Chem 332 Biochemistry II Spring 2017

Dr. Joseph J. Provost
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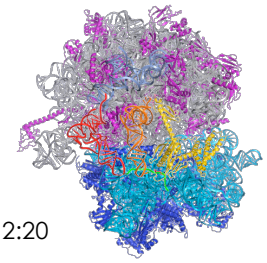
Phone: 260-7564 (office)
SCST 230
Class Time: 11:15-12:10 M,W,F

***Biochemistry at work*:** In eukaryotes, the ribosome is composed of ~6,880 nucleotides of RNA and 79 proteins. Differences between bacterial and eukaryotic ribosome structures have been exploited to develop antibiotics.



Office Hours:

Monday	10:10	Tuesday	By Appt	Wednesday	12:20
Thursday	2:30	Friday	10:10		

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

Course Description: This course advances the fundamental concepts of macromolecules, structure/function paradigms, enzyme mechanism & activity and metabolism gained in CHEM 331. We will study metabolic homeostasis, integrating anabolic/catabolic pathways and energy flux with nutrition/nutrient intake of essential and non-essential molecules. Regulatory control through allosteric, transcriptional/translational, and post-translational mechanisms will be examined as part of maintaining metabolic homeostasis. Where relevant, disease and pathology will be used to highlight these concepts. We will study signal transduction to address the flow of information within a system. As a capstone to our in-depth study of biochemistry, we will examine cross-disciplinary applications of core biochemical concepts (structure/function, homeostasis, energy flow and information flow) in the context of systems biology, chemical biology and synthetic biology.

Expected Learning Outcomes:

1. Understand the basics of advanced biochemical metabolic pathways.
2. Given a starting macromolecule, predict the metabolic pathway, site(s) of regulation and thermodynamic principles driving its metabolism.
3. Assess role of metabolic pathway in specific tissues and in maintaining nutritional homeostasis of an organism under normal versus disease state.
4. Justify regulatory mechanisms (covalent or small molecule) employed by metabolic pathways and evaluate the structural and kinetic impact of regulatory molecule on the output of the protein/pathway/system.
5. Understand the signaling components controlling biochemical processes.
6. Predict or design models of information transfer cascades of commonly encountered signal transduction mechanisms.
7. Given thermodynamic input, macromolecule structure/function, students should justify evolutionary driving forces for large biochemical systems.
8. Apply fundamental biochemical knowledge to understand systems and big data science; understand current questions in selected cross-disciplinary topics, and begin to predict/design their own application in the field.

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: Fundamentals of Biochemistry, Voet, Voet and Pratt 4th 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. *Reading the book is required, not suggested.*
(c) Help sessions: We will have the help sessions as the schedule allows. 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.

Grades: There will be four examinations. Each regular examination will be normalized to 300 pts each. 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. ***Make-up examinations***: These will be given only for major, documented emergencies (severe illness, death in family…) ***prior notice*** is required. ***Homework/Activities*** will be worth up to 16 % of your grade.

- Three Exams (300 points each)	900 points
- Hexose Metabolism and Fructose Assign	25 points
- Metabolism PEPCK Paper Assign	25 points
- Cell Signal Paper	25 points
- Drug Design Paper	25 points
- CRISPR Assignment/Debate	25 points
- Wiley Plus Assignments (total)	50 points

Academic Integrity: Review the Student Code of Rights and Responsibilities and Rules of Conduct (http://www.sandiego.edu/conduct/the_code). In particular, familiarize yourself with the Academic Integrity Policy, which is found under "University Policies". You will need your MySanDiego username and password to view the policy.

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

Date	Topic	Chapter
Fri Jan 27	Introduction, Processes and Gluconeogenesis	15
Mon Jan 30	Glycogen Metabolism	16
Wed Feb 1	Glycogen Metabolism and Cori Cycle, Alanine Cycle	16, 22
Fri Feb 3	Krebs, ETS & Oxidative Phosphorylation	17, 18
Mon Feb 6	Krebs, ETS & Oxidative Phosphorylation	17, 18
Wed Feb 8	Krebs, ETS & Oxidative Phosphorylation	17, 18
Fri Feb 10	Metabolism Papers	Online
Mon Feb 13	Metabolism Papers	Online
Wed Feb 15	Fatty Acid Metabolism	20
Fri Feb 17	Fatty Acid Metabolism	20
Mon Feb 20	Cholesterol Metabolism	20
Wed Feb 22	Metabolic Integration	22
Fri Feb 24	Metabolic Integration	22
Mon Feb 27	**Exam I**	
Wed Mar 1	Cell Signaling	13
Fri Mar 3	Cell Signaling	13
Mar 6-10	*Spring Break*	13
Mon Mar 13	Cell Signaling	13
Wed Mar 15	Cell Signaling	13
Fri Mar 17	Cell Signaling	13
Mon Mar 20	Cell Signaling	13
Wed Mar 22	Cell Signaling	13
Fri Mar 24	Cell Signaling	13
Mon Mar 27	Cell Signaling	
Wed Mar 29	Cell Signaling Paper	25
Fri Mar 31	**Exam II**	
Mon Apr 3	DNA/RNA Structure and Protein Binding	
Wed Apr 5	DNA/RNA Structure and Protein Binding	
Fri Apr 7	DNA Repair	
Mon Apr 10	DNA Repair	26
Wed Apr 12	Transcription and RNA Processing	26
Apr 13-17	*Easter Break*	26
Wed Apr 19	Transcription and RNA Processing	27
Fri Apr 21	DNA Repair Paper	27
Mon Apr 24	CRISPR CAS9 – Background	28
Wed Apr 26	CRISPR CAS9 – Debate Prep	28
Fri Apr 28	CRISPR CAS9 - Debate	28
Mon May 1	Protein Synthesis	TBD
Wed May 3	Protein Synthesis / Regulation of Gene Expression	TBD
Fri May 5	Regulation of Gene Expression	TBD
Mon May 8	Regulation of Gene Expression	Online
Wed May 10	Chemical Biology – Drug Design	Online
Fri May12	Chemical Biology – Drug Design	Online
Mon May 15	Chemical Biology – Drug Design	Online
Fri May 19	**Final / Exam III 11:00 – 1:00**	