Biochemistry 6640: Biochemical Regulation and Signal Transduction

Course description: A study of metabolic regulation in biochemical processes and pathways emphasizing theories of metabolic flux and enzyme regulation in the context of cellular signaling processes. Theories of metabolic flux, signal transduction pathways, fundamental regulatory mechanisms, such as allosterism, covalent protein modification, induction and protein degradation are discussed. Prerequisite: BIOC 4550 or 5550, or consent of department.

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Prerequisites: Satisfactory completion of BIOC 4550 or BIOC 5550 or their equivalents or permission of the instructor.

Class time and place: MW 4-5:20, Biology 111; During the week of Feb 4, classes will be held WF.

Recommended textbooks:

1. Krauss 2003. Biochemistry of Signal Transduction and Regulation. Wiley VCH, Darmstadt, FRG
2. Gomperts et al 2002. Signal Transduction. Academic Press, San Diego, CA
3. A biochemistry text, suitable for a course like BIOC 5540 and BIOC 5550
4. The instructor will also use Weinberg 2007. The Biology of Cancer. Garland Science, NY, NY

There will be auxiliary readings from the recent literature. These will be handed out in class and posted on the web.

Website: We will be using webvistact at http://ecampus.unt.edu. Please check ASAP to make sure that you can get onto the website. If there are any school closures due to weather, announcements from the instructor will be posted on the course page. Class handouts will be posted to this website.

Syllabus: This syllabus is tentative and subject to change.

Week	Date	Topic	Reading (Chapters given for Krauss text)
1	1.14 1.16	What is biochemical regulation? Regulation of metabolic pathways	Biochemistry texts, Krauss ch 2
2	1.21 1.23	Holiday Regulation of metabolic pathways	 Biochemistry texts
3	1.28 1.30	Metabolic pathways **Proposal topic due**	Biochemistry texts
4	2.06* 2.08	Fuel selection and pathway steady states Glycolysis, TCA cycle, ox. phos.	Biochemistry texts
5	2.11 2.13	Gluconeogenesis, pentose phosphate Regulatory strategies	Biochemistry texts
6	2.18 2.20	Transcription regulation, Targetted degradation **Exam 1**	Krauss, ch. 1, 2
7	2.25 2.27	Signal transduction pathways G-protein coupled pathways	Krauss, ch. 3 Krauss, ch. 5
8	3.03	G-protein coupled pathways	Krauss, ch. 5

	3.05	Second messengers	Krauss, ch. 6
9	3.13 3.15	Nuclear receptors S/T protein kinases	Krauss, ch. 4 Krauss, ch. 7
10	3.17 3.19	SPRING BREAK	
11	3.24 3.26	Y protein kinases, Ras proteins **Exam 2**	Krauss, ch. 8, 9
12	3.31 4.02	Ras proteins MAP kinases	Krauss, ch. 9 Krauss, ch. 10
13	4.07 4.09	Membrane receptors, Y kinases Other receptor classes	Krauss, ch. 11 Krauss, ch. 12
14	4.14 4.16	Cell cycle Malfunction of signal pathways	Krauss, ch. 13 Krauss, ch. 14
15	4.21 4.23	Apoptosis	Krauss, ch. 15
16	4.28 4.30	PRE-FINALS WEEK: **Proposals Due Monday** **April 28 at 5 PM**	
17	5.05	FINALS WEEK: **Exam 3**	

Exams: Each exam will each count for 25 % of your final grade. Your proposal will count for 20 % of your final grade and your class participation will count for 5 % of your grade. Guaranteed minimum grades:

A	90 % or higher
B	80 – 89,99 %
C	70 – 79.99 %
D	60 – 69.99 %
F	below 60 %

Because this is a graduate class, the instructor is expecting all students to work at "A" level.

Exam questions will be handed out in class one week before each scheduled exam. A selection of the questions will be on the in-class exam one week later.

Exams are not cumulative.

Academic calendar and other information:

January 28th is the 12th day class.

February 22nd is the last day for change in pass/no pass status and the last day to drop a course or withdraw from the University with a W grade for the course.

March 25th is the last day to drop a course with the consent of the instructor.

Friday, May 9th is the day for the final examination. The instructor wishes to change this to Monday of finals week at a time mutually agreeable to all students in the class.

Academic integrity: The university (and the professor) expects the highest standards of academic integrity. A description of the Code of Student Conduct and Discipline is in the student handbook and at http://www.unt.edu/csrr/categories_of_misconduct.htm.

Disabilities: The Department of Biological Sciences complies with the Americans with Disabilities Act. Please see the instructor by the 12th day of class for accomodation if you qualify.

Research Proposal:

Purpose: The point of the proposal is to become focused on an area within biochemical regulation and signal transduction in some depth and to develop scientific thinking and writing.

1. Each student in the class will choose an area/topic within biochemical regulation and signal transduction on which to write a proposal. The topic may be similar to one on the syllabus or may be

different. You may use references in the back of the text chapters to begin looking for a paper or you may go to PubMed (http://www.ncbi.nlm.nih.gov/sites/entrez?db=PubMed) and search there.

2. Topics are due on Wednesday January 30. At that point, students will turn in a one (1) page summary of the topic and outline of the experiments to be investigated, together with two (2) review papers and one (1) primary literature paper on the topic of interest. The one page summary should contain a statement of the investigation to be undertaken in the proposal and the references each student is using. The abstracts of the references should be appended to the one page summary.

Research Proposal Content:

1. Review the subject you chose in a clear and logical manner – remember that many topics will be outside of the expertise of the instructor. Describe the most relevant experiments, discussing the methods as well as results, from the articles you selected.
2. Develop a question and hypothesis that has not been addressed in the literature you have read and reviewed.
3. Propose experiments to test the hypothesis. These should be logical and actually test the hypothesis developed.
4. Predict the potential results from the proposed experiments. Be sure to consider potential results besides your "favorite" ones. Discuss how you plan to interpret the results.

Format:

Page 1: Name, title of proposal, one paragraph summary of proposal.
Page 2-3: Introduction: Review of research area and previous experiments done by others.
Page 4-5: Hypothesis and proposed experiments.
Page 6: Discussion of potential results.
Page 7: References
Use 11 or 12 point font, single spaced, 1 inch margins, and Times, Times New Roman, Ariel, or Helvetica font.
Write in a scientific format.
The final proposal is due no later than Monday April 30. Proposals may be turned in at any time before that date for feedback from the instructor. If a student chooses this option, allow at least 2 weeks for the proposal to be returned to the student. For late proposals, 1 percentage point per day (out of 20 percentage points final grade for the proposal) will be deducted for each day late.

Grading Criteria for the Proposal and Presentation: 120 points total

Topic, 1 Page plus abstracts of references: Due Jan. 30: 10 points

Written Proposal Due Monday May 1, 5 PM: Grading Criteria for Proposal Only:

Format followed: 10 points
One paragraph summary of proposal: 10 points
Concise Introduction: 10 points
Logic/Rationale for Proposed Experiments: 10 points
Clear Hypothesis: 10 points
Proposed Experiments, Clear Description: 10 points
Hypothesis is Tested by Proposed Experiments: 10 points
Potential Results Clearly/Logically Stated: 10 points
Discussion of Potential Results/SO WHAT?: 10 points
References in Standard Format: 10 points
Good Grammar/English: 10 points