

**BIOCHEMISTRY 463 (BCHM 463, BIOCHEMISTRY AND PHYSIOLOGY)—SUMMER II, 2007**  
**MTuWThF, 9:30-10:50 a.m., Chemistry 1402, University of Maryland, College Park**

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

**Second Half Prof.: Assoc. Prof. Douglas A. Julin, Dept. of Chemistry and Biochemistry**

**Teaching Assistant: Mr. Aaron Haeusler, Dept. of Chemistry and Biochemistry**

**Contacts:** All of us are in Biochemistry, Wing 5 of the Chemistry complex.

Dr. Kahn: Chemistry 2500A, jdkahn@umd.edu much preferred to 301-405-0058

Dr. Julin: Chemistry 3505, djulin@umd.edu, 301-405-1821

Mr. Haeusler: Chemistry 2512. arhaeusler@yahoo.com, 301-405-1815

Office hours: Kahn: Weds. 1-2 p.m., Thurs. 11 a.m.-12 noon, Chemistry 2500A (July 16-August 3)

Julin: Weds. 1-2 p.m., Thurs. 11 a.m.-12 noon, Chemistry 3505 (August 6-August 24)

Haeusler: Mon. 1-2 p.m., Tues. 3-4 p.m., Chemistry 2507 (except August 3-8)

*Please do not drop in to our offices or labs, but we will set up appointments outside of office hours. Please see us as early as possible with any questions or concerns: do not wait until an exam looms!*

Web and email: The class web site is provided on the campus Blackboard site at <http://elms.umd.edu>.  
You should already be subscribed to the class listserv.

### **Course Description**

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

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

### **Textbook, Sources, and Advice**

**Required: Berg, Tymoczko and Stryer, “Biochemistry,” 6<sup>th</sup> edition (2007). W.H. Freeman.**

The book’s companion web site is <http://www.whfreeman.com/stryer>, and we recommend that you explore the structures and tutorials available there. You may also find the Student Companion useful, but it is not required. Other sources may be provided through the course web site.

The textbook is intended to support, extend, and if necessary clarify our lectures. Unless specifically told otherwise, you are not responsible for material in the book that we do not cover in class. However, you are responsible for material that we do cover that is not in the textbook. The lecture schedule below gives the chapters that cover the general topic of the lecture—more specific reading assignments will be given at each lecture.

**To succeed in this course, you must keep up! Read over your notes and do the assigned reading and problems as soon as possible after lecture! If you fall behind, it will just get worse! Stay engaged!**

## Requirements, Grading, and Academic Honesty Policies:

There will be two 80-minute midterm exams (100 points each) and an 80-minute cumulative final exam (150 pts). Problems from the book or other sources will be assigned but generally not graded. However, your exam performance is likely to be highly correlated to the effort you put in on the problem sets. Two brief assignments will also be graded (25 pts each), so the course total will be 400 points. Exams will be about 50% relatively easy questions, testing your comprehension of lecture material, and about 50% more difficult questions, testing your ability to apply and extend this basic knowledge. Each exam will explicitly cover only the recent part of the course but will inevitably draw on older material. Our exams tend to be difficult: they are intended to stretch your thinking, not reward casual effort. We encourage questions and discussion in class, but class participation does not affect grading.

Your final letter grade will be based on your performance relative to the class as a whole and to our expectations (*i.e.* it's curved, but we draw the lines between grade levels depending on how we felt the class as a whole performed). Letter grades will not be assigned on the midterms but we will give some feedback on the curve with each one. Final grades, with plus/minus, will be given out only through Testudo. You do not need to score 90 % to get an A: we anticipate roughly 1:1:1 A:B:C, with D's and F's given only as needed but without hesitation.

If you absolutely must miss an exam, you must call us 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 the two midterm 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 we support its efforts. Please note in this regard the University Honor Pledge. The Student Honor Council proposed and the University Senate have approved this Pledge: "I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination." You will be asked to write out and sign the pledge statement on all examinations. (See [http://www.inform.umd.edu/CampusInfo/Departments/JPO/AI/honorpledge/.](http://www.inform.umd.edu/CampusInfo/Departments/JPO/AI/honorpledge/))

Furthermore, we 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 the personal statement on plagiarism at <http://www.biochem.umd.edu/biochem/kahn/plagiarism.html>, as a condition of taking this course.

## Approximate Lecture Schedule (Exam dates are fixed)

ALL READING ASSIGNMENTS REFER TO BERG ET AL., *BIOCHEMISTRY*, 6<sup>TH</sup> EDITION.

### Dr. Kahn's Lectures: Biomolecules, Proteins, Enzymes, Oxygen Transport

1.	Introduction; cellular structure and milieu	Chapter 1	7/16/07
2.	Overview of biomolecules	Chapters 2.1, 4.1, 11.1, 12.1	7/17/07
3.	Amino acid structure and the peptide bond	Chapter 2.2	7/18/07
4.	Protein secondary structure	Chapter 2.3	7/19/07
5.	Protein tertiary structure and evolution	Chapters 2.4, 6	7/20/07

(continued)

6.	Protein folding and protein folding diseases	Chapter 2.6	7/23/07
7.	Quaternary structure and allostery	Chapter 2.5, 10.1	7/24/07
8.	Catch-up/review day on protein structure		7/25/07
9.	Hemoglobin and oxygen transport I	Chapter 7.1, 7.2	7/26/07
	<b>EXAM I ← Covers through Lecture 8</b>		<b>7/27/07</b>
10.	Hemoglobin and oxygen transport II	Chapter 7.3, 7.4	7/30/07
11.	Introduction to enzymes and catalysis	Chapter 8	7/31/07
12.	Catalytic strategies	Chapter 9	8/1/07
13.	Michaelis-Menten kinetics	Chapter 8.4	8/2/07
14.	Enzyme inhibition: proteases and inhibitors	Chapter 8.5	8/3/07

**Dr. Julin's Lectures: Metabolism, Bioenergetics, Integration of Metabolism**

15.	Introduction to metabolism and bioenergetics I	Chapter 15	8/6/07
16.	Introduction to metabolism and bioenergetics II	Chapter 15	8/7/07
17.	Glycolysis: Pathway and mechanisms	Chapter 16.1	8/8/07
18.	Glycolysis: Regulation	Chapter 16.2	8/9/07
	<b>EXAM II ← Covers Lectures 9-17</b>		<b>8/10/07</b>
19.	Gluconeogenesis	Chapter 16.3-16.4	8/13/07
20.	Citric acid cycle: Pathway and mechanisms	Chapter 17	8/14/07
21.	Citric acid cycle: Regulation	Chapter 17	8/15/07
22.	Electron transport and oxidative phosphorylation	Chapter 18	8/16/07
23.	Glycogen metabolism	Chapter 21	8/17/07
24.	Fatty acid oxidation and synthesis	Chapter 22	8/20/07
25.	Pentose phosphate pathway	Chapter 20	8/21/07
26.	Integration of metabolism; diabetes	Chapter 27	8/22/07
27.	Catch-up and review day		8/23/07
	<b>EXAM III ← Cumulative Final, Emphasizes Lectures 18-27</b>		<b>8/24/07</b>

**Rough concordance between Berg 6e and Berg 5e:**

Chapter in 6 <sup>th</sup> ed.:	1	2	3	4	5	6	7	8	9	10	11	12
Chapter in 5 <sup>th</sup> ed.:	1, 2	3	4	5	6	7	10.2	8	9	10	11	12
Chapter in 6 <sup>th</sup> ed.:	13	14	15	16	17	18	19	20	21	22	27	
Chapter in 5 <sup>th</sup> ed.:	13	15	14	16	17	18	19	20	21	22	30	

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