Chem 331 Biochemistry Spring 2020

Dr. Joseph J. Provost josephprovost@sandiego.edu http://home.sandiego.edu/~josephprovost/ Office - SCST 375 Lab 425 Section 1 8:00 am Section 2 9:05 am		Biochemi neurotransm need to be of the next sig transporters. neuron or in neurotransm between the transport of s shown here, neurotransm	stry at itters have deliver leaned up, to ge nal. This is the j They are found in associated cel itters out of the nerve cells, powe sodium and chlori from PDB entry itter dopamine.	work: Once red their message, the t the neurons ready for ob of neurotransmitten n the membrane of the ls. They transport the narrow synaptic cleared by the simultaneous de ions. The transports the 4m48, transports the	e by br e e e e ft s e e e e e e e e e e e e e
					Neurotransmitter Transporter
Office Hours:					
Monday	11:00	Tuesday	2:30	Wednesdav	11:00

Thursday	Arraigned	Friday	11:00				
Explore the Funda	mental Science	of Life. In the po	ast century, progress	in biochemistry	and molecular	biology l	has led
astonishing advance	ces in medicine,	nutrition, agricul	Iture, and other areas	s. It's a scientific	revolution every	bit as m	omento
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astonishing advances in medicine, nutrition, agriculture, and other areas. It's a scientific revolution every bit as momentous as Einstein's relativity or Hubble's discovery of the expanding universe. Covering the essential topics of a first-semester college course in biochemistry and molecular biology, these lectures plunge you into the thick of amino acids, proteins, enzymes, genes, and much more. The course will also help shed scientific light on everything from fad diets to wonder drugs to DNA storage. Discover thought-provoking connections between the microworld and your life!

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I will be in my office (**375**), or my research laboratory (**425**) during office hours and pretty much most other times of the day. <u>I</u> don't care how busy I am I will make time for your questions and concerns.

Course Description: This course is an introduction to the chemistry of biological molecules and macromolecules. We will study the structure and properties of the four major classes of biomacromolecules: nucleic acids, proteins, carbohydrates and lipids, and their functional impact on the cell and on the organism. We will study enzyme kinetics and metabolism and how they relate to different cellular pathways, including the production of energy and macromolecules. Throughout the semester we will take these broad ideas and study them in the context of human health and disease pathology.

Expected Learning Outcomes:

- 1. Identify biomacromolecules, their important functional groups and their global contribution to the cell and organism.
- 2. Understand non-covalent forces and how these forces contribute and stabilize the 3D structure of a biomacromolecule.
- 3. Understand structure relates to function, and the function of a biomacromolecule relates to its role in the cell and organism, and in pathology.
- 4. Explain how buffers work and their role in physiology and pathology.
- 5. Analyze enzyme reaction mechanisms and identify features that stabilize a transition state, leading to catalysis.
- 6. Perform graphical analysis of enzyme kinetics and inhibition. Describe different ways enzymes can be inhibited.
- 7. Understand how the equilibrium constant for a reaction relates to that reaction's free energy, and how that fits into the bigger context of biomacromolecular events.
- 8. Identify metabolic pathways and the energetic strategies of metabolism, and relate them to normal energy production and disease.

Resources:

- (a) Lectures: The most important topics are always identified in class, and are usually discussed in detail. Attending class and accurate note-taking are the only way to learn the material.
- (b) Textbook Required: Biochemistry. By Tansey 1st Edition. The material in the book will clarify points, fill in gaps, and extend your knowledge. Portions of selected lectures will come from current literature and handouts. <u>Reading the book is required, not suggested</u>. The book will have annotated comments and questions on the electronic version. Keeping up with this will help you.
- (c) Help sessions: We will have the help sessions through facebook group more in class... Please do not hesitate to make an appointment to ask questions. I believe that there is no such thing as a stupid question. Your questions are the best guide I have to your particular needs. If you do not know enough to phrase a question, then meet with me and we can work it out.
- (d) Website: The website will have ppt handouts, learning objectives/study guides and suggested study questions.
- (e) <u>WileyPLUS.</u> WileyPLUS is an online tool. At this site, you can read the textbook, do practice problems, etc. Pre-lecture questions are posted for each topic. These ARE graded, and will provide an assessment of your comprehension and preparedness for the upcoming class. These quizzes will be timed (30 60 minutes). You are given one attempt to answer each question after which you will be given the answer and corresponding reading either to confirm your response or direct you to review the material. 11 will be given, the lowest will be tossed out.

Grades: The grade cut offs are A-92%, B-80%, C-70%, D-60% and F-50%. These are tentative, may be decreased but will not be increased. Learning objectives and chapter questions will be provided but not graded. Note the deadline is before class - access will be cut off before we start class. No exceptions as these can be done ahead of time. T

Make-up examinations will be given only for major, documented emergencies (severe illness, death in family...) *prior notice* is required.

GRADE BREAKDOWN - See web for due dates and assignment information.

- Exams 1-3 (500 points each 88% of total points)
- Pre-lecture quizzes (WileyPLUS) 10 @ 5 pts each.
- Amino Acid Quiz
- Thermodynamics, pH and Buffer Homework
- Kinetics Homework

1500 points 50 points 10 points 80 points <u>50 points</u> 1690 possible points

WILEYPLUS assignment are due BEFORE CLASS. The deadline is 8:00 am on date for each assignment.

Tentative Schedule - we will adjust based on progress of the class and pace of discussion.

<u>Date</u>	Topic	<u>Chapter</u>
Mon Jan 27	Chapter 1 – Chemical principles, water, pH, acid base and bonding	1
Wed Jan 29	Chapter 1 – Chemical principles, water, pH, acid base and bonding	1
Fri Jan 31	Chapter 1 – Chemical principles, water, pH, acid base and bonding	1
Mon Feb 3	Chapter 1 – Chemical principles, water, pH, acid base and bonding	1
Wed Feb 5	Chapter 2 - Nucleic Acids Structure & Function	2
Fri Feb 7	Chapter 2 - Nucleic Acids Structure & Function	2
Mon Feb 10	Chapter 2 - Nucleic Acids Techniques	2 & Web
Wed Feb 12	Chapter 2 - Nucleic Acids Techniques	2 & Web
Fri Feb 14	Chapter 3 – Proteins I: Amino acids and peptide bond	3
Mon Feb 17	Chapter 3 – Proteins I: Protein Structure	3
Wed Feb 19	Chapter 3 – Proteins I: Protein Structure	3
Fri Feb 21	Chapter 3 – Proteins I: Protein Structure = Function	3
Mon Feb 24	Proteins Purification and Characterization	Web
Wed Feb 26	Protein Techniques	Web
Fri Feb 28	Exam I	
Mon March 2	Spring Break	
Wed March 4	Spring Break	
Fri March 6	Spring Break	
Mon March 9	Chapter 4 – Proteins II: Enzyme Kinetics	4
Wed March 11	Chapter 4 – Proteins II: Enzyme Kinetics	4
Fri March 13	Chapter 4 – Proteins II: Reaction Mechanism	4
Mon March 16	Chapter 4 – Proteins II: Reaction Mechanism	4
Wed March 18	Chapter 4 – Proteins II: Enzyme Regulation	5
Fri March 20	Chapter 5 – Intro to Signal Transduction	5
Mon March 23	Chapter 5 – Intro to Signal Transduction	6
Wed March 25	Chapter 6 – Carbohydrates I: Carbohydrate Structure & Function	6
Fri March 27	Chapter 6 – Carbohydrates I: Glycolysis	6
Mon March 30	Chapter 6 – Carbohydrates I: Glycolysis	6
Wed April 1	Chapter 6 – Carbohydrates I: Gluconeogenesis	6
Fri April 3	Chapter 6 – Carbohydrates I: Gluconeogenesis & Pyruvate	6
Mon April 6	American Society of Biochemistry and Molecular Biology – Field Trip!	
Wed April 8	Exam II	
Fri April 10	Easter Break	
Mon April 13	Easter Break	
Wed April 15	Chapter 7 – Catabolic Metabolism: TCA Cycle	7
Fri April 17	Chapter 7 – Catabolic Metabolism: TCA Cycle/ETS	7
Mon April 20	Chapter 7 – Catabolic Metabolism: ETS	7
Wed April 22	Chapter 7 – Catabolic Metabolism: Ox/Phos ATP Synthesis	7
Fri April 24	Chapter 8 – Carbohydrates II: Glycogen Metabolism	8
Mon April 27	Chapter 8 – Carbohydrates II: Glycogen Metabolism	8
Wed April 29	Chapter 9 – Lipid Introduction & Ecosanoids	9
Fri May 1	Chapter 9 – Lipid Introduction & Ecosanoids	9
Mon May 4	Chapter 10 – Lipid Digestion & Transport	10
Wed May 6	Chapter IU – Lipid Digestion & Iransport	10
Fri May 8	Chapter 12 – Metabolic Integration	12
Mon May 11	Chapter 12 - Metabolic Integration	12
Wea May 13	Chapter 12 - Metabolic Integration	12
Mon May 18	Exam III & partial cumulative (Sec 01) 8:00 am - 10:00 am	
wea May 20	Exam III & partial cumulative (Sec 02) 8:00 am – 10:00 am	