

**BIOCHEMISTRY 463 (BCHM 463, BIOCHEMISTRY AND PHYSIOLOGY) — FALL, 2002**  
**MWF, 11:00-11:50 a.m., Chemistry 1402**  
**University of Maryland, College Park**

**Assoc. Prof. Jason D. Kahn, Dept. of Chemistry and Biochemistry**

Office: Chemistry 2505 (in Biochemistry, Wing 5 of the Chemistry complex)

Contacting me: kahn@adnadm.umd.edu much preferred to 301-405-0058. Please do not drop in to my office or lab; I will set up appointments outside of office hours if necessary.

Class web site: <http://www.biochem.umd.edu/biochem/kahn/bchm463>; there will also be a listserv.

Teaching Asst.: Steven Poole, sp141@umail.umd.edu, 301-405-1817

Office hours: Kahn: Weds. 2-3 p.m., Thurs. 1-2 p.m., Chemistry 2505

Poole: Mon. 12-1 p.m., Fri 12 –1 p.m., Chemistry 2513

**Course Description:**

This course concerns the structure and function of proteins, their roles in biochemical pathways, and some connections to organismal physiology. Specific topics include:

- **Overview of biomolecules and the cellular milieu.**
- **Chemistry and structure of proteins.**
- **Fundamentals of enzyme kinetics and mechanism.**
- **Biochemical pathways fundamental to bioenergetics, including glycolysis and gluconeogenesis, citric acid cycle, glycogen metabolism, oxidative phosphorylation, and fatty acid metabolism.**
- **Regulation of flux through pathways, signal transduction cascades, integration of metabolism.**
- **Connections to protein folding diseases, diabetes, exercise physiology.**

**Textbook and Other Materials (note that the course is primarily lecture-based):**

**Required: Voet, Voet and Pratt, “Fundamentals of Biochemistry, Upgrade Edition.” (2002). Wiley.**

You may find the Student Guide useful, but it is not required. I recommend that you have access to a computer that can run the Biochemical Interactions CD included with the book. It requires only freely available software to run. The publisher’s web site is <http://jws-edcv.wiley.com/college/>, but I have not found material there that improves upon the book and CD. Other web resources will be available through the class web site.

**Requirements, Grading, and Academic Honesty Policies:**

There will be three 50-minute midterm exams (100 pts each) and a two hour final (250 pts). Problem sets will be assigned but will not be collected or graded. However, your exam performance is likely to be highly correlated to the effort you put in on the problem sets. Exams will be about 50% short-answer questions, testing your comprehension of lecture material, and about 50% essay or computational questions, testing your ability to apply and extend this basic knowledge. Each midterm will explicitly cover only the recent part of the course but will inevitably draw on older material. The final will be comprehensive. There will be a review session before each exam (times to be determined).

Your final letter grade will be based on your performance relative to the class as a whole and to my expectations (*i.e.* it’s curved, but I draw the lines between grade levels depending on how I felt the class as a whole performed). Letter grades will not be assigned on the midterms but I will give some feedback on the

curve with each one. Final grades, with plus/minus, will be given out only through MARS or testudo. My exams tend to be quite difficult, but in the past I have had few complaints about final grades. I encourage questions and discussion in class, but class participation does not affect grading.

If you absolutely must miss a midterm exam, you must call me in advance or within 24 hours after the exam, and you must also present a valid University excuse, in order to be eligible for a make-up exam at the end of the semester or for the assignment of a grade based on the remaining course work. If you miss the final or miss two hour exams, you will receive a failing grade.

The University has an active Student Honor Council, which administers an Honor Code. The Honor Council sets high standards for academic integrity, and I support its efforts. Please note in this regard the University Honor Pledge. The Student Honor Council proposed and the University Senate approved this Pledge: "I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination." The Pledge statement should be handwritten and signed on the front page of all examinations and the group project. Students who fail to write and sign the Pledge will be asked to confer with me. (Adapted from <http://www.inform.umd.edu/CampusInfo/Departments/JPO/AI/honorpledge/>.)

Furthermore, I otherwise expect and enforce adherence to the University's Code of Academic Integrity, found at [http://www.inform.umd.edu/CampusInfo/Departments/JPO/code\\_acinteg.html](http://www.inform.umd.edu/CampusInfo/Departments/JPO/code_acinteg.html). That document is incorporated here by reference. You are also hereby specifically directed to read my personal statement on plagiarism at <http://www.biochem.umd.edu/biochem/kahn/plagiarism.html>, as a condition of taking this course.

### **Lecture Schedule (approximate):**

**READING ASSIGNMENTS ARE FOR REFERENCE, NOT REQUIRED UNLESS STATED IN CLASS.  
ALL ASSIGNMENTS REFER TO V, V, AND P, FUNDAMENTALS OF BIOCHEMISTRY.**

#### **I. Biomolecules, Proteins, Enzymes**

1.	Introduction; cellular structure and milieu	Chapters 1, 2	9/4/02
2.	Overview of biomolecules	Chapters 3, 4, 8, 9	9/6/02
3.	Introduction to amino acid structure and the peptide bond	Chapters 4, 5	9/9/02
4.	Protein secondary structure	Chapter 6	9/11/02
5.	Protein tertiary structure, molecular visualization	Chapters 6, 7	9/13/02
6.	Methods for studying proteins	Chapter 5	9/16/02
7.	Catch-up/review day on protein structure		9/18/02
8.	Evolution of protein sequences	Chapter 5	9/20/02
9.	Protein folding and protein folding diseases	Chapters 6	9/23/02
10.	Quaternary structure and allostery	Chapters 6, 7	9/25/02
11.	Hemoglobin and oxygen transport I	Chapter 7	9/27/02
12.	Hemoglobin and oxygen transport II	Chapter 7	9/30/02
13.	Catch-up/review day on protein function		10/2/02
14.	Introduction to enzymes and catalysis	Chapter 11	10/4/02
15.	Catalytic strategies	Chapter 11	10/7/02
	<b>EXAM I ← Covers through lecture 13</b>		<b>10/9/02</b>

(continued)

16.	Michaelis-Menten kinetics	Chapter 12	10/11/02
17.	Enzyme inhibition: proteases and inhibitors	Chapter 12	10/14/02
18.	Carbohydrate structure and chemistry	Chapter 8	10/16/02
19.	Catch-up/review day on enzymes		10/18/02

## II. Metabolism and Bioenergetics

20.	Introduction to metabolism and bioenergetics I	Chapter 13	10/21/02
21.	Introduction to metabolism and bioenergetics II	Chapter 13	10/23/02
22.	Glycolysis: Pathway	Chapter 14	10/25/02
23.	Glycolysis: Mechanisms	Chapter 14	10/28/02
24.	Glycolysis: Regulation	Chapters 14, 21	10/30/02
25.	Review of intro to metabolism		11/1/02
	<b>EXAM II ← Covers through Lecture 25</b>		<b>11/4/02</b>
26.	Pentose Phosphate Pathway	Chapter 14	11/6/02
27.	Citric Acid Cycle: Pathway	Chapter 16	11/8/02
28.	Citric Acid Cycle: Mechanisms	Chapter 16	11/11/02
29.	Citric Acid Cycle: Regulation	Chapter 16, 21	11/13/02
30.	Electron Transport and Oxidative Phosphorylation I	Chapter 17	11/15/02
31.	Electron Transport and Oxidative Phosphorylation II	Chapter 17	11/18/02
32.	Catch-up/review day on aerobic energy production		11/20/02
33.	Observing single molecules		11/22/02
34.	Glycogen metabolism	Chapters 15, 21	11/25/02
35.	Gluconeogenesis	Chapters 15, 21	11/27/02
	<b>THANKSGIVING</b>		11/29/02
36.	Fatty acid oxidation and synthesis I	Chapter 19	12/2/02
37.	Fatty acid oxidation and synthesis II	Chapter 19	12/4/02
38.	Integration of metabolism	Chapter 21	12/6/02
39.	Signal transduction mechanisms	Chapter 21, 27	12/9/02
	<b>EXAM III ← Covers through Lecture 38</b>		<b>12/11/02</b>
40.	Diabetes	Chapter 21	12/13/02

**FINAL EXAM: Cumulative**

**Wednesday, 12/18/02, 8:00-10:00 a.m., Chem. 1402**