



**Biochemistry**  
UNIVERSITY OF WISCONSIN-MADISON

**BIOCHEM 507 – 001 General Biochemistry I**

**Instructors and Teaching Assistants**

**Instructors:**

Prof. Aaron Hoskins, [ahoskins@wisc.edu](mailto:ahoskins@wisc.edu)

Office hours: TBD or by appointment

Prof. Amy Weeks, [amweeks@wisc.edu](mailto:amweeks@wisc.edu)

Office hours: TBD or by appointment

**Teaching assistants:**

David Rivera-Kohr, [riverakohr@wisc.edu](mailto:riverakohr@wisc.edu)

Discussion section: TBD

Office hours: TBD

Debayan Chaudhury, [dchaudhury@wisc.edu](mailto:dchaudhury@wisc.edu)

Discussion section: TBD

Office hours: TBD

## Course Information

**Course description:** Chemistry of biological materials, intermediary metabolism and protein structure.

**Prerequisite:** CHEM 345

### **Credits: 3**

This class meets for three 50-minute class periods each week over the Fall semester and carries the expectation that students will work on course learning activities (reading, problem sets, studying, etc.) for 2-3 hours out of the classroom for every class period. Additional information about meeting times and expectations for student work are described below.

## Course details

**Instructional modality:** Classroom instruction

**Canvas course URL:** <https://canvas.wisc.edu/courses/307318>

### **Meeting time and location:**

Lecture time: MWF 9:55-10:45 am

Lecture location: Biochemistry 1125

**Discussion sections:** Your instructors will be available to help you during office hours and discussion sections, listed above and on the Canvas course homepage, or by appointment. During the discussion sessions, the course graduate assistants will address questions related to material presented in lecture and go over any problems you have difficulty with. Discussion sections and office hours will be held at the times and locations described on page 1. **Attendance at a Discussion section is not required but is strongly recommended.**

### **Lecture video, audio, and slides:**

Slides will be available before class on the Canvas 'Modules' page. Captioned lecture videos and lecture audio will be posted on the Canvas 'Modules' page after each class period.

## **Honors credit**

Biochem 507 can be taken for honors credit. To receive honors credit for Biochem 507, you must have chosen the honors option when you registered for the course, complete the honors-specific extra assignments, and receive a grade of "B" or better in the course. For details on honors assignments, see the Biochem 507 Honors Canvas page).

## Course materials

### Textbook

In this course, examination questions are derived primarily from the lecture material. We will assign readings and problems sets from *Lehninger Principles of Biochemistry* by Nelson and Cox (Macmillan Learning, 8th edition, 2021). **Students are required to purchase access to the electronic eBook version of this textbook.** The eBook comes packaged with a resource called Achieve. The link to the online store for purchasing eBook and Achieve Access can be found on the Canvas course homepage, as well as in the 'Modules' section. A physical copy of the textbook is more expensive and does not replace the eBook; it would therefore only be useful if you intend to retain it as a resource for your education.

### Study materials

**Learning goals:** A list of learning goals is provided in the Resources section for each exam on the Canvas 'Modules' page.

**Problem sets and reading assignments:** For each exam, we will provide a list of suggested readings from the electronic textbook. We will assign problems and Achieve resources from the electronic textbook and also problems written by your instructors. Detailed solutions to end-of-chapter textbook problems can be found in *The Absolute, Ultimate Guide to Lehninger Principles of Biochemistry* by Osgood and Ocorr. You do NOT need to purchase this book. Several hard copies of *Lehninger* are on reserve at the Steenbock Library, along with multiple copies of *The Absolute, Ultimate Guide to Lehninger Principles of Biochemistry*. Please keep in mind that *The Absolute, Ultimate Guide* has not yet been updated for the 8th edition and many assigned problems are new to this edition of the textbook. You can find assigned problem sets and readings in the Resources section for each exam on the Canvas 'Modules' page.

**Practice exams:** Selected previous BIOCHEM 507 exams and exam keys will be provided in in the Resources section for each exam on the Canvas 'Modules' page. To best simulate the exam experience, we suggest that you initially attempt these exams without consulting your textbook, notes, or the provided exam key.

### Lecture video, audio, and slides:

Slides will be available before class on the Canvas 'Modules' page. Captioned lecture videos and lecture audio will be posted on the Canvas 'Modules' page after each class period.

## Exams and grading

### Point distribution

The course will be graded out of 450 total points. These will be distributed as follows:

#### **50-minute exams: 200 points**

There will be three 50-minute exams which will be given **only during class time**. Your best two out of the three 50-minute exams will be used to determine your grade in the course. If you miss a 50-minute exam, your final grade will be based on the other two; **make-up exams will not be given**.

#### **Final exam: 150 points**

The final exam covers lectures 1-39 and has been scheduled for **Saturday, December 17 7:45 am – 9:45 am**. An alternative time for the final will be arranged for those with three exams within 24 hours per university policy.

#### **Quizzes: 36 points**

Quizzes will be given on Canvas one week before each 50-minute exam. You will have a 24-hour window to begin the quiz; once the quiz has been started, you will have 10 minutes to complete the quiz. Quizzes must be completed by the deadline indicated in the course schedule. No extensions will be given.

#### **Scavenger hunt: 16 points**

Completion of the Scavenger hunt quiz by the due date indicated in the course schedule is worth 16 points. No extensions or make-up quiz will be given.

#### **Peerwise participation: 48 points**

Participation in the course Peerwise site is worth 48 points. More information on Peerwise assignments is given below. Peerwise assignments must be completed by the dates given in the course schedule. No extensions or make-ups will be given.

## Exam and grading policies

### Calculator policy for exams

Most of the exams in Biochem 507 include problems that require some numerical calculations. For this purpose, students are encouraged to bring a simple scientific calculator to the exams. Suitable calculators can be obtained for about \$10. Note that the calculator is for number crunching only. Cell phones and graphing calculators will not be permitted during exams. If you are unsure whether your calculator is acceptable, please check with one of the instructors or graduate assistants in advance of the first exam.

## **Assignment of letter grades**

Letter grades for the course will only be assigned after all possible total points for the course have been tabulated. We (the instructors and graduate assistants) will not discuss with you your expected letter grades during the semester. However, our policy is to guarantee students who earn at least 400 of the 450 total points ( $\geq 90\%$ ) will be assigned a letter grade of "A".

## **Regrade policy**

50-minute exams will be graded and returned within a few days of the exam. If you believe that an error was made in grading your exam, you must submit your test for a regrade to the graduate teaching assistants with a written explanation of the grading issue within one week after the exams have been returned. Final exams will not be subjected to regrading.

## **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/](http://studentconduct.wiscweb.wisc.edu/academic-integrity/).

## **Accommodations for students with disabilities**

"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 [me] 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, will work either directly with the student 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 and inclusion**

"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>

## Peerwise assignments

There will be a total of four exercises, corresponding to the four parts of the course (lectures 1-10 and exam 1, lectures 11-20 and exam 2, lectures 21-30 and exam 3, lectures 31-39 and the final exam). There are four separate Peerwise "courses" corresponding to the four exercises. Each exercise is worth 12 participation points in total that will be distributed as follows:

**Composing questions (6 points).** For each Peerwise exercise, you will be asked to compose two multiple choice questions. In each case, your questions should have four possible answers, with one correct answer. In addition to the question, you will need to compose an explanation of the question that describes why the correct answer is in fact correct, and why the other ones are wrong. This will be worth 6 of the total points (3 points for each question).

**Answering questions composed by your classmates (6 points).** In addition to your own question, you will be asked to answer questions posed by your classmates, to critique those questions, and to modify your own question in response to critiques you receive from your peers. All of these activities contribute to your Peerwise reputation score. **You will receive 2 points for a reputation score of 200, 4 points for a reputation score of 500, and 6 points for a reputation score above 1000.** Building your reputation score takes time because it is based on your feedback to other students and other students' feedback on your questions. For this reason, you should plan on beginning the Peerwise exercise at the beginning of each section of the course. Do not wait until the last minute to increase your reputation score--**start using Peerwise early!**

**Peerwise login:** Log into Peerwise by clicking the link at the top of the Biochem 507 Canvas Home page under 'Important links'. You will need the four Peerwise course IDs (**24942, 24943, 24944, 24945**) and **your student WISC.EDU email address** to login to the site and set up your username and password. **Please also use your WISC.EDU email address** for your username. Use of other usernames will make it difficult for us to give you credit for the points you earn. You will need to set this up separately for each of the four Peerwise courses/exercises.

### Schedule for Peerwise assignments

<b>Peerwise course ID:</b>	<b>24942</b>	<b>24943</b>	<b>24944</b>	<b>24945</b>
<b>Question due date:</b>	9/25/22	10/21/22	11/16/22	12/7/22
<b>Reputation score due date:</b>	9/30/22	10/26/22	11/21/22	12/12/22
<b>If your last name begins with:</b>	<b>Choose question #1 topic from:</b>	<b>Choose question #2 topic from:</b>	<b>Choose question #3 topic from:</b>	<b>Choose question #4 topic from:</b>
<b>A-G</b>	Lecture 1-3	Lecture 18-20	Lecture 26-27	Lecture 33-34
<b>H-L</b>	Lecture 4-5	Lecture 11-13	Lecture 28-30	Lecture 35-36
<b>M-R</b>	Lecture 6-7	Lecture 14-15	Lecture 21-23	Lecture 37-38
<b>S-Z</b>	Lecture 8-10	Lecture 16-17	Lecture 24-25	Lecture 31-32

## Course schedule for Biochem 507: Fall 2022

*\*due dates for Peerwise assignments, quiz dates, and exam dates*

### **Lectures 1-10: Foundational material; amino acids, peptides, proteins, and enzymes**

Wed	Sept 7	1. Course introduction and Canvas	Hoskins
Fri	Sept 9	2. Water and weak interactions in biochemistry ( <i>Ch. 1, 2</i> )	Hoskins
Mon	Sept 12	3. Amino acids and peptides ( <i>Ch. 3.1, 3.2</i> )	Weeks
Wed	Sept 14	4. The hierarchy of protein structure ( <i>Ch. 3.4, 4.1, 4.2, 4.3</i> )	Weeks
		<b>Canvas Scavenger Hunt due by 11:59 pm</b>	
Fri	Sept 16	5. Protein folding and protein structure determination ( <i>Ch. 4.4, 4.5</i> )	Weeks
Mon	Sept 19	6. Protein biotechnology and protein analysis ( <i>Ch. 3.3, 3.4</i> )	Weeks
Wed	Sept 21	7. Protein function: ligand binding ( <i>Ch. 5.1, 5.2</i> )	Weeks
Fri	Sept 23	8. The hierarchy of protein structure ( <i>Ch. 3.4, 4.1, 4.2, 4.3</i> )	Weeks
		<b>Canvas quiz #1 opens after class (due by Sat, Sept 24 at 11:15 am)</b>	
<b>*Sun</b>	<b>Sept 25</b>	<b>Peerwise #1 questions due by 11:59 pm</b>	
Mon	Sept 26	9. Enzymatic catalysis ( <i>Ch. 6.1, 6.2</i> )	Weeks
Wed	Sept 28	10. Enzymatic catalysis continued ( <i>Ch. 6.1, 6.2, 6.4</i> )	Weeks
<b>*Fri</b>	<b>Sept 30</b>	<b>Exam 1 covering lectures 1-10</b>	
		<b>Peerwise #1 reputation score due by 11:59 pm</b>	

### **Lectures 11-20: Enzyme kinetics; carbohydrates; nucleotides and nucleic acids**

Mon	Oct 3	11. Enzyme kinetics 1 ( <i>Ch. 6.3</i> )	Weeks
Wed	Oct 5	12. Enzyme kinetics 2 ( <i>Ch. 6.3</i> )	Weeks
Fri	Oct 7	13. Enzyme mechanisms ( <i>Ch. 6.4</i> )	Weeks
Mon	Oct 10	14. Enzyme kinetics: enzyme regulation ( <i>Ch. 6.5</i> )	Weeks
Wed	Oct 12	15. Carbohydrates: structure, nomenclature ( <i>Ch. 7.1</i> )	Weeks
Fri	Oct 14	16. Polysaccharides: structure and properties ( <i>Ch. 7.2, 7.3, 7.4</i> )	Weeks
Mon	Oct 17	17. Nucleotides and nucleic acids: structure and properties ( <i>Ch. 8.1, 8.2</i> )	Weeks
Wed	Oct 19	18. Nucleic acids: information transfer ( <i>Ch. 8.1, 8.2</i> )	Weeks
		<b>Canvas quiz #2 opens after class (due by Thurs, Oct 20 at 11:15 am)</b>	
Fri	Oct 21	19. Nucleic acids: synthesis and sequencing ( <i>Ch. 8.3</i> )	Weeks
		<b>Peerwise #2 questions due by 11:59 pm</b>	
Mon	Oct 24	20. Nucleic acid biotechnology ( <i>Ch. 9</i> )	Weeks
<b>*Wed</b>	<b>Oct 26</b>	<b>Exam 2 covering lectures 11-20</b>	
		<b>Peerwise #2 reputation score due by 11:59 pm</b>	

### **Lectures 21-30: Lipids, membranes, and metabolism**

Fri	Oct 28	21. Lipids: Structure, Properties & Function ( <i>Ch. 10 inclusive</i> )	Hoskins
Mon	Oct 31	22. Membranes and Transport 1 ( <i>Ch. 11 inclusive</i> )	Hoskins
Wed	Nov 2	23. Membranes and Transport 2 ( <i>Ch. 11 inclusive</i> )	Hoskins
Fri	Nov 4	24. Principles of Metabolism: free-energy changes in biology ( <i>Part II intro and section 13.1</i> )	Hoskins
Mon	Nov 7	25. ATP and Phosphoryl Group Transfers ( <i>Section 13.3</i> )	Hoskins
Wed	Nov 9	26. Electron Transfers in Biology ( <i>Section 13.4</i> )	Hoskins
Fri	Nov 11	27. Metabolism Overview & Practice Problems ( <i>Section 13.2</i> )	Hoskins
Mon	Nov 14	28. Glycolysis and Gluconeogenesis 1 ( <i>Ch. 14 inclusive</i> ) <i>See Chapter 13 living graphs</i> <b>Canvas quiz #3 opens after class (due by Tues, Nov 15 at 11:15 am)</b>	Hoskins
Wed	Nov 16	29. Glycolysis and Gluconeogenesis 2 ( <i>Ch. 14 inclusive</i> ) <i>See animated enzyme mechanisms in Chapter 14</i> <b>Peerwise #3 questions due by 11:59 pm</b>	Hoskins
Fri	Nov 18	30. Glycogen Metabolism and Regulation ( <i>Ch. 15 inclusive</i> )	Hoskins
<b>*Mon</b>	<b>Nov 21</b>	<b>Exam 3 covering lectures 21-30</b> <b>Peerwise #3 reputation score due by 11:59 pm</b>	

### **Lectures 31-39: Metabolism: Citric Acid Cycle, Fatty Acid Oxidation, Amino Acid Metabolism, Mitochondrial Electron Transfer & Mitochondrial Biology**

Wed	Nov 23	31. Citric Acid Cycle & TPP ( <i>Ch. 16 inclusive</i> )	Hoskins
Fri	Nov 25	No class	
Mon	Nov 28	32. Citric Acid Cycle & TPP ( <i>Ch. 16 inclusive</i> ) <i>See anim. enzyme mech. (under problem solving videos) in ch. 16.</i>	Hoskins
Wed	Nov 30	33. Oxidation of Fatty Acids & B12 ( <i>Ch. 17 inclusive</i> ) <i>See animated enzyme mechanism in chapter 17.</i>	Hoskins
Fri	Dec 2	34. Amino Acid Catabolism & PLP ( <i>Sections 18.1, 18.2</i> )	Hoskins
Mon	Dec 5	35. Amino Acid Catabolism & Keto Acids ( <i>Section 18.3</i> ) <i>See animated enzyme mechanisms in Chapter 18</i> <b>Canvas quiz #4 opens after class (due by Tues, Dec 6 at 11:15 am)</b>	Hoskins
Wed	Dec 7	36. Mitochondrial Electron Transfer ( <i>Section 19.1</i> ) <b>Peerwise #4 questions due by 11:59 pm</b>	Hoskins
Fri	Dec 9	37. ATP Synthesis and Coupled Electron Transfer ( <i>Sections 19.2, 19.3</i> )	Hoskins
Mon	Dec 12	38. Mitochondrial Biology and Photosynthesis	Hoskins
Wed	Dec 14	39. Semester Wrap-Up ( <i>Sections 19.4, 19.5, 20.1, 20.2, 20.3</i> ) <b>Peerwise #4 reputation score due by 11:59 pm</b>	Hoskins
<b>*Sat</b>	<b>Dec 17</b>	<b>Final exam 7:45 am – 9:45 am (covers lectures 1-39)</b>	



