



BIOCHEM 507 General Biochemistry I

Credits: 3

Canvas Course URL: <https://canvas.wisc.edu/>

Course Designations and Attributes

Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Meeting Time and Location:

Monday, Wednesday, Friday, 9:55am, 1125 Biochemistry Building, 420 Henry Mall

Optional Discussion Sessions held Room 1101 Biochemistry Building (times listed on course website)

Instructional Mode: Face-to-Face instruction

Specify how Credit Hours are met by the Course: Three 50 min lectures per week over approximately 15 weeks.

INSTRUCTORS AND TEACHING ASSISTANTS

Instructor Titles and Names: Professors Michael M. Cox and Aaron Hoskins

Instructor Availability: scheduled office hours (listed on course website) or by appointment

Instructor Email/Preferred Contact: mcox@wisc.edu or ahoskins@wisc.edu

Teaching Assistants:

Zachary Romero zjromero@wisc.edu

Kanika Jain kjain5@wisc.edu

Ahlan Ferdous aferdous@wisc.edu

TA Office Hours; Listed on course website

TA Email/Preferred Contact: Listed above

OFFICIAL COURSE DESCRIPTION

Course Description

As approved through governance, presented in [the Guide](#).

Chemistry of biological materials, intermediary metabolism and protein structure. First semester of a year-long sequence in biochemistry; Biochemistry 508 is offered in the spring.

This course is designed and recommended for undergraduate Biochemistry majors, but others are welcome. Enroll Info: None

Requisites: CHEM343

LEARNING OUTCOMES

Course Learning Outcomes:

Students will become familiar with a series of basic concepts in Biochemistry and life sciences, including but not limited to macromolecular structure, reversible ligand binding interactions, enzymes, enzyme kinetics, membrane structure and function, nucleic acid structure and function, modern methods in biotechnology, thermodynamics as applied to living systems, cellular metabolic processes and catabolism, and regulatory mechanisms.

Required Textbook:

Course textbook is Lehninger Principles of Biochemistry, 7th Edition. Students must purchase the Sapling Plus online version of the textbook.

GRADING

Three, hour-long exams, each 100 points (lowest grade is dropped). Final exam (partly cumulative) is 150 points. 10 participation points. Total grade based on 360 points.

Lecture Number	Date	Lecturer	Topic
1	9/05/2018	Cox	Course introduction and CANVAS
2	9/07/2018	Cox	Evolution and Water POB: Ch. 1–2, especially sections 1.4, 1.5, 2.1, 2.2, 2.3. Chapter 2 living graphs
3	9/10/2018	Cox	Amino acids and peptides: chemistry, stereochemistry, ionization, structure of the peptide bond, biological activities of peptides; chemical synthesis of peptides POB: Sections 3.1 and 3.2
4	9/12/2018	Cox	Protein Methods: purification, composition, quantification POB: Section 3.3 SDS gel electrophoresis animation
5	9/14/2018	Cox	Protein structure; primary; amino acid sequence; sequence homology and its relevance to evolution POB: Section 3.4
6	9/17/2018	Cox	Protein structure; secondary and tertiary POB: Sections 4.1, 4.2
7	9/19/2018	Cox	Protein Structure; tertiary and quaternary POB: Sections 4.3, 4.4
8	9/21/2018	Cox	Protein function: ligand binding; allostery; regulation POB: Section 5.1 Chapter 5 living graphs
9	9/24/2018	Cox	Enzymatic catalysis: principles that explain catalytic power and specificity; transitionstate complementarity POB: Sections 6.1, 6.2
10	9/26/2018	Cox	Enzymes: role of cofactors POB: Sections 6.1, 6.2
Exam 1	9/28/2018		Exam 1 covers lectures 1-10
11	10/01/2018	Cox	Enzyme kinetics 1: an approach to understanding mechanism POB: Section 6.3 Chapter 6 living graphs
12	10/03/2018	Cox	Enzyme kinetics 2: bisubstrate kinetics, inhibition, etc. POB: Section 6.3
13	10/05/2018	Cox	Enzyme mechanisms: principles POB: Section 6.4 Chymotrypsin enzyme animation

14	10/08/2018	Cox	Enzyme regulation: allosteric and covalent POB: Section 6.5
15	10/10/2018	Cox	Carbohydrates: review of structure, nomenclature, stereochemistry, glycosidic bond, disaccharides POB: Section 7.1
16	10/12/2018	Cox	Polysaccharides: structure, analysis, physical properties of glycogen, starch, chitin, peptidoglycan, hyaluronic acid, chondroitin sulfate; extracellular matrix POB: Section 7.2
17	10/15/2018	Cox	Informational carbohydrates POB: Sections 7.3, 7.4
18	10/17/2018	Cox	Nucleotides and nucleic acids: structure and physical properties POB: Sections 8.1, 8.2
19	10/19/2018	Cox	Nucleic acids: determination of sequence; chemical synthesis POB: Section 8.3 See Technique animations in chapter 8
20	10/22/2018	Cox	Genomics and proteomics POB: Chapter 9 inclusive See Technique animations in chapter 9
Exam 2	10/24/2018		Exam 2 covers lectures 11–20
21	10/26/2018	Hoskins	Lipids: Structure, Properties, & Function POB: Chapter 10 inclusive
22	10/29/2018	Hoskins	Membranes and Transport 1 POB: Chapter 11 inclusive See chapter 11 living graphs
23	10/31/2018	Hoskins	Membranes and Transport 2 POB: Chapter 11 inclusive
24	11/02/2018	Hoskins	Principles of Metabolism: free-energy changes in biology and chemical sense POB: Part II Intro and Section 13.1
25	11/05/2018	Hoskins	ATP and Phosphoryl Group Transfers POB: Section 13.3
26	11/07/2018	Hoskins	Electron Transfers in Biology POB: Section 13.4

27	11/09/2018	Hoskins	Metabolism Overview & Practice Problems POB: Section 13.2 See chapter 13 living graphs
28	11/12/2018	Hoskins	Glycolysis and Gluconeogenesis 1 POB: Chapter 14 inclusive
29	11/14/2018	Hoskins	Glycolysis and Gluconeogenesis 2 POB: Chapter 14 inclusive See animated enzyme mechanisms in chapter 14
30	11/16/2018	Hoskins	Glycogen Metabolism and Regulation POB: Chapter 15 inclusive
Exam 3	11/19/2018		Exam 3 covers lectures 21-30
31	11/21/2018	Hoskins	Citric Acid Cycle & TPP POB: Chapter 16 inclusive
	11/23/2018	No Class	Thanksgiving Break
32	11/26/2018	Hoskins	Citric Acid Cycle & TPP POB: Chapter 16 inclusive See animated enzyme mechanisms (under problem solving videos) in chapter 16.
33	11/28/2018	Hoskins	Oxidation of Fatty Acids & B12 POB: Chapter 17 inclusive See animated enzyme mechanism in chapter 17.
34	11/30/2018	Hoskins	Amino Acid Catabolism & PLP POB: Sections 18.1, 18.2
35	12/03/2018	Hoskins	Amino Acid Catabolism & Keto Acids POB: Section 18.3 See animated enzyme mechanisms in chapter 18.
36	12/05/2018	Hoskins	Mitochondrial Electron Transfer POB: Section 19.1
37	12/07/2018	Hoskins	ATP Synthesis and Coupled Electron Transfer POB: Sections 19.2, 19.3
38	12/10/2018	Hoskins	Mitochondrial and Chloroplast Biology POB: Sections 19.4, 19.5, 20.1, 20.2, 20.3
39	12/12/2018	Hoskins	Semester Wrap-up
Final	12/17/2018	5:05 PM	FINAL EXAM

RULES, RIGHTS & RESPONSIBILITIES

- See the Guide's to [Rules, Rights and Responsibilities](#)

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [Cox and Hoskins] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [Cox and Hoskins], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA."

<http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>

DIVERSITY & INCLUSION

Institutional statement on diversity: "Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." <https://diversity.wisc.edu/>