BIOCHEMISTRY 673: REGULATION OF METABOLISM **SPRING, 2005**
TUTH 9:30-10:45, CHEMISTRY 2507 **SYLLABUS**

Assoc. Prof. Jason D. Kahn, Dept. of Chemistry and Biochemistry, UMCP
Office: Chemistry 2500A (Biochemistry, Wing 5 of the Chemistry complex)
Office hours: Mon. 1-2 p.m., Thurs. 1-2 p.m., Chemistry 2500A; there is no TA for the course
Contacting me: jdkahn@umd.edu much preferred to 301-405-0058. Please do not drop in to my office or lab, but I will be happy to set up appointments outside of office hours if necessary.
Web and email: http://www.biochem.umd.edu/biochem/kahn/bchm673; there is also an e-mail reflector.

This course will cover several examples of regulation and regulatory networks in biochemistry and molecular cell biology. It will be a combination of lectures, discussions of current literature, and student presentations. The final grade will be will be based on class participation (75 pts), a student presentation and short paper (75 pts), one in-class exam (100 pts), and the final exam (150 pts).

The general areas to be covered may include:

- Transcriptional regulation by steroid hormones
- Regulation of bacterial chemotaxis
- Regulatory cascades in apoptosis
- Insulin signaling and diabetes
- G-protein coupled receptors
- Identification, modeling, and emergent properties of gene regulation networks

The unifying themes in the course will be as follows:

- How are the activities of enzymes and other proteins regulated at the molecular level? Mechanisms include subcellular localization, phosphorylation cascades, proteolysis, receptor dimerization/multimerization, allostery, and second messengers.
- What are some essential techniques used for the analysis of signal transduction pathways? They will be explored largely through in-class discussion of papers from the research literature.
- What additional complexities arise when we consider pathways and networks rather than just isolated proteins?

Textbooks and Other Sources:

Recommended:

E. J. M. Helmreich (2001). *The Biochemistry of Cell Signalling*. Oxford University Press.

Other sources: All are on reserve in the White Memorial Chemistry Library or on the Web.

B.D. Gomperts, I.M. Kramer, and P.E.R. Tatham (2002). *Signal Transduction*. Elsevier Academic Press.

D. S. Latchman (2003). *Eukaryotic Transcription Factors*. 4th ed. Academic Press.

Lodish, Berk, Zipursky, Matsudaira, Baltimore, and Darnell (2000). *Molecular Cell Biology*. 4th ed. W.H. Freeman. Available free on the web at http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=Books.

The Signal Transduction Knowledge Environment maintained by Science magazine/AAAS. By subscription at http://stke.sciencemag.org/.

Research papers will be provided as the semester progresses.

Procedures and Grading

The final grade will be will be based on class participation (75 pts), a student presentation and short paper (75 pts), one in-class exam (100 pts), and the final exam (150 pts). Your course grade will be based on your performance relative to a curve and to my expectations. I anticipate roughly 50:50 A's:B's. The curve does not require C's and D's but I will give them without hesitation if necessary. Plus/minus final grades will be given.

The class participation grade (75 pts over the semester) will be assigned based upon your ability and willingness to comment accurately and critically on assigned readings during class periods set aside for discussion. For example, you may be called upon to explain how the experiment in Figure 3 works, or propose the most useful next steps are in dissecting a pathway, or discuss the relationship between the paper we are reading and other work in the field that we have covered. I also encourage discussion during lectures, but it will not affect grading.

The student presentation will be a 20 minute presentation of a research paper in one of our focus areas, laying out the importance of the work, the experimental rationale, the results, and any problems with it. You will provide the class with a reference to your paper in advance and a 2-page outline of your presentation. We will have three student presentations per session, with 5 minutes each for questions.

The midterm exam and the final will cover lecture material and the required reading. If you absolutely must miss the midterm, you must call me in advance or within 24 hours after the exam, and you must also present a valid University excuse (please secure a note from the Health Services if possible). Do not miss the final exam.

I expect and enforce adherence to the University's Code of Academic Integrity, found at http://www.studenthonorcouncil.umd.edu/code.html. I expect you to write out and sign the University honor pledge on each exam: "**I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination."** Also, you are hereby notified that "plagiarism" will be interpreted in its broadest sense: ideas from others must be referenced; words from others must be in quotation marks and referenced. Paraphrasing without referencing will be considered plagiarism. Extensive paraphrasing from a single source is unacceptable, referenced or not. As a condition of remaining in the class, you are specifically directed to read my own web page on this: http://www.biochem.umd.edu/biochem/kahn/plagiarism.html.

Tentative Course Schedule

January 27, 2005	Introduction to the course and to signal transduction
February 1, 2005	Lecture 1 – Steroid hormone receptor signalling
February 3, 2005	Lecture 2 – Structural biology of hormone binding
February 8, 2005	Lecture 3 – Chromatin dynamics during transcription activation
February 10, 2005	Discussion of classic Yamamoto papers
February 15, 2005	– no class –
February 17, 2005	Discussion of Hager and Gannon papers
February 22, 2005	Lecture 4 – Introduction to Bacterial Chemotaxis
February 24, 2005	Lecture 5 – Regulation of Chemotaxis
March 1, 2005	Discussion of Berg papers
March 3, 2005	Three student presentations of papers on nuclear receptors or chemotaxis
March 8, 2005	Lecture 6 – Review of glycolysis, gluconeogenesis, TCA cycle
March 10, 2005	Lecture 7 – Introduction to regulation by insulin
March 15, 2005	**Midterm Examination**
March 17, 2005	Lecture 8 – Genetics of Diabetes
March 22, 2005	Spring Break
March 24, 2005	Spring Break
March 29, 2005	Discussion of insulin signaling papers
March 31, 3005	3 student presentations
April 5, 2005	Lecture 9 – Introduction to Apoptosis
April 7, 2005	Lecture 10 – Regulation of Apoptosis
April 12, 2005	Discussion of apoptosis papers
April 14, 2005	3 student presentations
April 19, 2005	Lecture 11 – G-protein coupled receptors and vision
April 21, 3005	Lecture 12 – Pharmacology of GPCRs
April 26, 2005	Discussion of GPCR papers
April 28. 2005	3 student presentations
May 3, 2005	TBA
May 5, 2005	TBA
May 10, 2005	Lecture 13 – Properties of Networks
May 12, 2005	The Summing Up

Final exam: Tuesday, May 17, 8-10 a.m.