; 59-50% = D; \leq 49% = F

Exams: There will be four exams given on: **September 10th, October 8th, October 31st, and November 21st**. No make-up exams will be given. You will be responsible for PowerPoint material, the assigned reading from the textbook, homework assigned and all class activities.

Quizzes: There will be four memorization quizzes this semester. You will not be excused from any quizzes; there are no make-up quizzes. The quizzes will cover structures of amino acids, structures of nucleic acids and lipids, glycolysis and cac. Each quiz will count 10 points.

Problem sets need to be turned in on the due date but they may or may not be graded. PS will count a total of 35 points. Late assignments will be accepted with a 10% deduction per day until the next class.

Clicker: At the beginning of each class you will have a number of clicker questions covering the reading and PowerPoints. These questions will be graded as correct or incorrect. No discussion with classmates can take place during this time. During each lecture there will be several clicker participation questions, full credit will be given for a correct response, and 75% credit for an incorrect response, 0% for no response. Only top 20 sessions will be counted for the 25 points.

Paper and Presentation - You must choose a topic of biochemical relevance in consultation with your instructor. The paper should discuss in detail the biochemistry of a health, diet or medical phenomenon. A topic of your paper must be submitted online to the designated Dropbox for approval no later than October 17th. Students are expected to write a maximum of a three-page discussion (excluding diagrams, figures, etc.) about your topic. You do need to explain the biochemistry underlying the topic and as much of the information given as you can in a clear, concise, and well-organized essay. You can discuss the paper with me. Please do not discuss with any other persons. You may use any written source (need to cite). Each student should have a very different essay even if the topic is similar. The paper and drafts need to be turned in via the drop box in CouseDen. Papers will be evaluated using an electronic plagiarism detection program.

Example topics: Treatment of Alzheimer's disease with diet?, Mitochondrial Biochemistry of aging, How does the keto diet work biochemically?, Can A 3-Day Fast Reset Your Immune System?, Type 2 diabetes and the function of insulin, Vitamin B12 or D, etc. - biochemistry and clinical significance, Importance of omega-3:6 ratio, Is mitochondrial malfunction a cause of autism? What does glyphosphate do in our bodies? Why does your sweat smell like ammonia?, Biochemistry of CBD or a reflective paper explaining examples of how other fields (analytical, physical, organic) of chemistry are used in biochemistry.

Textbook: Complete all the homework problems assigned in a notebook.

Policies:

1. You are responsible for all material covered and all announcements made in class. Absence from class does not either excuse or relieve you of this responsibility.
2. Academic dishonesty will not be tolerated. Academic dishonesty includes unauthorized use of any materials, notes, sources of information, electronic equipment, or study aids during a quiz or exam. It also includes using multiple clickers, the unauthorized assistance of any person other than the course instructor during a quiz or exam, the unauthorized viewing of another person's work during a quiz or exam, or the unauthorized securing of all or part of any quiz or exam before submission by the instructor.
3. No make-up exams will be given. Anyone not able to take an exam on the day scheduled must contact the instructor before the exam.
4. Homework will be assigned but only some will be collected and graded.
5. You will have one week from the time the exam is handed back to inquire about the grading. After that week the grade on the exam is **final**.

How to be successful in this course:

1. **Read before class.** Read the text and study the PowerPoints prior to class. Do not get behind on your reading! We will cover up to a chapter a day.
2. **Attend lecture and actively participate.**
3. **Study time.** I recommend you devote two hours per lecture study time after class. You need to take your own notes from the textbook and PowerPoints and complete the assigned homework.
4. **Biochemistry is a field that requires that you practice and think.**
Biochemistry is highly integrated, and many of the concepts covered in other classes will be used extensively in this class. Biochemistry is not a spectator sport; to be successful it requires hard work and lots of practice. Biochemistry builds on itself, falling behind can be disastrous.
5. **Be an interactive learner.** Ask questions, participate in discussion and problem solving during class.

TENTATIVE SCHEDULE*subject to change 4thed

<u>Date</u>	<u>Topic</u>	<u>Reading</u>	<u>Homework</u>
8/15	Introduction, Water, Acids and Bases	1.1-3, 2	Chapter 2: 10, 12, 25, 39, 40, 42, 48, 60
8/20	Buffers	2	Chapter 2: 52, 53, 55, 56, 62, 64, 60, 62, 64, 66, 67. Chapter 4: 17
8/22	Amino Acids	4.1	Chapter 4: 11, 13, 19, 38, 43, 63, 64
8/27	Protein Structure (quiz)	4.2-4.4	Chapter 4: 25, 30, 31, 33, 34, 46, 48, 50
8/29	Protein Purification & Sequencing	4.5	Chapter 4: 67, 68, 71, 72
9/3	Protein Function: Hemoglobin (PS due)	5	Chapter 5: 6, 17, 19, 20, 21, 26, 33, 27, 40, 62
9/5	How Enzymes Work	6	Chapter 6: 10, 20, 26, 29, 31, 37, 40, 41, 42, 45, 57, 60
9/10	Exam I		
9/12	Enzymatic Kinetics	7	Chapter 7: 4, 14, 23, 25, 39, 37-39, 42, 45
9/17	Inhibition	7	Chapter7: 60, 63, 65, 68, 70-72
9/19	Nucleic Acids	3	Chapter 3: 5, 13, 14, 19, 22-26, 29, 35, 36, 45 and Chapter 22: 37
9/24	Nucleic Acids	20-2, 5, 22-3	Chapter 3: 59, 62, 64, 70 Chapter 20: 3, 9, 18, 23, 72
9/26	Lipids (PS)	8	Chapter 8: 2, 3, 7, 16, 26, 29, 39,40, 43-45, 50, 51, 59, 71
10/1	Membranes/Signaling (quiz)	9/10	Chapter 9: 2, 4, 6, 7, 17, 21-22, 25, 42, 51, 53 Chapter 10: 33
10/8	Exam II		
10/10	Carbohydrates	11	Chapter 11: 1, 6, 7, 13, 15, 17, 22, 25, 31, 37, 46, 66
10/15	Intro to Metabolism	12	Chapter 12: 3,5, 21, 22, 24, 27, 28, 50, 52, 57, 62, 65

10/17	Glycolysis/ Regulation (paper topic due)	13	Chapter 13: 1-3, 9, 17, 19-21, 23-25
10/22	Glycolysis/ Regulation	13	Chapter 13: 33, 35, 37, 40, 43-46, 48-49, 51
10/24	Fate of Pyruvate / other carbohydrates into glycolysis (quiz)	13	Chapter 13: 58, 67-68 Chapter 19: 2-4, 9-11, 20, 23, 24, 31,32
10/29	Glycogen Metabolism and Gluconeogenesis (PS due)	13	
10/31	Exam III		
11/5	Citric Acid Cycle	14	Chapter 14: 4, 5, 29, 59
11/7	Regulation/ CAC/ Electron Transport	14	Chapter 14: 7, 8, 25, 31, 33, 40, 49, 50 Chapter 15: 7, 16
11/12	Oxidative Phosphorylation	15	Chapter 15: 15, 23-25, 27, 30-31, 47, 51, 63, 68, 73, 77, 81
11/14	Lipid Metabolism/ β - oxidation (last day to turn in a draft)	17	Chapter 17: 15, 17-21, 23-24, 29
11/19	Lipid Metabolism (quiz & PS)		
11/21	Exam IV		
12/3	Presentation (Paper due)	19	
12/5	Review		
12/12	Final (ACS Exam) 8:00-10:00 am		

Clinical Biochemistry Topics: • Requesting and Interpreting Clinical Biochemistry Tests and Results; • Fluid distribution (body compartments), • Fluid Balance (Diagnostic significance) • Sodium and Potassium Balance, • Acid-Base Balance & Base Excess (Diagnostic significance) • Metabolic and Respiratory Acidosis and Alkalosis including Compensatory Mechanisms • Renal Function (Including Acute and Chronic Renal Failure, Renal Tubular Acidosis), • Oxygen Transport (Haemoglobin: Structure function relationship: Embryonic, Foetal, Adult) • Disorders of Calcium and Phosphate Metabolism (Diagnostic significance) • Enzymes in Clinical Diagnosis • Gastric, Pancreatic and Intestinal Disorders (Diagnostic significance) • Liver Function Tests: Neonatal Jaundice, Classification of Jaundice (Diagnostic significance) • Metabolic Disorders: Carbohydrate (Diabetes Mellitus, Gestational Jaundice), Disorders of Plasma Lipids and Lipoproteins, Hypercholesterolemia • Disorders of Purine Metabolism (Gout; Diagnostic significance) • Anaemia, Iron deficiency Anaemia (Diagnostic significance) • Disorders of Porphyrin Metabolism (Porphyria) • Thyroid function Tests (Interpretation and Diagnostic significance) • Disorders of Adrenal Cortex and Medulla Functions (Adreno-cortical failure: Diagnostic tests); • Hypothalamic and Pituitary Hormones (Diagnostic tests) • Sex Steroid hormones (Gonadal Dysfunction, Diagnostic tests and interpretation); • Clinical Toxicology (Diagnostic tests and interpretation) • Molecular Biology as a tool in Clinical Biochemistry (PCR, ELISA, EIA) • Endocrinology – Diagnostic Applications, • Critical Analysis of Research Data

The penalty for late submission will be 10% deduction each day (out of the 10 points). Unless you have a good reason, once the term paper topic is approved please do not change it because 20 out of 70 points will be deducted.

The term paper must be your own work and use your own words and sources of ideas or information must be referenced.