



**Biochemistry 501**  
**Introduction to Biochemistry**  
**Fall 2018**

**Course Credits: 3**

**Course Website:**

<https://canvas.wisc.edu/courses/104513>

**Course Designation and Attributes:**

Breadth - Physical Sci. Counts toward the Natural Sci req

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

**Meeting Time and Location:**

MWF, 12:05 pm – 12:55 pm,

Room 125 Ag Hall,

1450 Linden Dr.

Fall Instruction begins 9/5/2018

Thanksgiving recess is 11/22/2018-11/25/2018

Last class day is 12/12/2018

Final exam Saturday, 12/15/2018 at 5:05 pm

Final exam location: TBA

**Instructional Mode:**

Blended

**Credit hour designation:**

50 minutes of classroom or online instruction carries the expectation of a minimum of two hours of out of class student work for every class period over approximately 15 weeks. Additional information about expectations and optional learning opportunities for student work are included below.

## Teaching Team and Office Hours:

### Professors:

Dr. Samuel Butcher, MWF, 1:10 pm – 2:10 pm;  
141E DeLuca Biochemistry Laboratories, 433 Babcock Dr.,  
[sebutcher@wisc.edu](mailto:sebutcher@wisc.edu)

Dr. Richard Amasino, WF, 2:30 pm – 3:30 pm;  
215B DeLuca Biochemistry Laboratories, 433 Babcock Dr.,  
[amasino@biochem.wisc.edu](mailto:amasino@biochem.wisc.edu)

Dr. Jill Wildonger, MWF, 1:10 pm – 2:10 pm;  
2204 Biochemical Sciences Building, 440 Henry Mall,  
[wildonger@wisc.edu](mailto:wildonger@wisc.edu)

### Course Coordinator and Lecturer:

Dr. Mario Pennella, TR 12:00– 1:30pm;  
1142E DeLuca Biochemistry Building, 420 Henry Mall,  
[mpennella@wisc.edu](mailto:mpennella@wisc.edu)

### Teaching Assistants (schedule meetings by email):

Wamiah Chowdhury, [wchowdhury@wisc.edu](mailto:wchowdhury@wisc.edu)

Elizabeth Duchow, [educhow@wisc.edu](mailto:educhow@wisc.edu)

Ashley Cortes Hernandez, [corteshernan@wisc.edu](mailto:corteshernan@wisc.edu)

Jonathan Tai, [jtai4@wisc.edu](mailto:jtai4@wisc.edu)

## **COURSE INFORMATION**

**Course Description:** Biochemistry 501 is a three-credit course. We will examine the chemical and physical processes that occur within living organisms.

**Course Requisites:** Chem 341 or 343 or concurrent enrollment: or graduate student.

## **Learning Outcomes:**

1. Students will be able to demonstrate an understanding of the basic principles of biochemistry for a range of topics spanning the structural and catalytic components of cells, catabolism and bioenergetics, hormonal control of metabolism and biosynthesis, and the transfer of genetic information.
2. Evaluate how biochemistry relates to other scientific disciplines and to contemporary issues in our society.
3. Synthesize knowledge and use insight to better understand biological systems.

## **Piazza – class discussion board over course material**

We will use Piazza (free and found on Canvas course site) for “students to post questions and collaborate to edit responses to these questions.” Students can post anonymously (must select option) and instructors will monitor students answers/questions, endorse student answers, and edit or delete any posted content. The purpose of Piazza is to provide relatively rapid feedback to student questions by other students and instructors. You can access Piazza via the Canvas course site or this address:

[piazza.com/wisc/fall2018/fa18biochem501001/home](https://piazza.com/wisc/fall2018/fa18biochem501001/home)

## **PeerWise – Assessment (Exam) questions**

“PeerWise is an online repository of multiple-choice questions that are created, answered, rated and discussed by students. At the beginning of the semester, PeerWise begins with an empty repository. This grows gradually as the course progresses and students author and contribute relevant questions. All activity remains anonymous to students, however instructors are able to view the identity of question and comment authors and have the ability to delete inappropriate questions.” We will use PeerWise (free).

**Part of your grade in this course will be dependent upon your participation in PeerWise.** Each student will be required to contribute 4 questions (1 per unit) over the semester. You **must include** sufficient explanations for your answers. This includes explaining why a choice is incorrect. You are required to answer 16 questions (4 per unit) over the semester. We encourage each student to evaluate the questions you answer and provide (when appropriate) constructive open-ended comments. Lastly, we may use PeerWise question(s) on some exams. The course coordinator will send an invitation to PeerWise. The following link provides a guide on using PeerWise:

<https://peerwise.cs.auckland.ac.nz/docs/students/>

## Grading:

40 Quizzes (each worth 0.25%)	10%
PeerWise	2%
4 Exams (The lowest score will be dropped)	78%
Cumulative Portion of Final Exam ( <b>Includes all Units</b> )	10%
<b>Total</b>	<b>100%</b>

We will drop the lowest exam score for students who take all of the exams for the four sections, excluding the cumulative portion of the final. ***The cumulative portion of the final will not be dropped.*** If you do not take an exam, your score for that exam will be 0% and you will not be allowed to drop that score.

A = 90 – 100%

AB = 86 – 89.9%

B = 80 – 85.9%

BC = 76 – 79.9%

C = 65% – 75.9%

D = 55% – 64.9%

F= 0% – 54.9%

**Discussion Sections:** A team of former 501 undergraduates and graduate students will lead optional discussion sections. Although attendance is optional, we strongly encourage you to attend one or more sections each week. The discussion sections will provide an opportunity to study for the course in a small group. We encourage you to bring questions. In addition, extra study guide materials, such as additional problems designed to reinforce the important points from the lectures, will be provided. *You do NOT need to sign up for the discussion sections.* Days, times, and locations of the discussion sections are found on Canvas course site in the modules section under Schedule of Discussion Sessions.

**Textbook - Recommended (Not Required):** Lehninger Principles of Biochemistry, by Nelson and Cox, 7th edition (earlier editions suitable as well). We will not assign readings or homework directly from the textbook. However, many of you may find the book to be a useful study guide and reference. To facilitate use of the book as a study guide and reference, the lectures will closely follow this textbook and the parts of the book relevant to lecture will be referenced by providing page numbers or by providing the number of the figures in the book that correspond to the images used in lecture. (The figures are labeled sequentially in each chapter; thus, Figure 22-5 is the 5th figure in Chapter 22.) Here are your options for textbook access.

1. Use reserve copies. We keep a few copies of the textbook on reserve at Steenbock and Helen C White libraries.
2. Buy a used book. There should be some 6<sup>th</sup> edition used books available. Furthermore, an old copy of the 4<sup>th</sup> or 5<sup>th</sup> edition will be suitable for almost all of the material we cover in the course.
3. The publisher is offering a loose-leaf, full color copy of the book, along with electronic resources, for around \$80. The electronic resources include one-year access to a resource called LaunchPad and the electronic copy of the book. LaunchPad has a variety of problems and other resources that may be of use in learning the material. The supplemental problems are found by clicking on the LearningCurve Activity link. You will need to buy a 3-ring binder for the loose-leaf book. The loose-leaf book and the access card to the electronic resources are available for purchase in the bookstore.
4. Buy a new hardcover textbook (in the range of \$250).

**Quizzes:** You will be assigned one 4-question quiz for each lecture (~40 quizzes total, excludes lecture 1 from Unit 1). The links to quizzes can be found within each Unit within the Modules section of the Canvas course site. They will open soon after class and will close at noon the day of the next class meeting unless otherwise noted on Canvas. ***If you miss the deadline for a quiz you will only receive 50% credit for completing the quiz based on questions answered correctly. Once a Unit is finished, quizzes will be closed and no makeups will be allowed.*** The answers to the quiz will be accessible soon after the submission deadline. **Please pay attention to the deadlines for the quizzes.** Deadlines are listed above the links to each quiz in the modules section on the course site.

**Exams:** There will be three evening exams given after the completion of Units 1, 2, and 3 (exam date/time below). These exams will have 33 questions and students will be allowed 75 minutes to complete the exam. The final exam will have the Unit 4 exam (33 questions) plus a cumulative part (20 questions) that is comprehensive, covering **ALL SECTIONS (UNITS 1-4) OF THE COURSE**. You will have 120 minutes to complete the Unit 4 and cumulative exam. Exams are multiple choice and true/false questions; a sample exam for each section is provided on the Canvas course site.

The lowest Unit exam score out of the four Unit exams (including Unit 4) will be dropped. The three unit exams that are retained will count towards 78% of your final grade.

**You must bring a photo ID to the exam and take the exam in the room assigned to you by the course coordinator.** Failure to take the exam in the correct room may result in a loss of a full letter grade from your exam score.

**Exams are collected at the end of the exam period.** Approximately 1 – 3 days after each exam, you will be able to view your grade on Canvas. The final semester grades for everyone will not be released until a few days after the exam. You will be able to view the questions you answered incorrectly at an exam viewing session the week following the exam. Times and locations will be announced after each exam. There will be no exam viewing session after the final.

**Exam conflicts:** We will try to accommodate students who have a legitimate conflict with a biochemistry exam. Our policy is to offer an exam *earlier that same day*. We do not offer late alternate exam times. If you have an exam conflict, please fill out an Early Exam Request Form located within the modules section of the Canvas course site. Send a copy of your completed request form to the course coordinator (mpennella@wisc.edu) via email.

Please enter ‘**501 exam conflict**’ in the subject line. If your request is approved, you will receive an email with the time and location the Friday before the exam. *No alternate exams will be offered for the final.*

## **OTHER COURSE INFORMATION**

**Course Accessibility:** The teaching team strives to provide everyone the opportunity to learn biochemistry. Please let the course coordinator (Mario Pennella, mpennella@wisc.edu) know if you have additional learning considerations relating to the curriculum, instruction, or assessment of this course that will enable you to engage in the course more fully. We will keep any information you share with us confidential. *If you are a McBurney student, see statement below and please contact the course coordinator to discuss your accommodations.*

**Learn@UW:** The course materials can be accessed through the Canvas course website via <https://learnuw.wisc.edu>. Here you can find textbook references, all lecture slides, practice problem sets and answers, recorded lectures, practice exams and answers, quizzes, and all course announcements regarding exam review sessions, exam locations, and grades. Visit Learn@UW frequently for course announcements.

**Lecture Recordings:** We will video record each lecture. The videos should be posted within 12 hours after class. **Media files can be accessed directly from the Canvas course site.**

**Cell phones:** Cell phones should be silenced when in the classroom. If you are on call for work or have a personal emergency, please lower the volume on your device and sit near an exit.

**How to succeed in this class:** To succeed it is important to study consistently and effectively. Here are some suggestions for effective studying.

- ▶ Before class, ***read the suggested chapter*** and lecture notes. Focus on general concepts rather than getting lost in the details. This “priming” exercise will make lecture easier to follow.
- ▶ ***Attend/watch class*** faithfully. As soon as possible after lecture, go over your notes and fill in parts that you do not fully understand using material from the textbook that applies to the topic covered in lecture. If you did not understand something, also review the lecture video and study the practice questions that are designed to help you learn important concepts.
- ▶ ***Writing is important to learning.*** Highlighting sentences with marker pen is not an effective way to transfer knowledge to the brain. Rather, putting concepts into your own words and writing them down results in your assimilating the concepts and recognizing relationships among concepts.
- ▶ Making ***flash cards*** is one version of using writing to learn concepts and recognize relationships. Picking out the most important concepts and putting them in your own words and writing them down is a powerful learning tool. Try pulling random cards from the stack and ask yourself “how do these ideas relate to each other?”
- ▶ ***Study groups*** are recommended. Although certain concepts in biochemistry can be memorized, the majority must be learned, and discussing biochemistry with others is a good way to learn. Join a peer mentor tutoring group or attend the discussions.
- ▶ ***Complete the problem sets*** provided in the course packet. Research has shown that working through problems is one of the best ways to prepare for a multiple choice exam.
- ▶ Taking accurate and complete notes and asking questions are part of the learning process. If you do not understand a topic that was presented in class, ***ask questions***. You can submit questions and reply to questions through the Piazza discussion board on the Canvas course site.

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

**During an exam**, if proctors have a concern, they may ask student(s) to move to the front of the classroom. If you are asked to move, this does not mean we are accusing you of cheating. Moving will help the proctors maintain proper visual contact of all students in the room. Please accommodate any such request made of you during the exam. In addition, we may videotape exams to determine if academic misconduct takes place.

### **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 [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 [I], 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/>

<b>Part 1: Structural and Catalytic Components of Cells – Prof. Butcher</b>				
<b>Lecture</b>	<b>Topic</b>	<b>Day of the Week</b>	<b>Date</b>	<b>Assignment Due</b>
1	Overview of the Course, Chemical Principles, and Cellular Basics	Wednesday	September 5	
2	Structure and Properties of Water, pH, Buffers	Friday	September 7	
3	Amino Acids and Protein Primary Structure	Monday	September 10	Quiz 1
4	Protein Purification and Analysis	Wednesday	September 12	Quiz 2
5	Three Dimensional Structure of Proteins	Friday	September 14	Quiz 3
6	Protein Function	Monday	September 17	Quiz 4
7	Enzyme Properties, Mechanisms, and Kinetics	Wednesday	September 19	Quiz 5
8	Enzyme Structure, Function, and Regulation	Friday	September 21	Quiz 6
9	Enzyme Inhibition & Structure and Properties of Lipids	Monday	September 24	Quiz 7
10	Lipids as Signaling Molecules & Membrane Structure	Wednesday	September 26	Quiz 8
11	Membrane Proteins and Transporters	Friday	September 28	Quiz 9
		Monday	October 1	Quiz 10
<b>Review Session</b>	<b>Time and Location TBA</b> <b>*OPTIONAL*</b>			
<b>Exam 1</b>	<b>7:15 pm, Location TBA</b>	<b>Tuesday</b>	<b>October 2</b>	

<b>Part 2: Energy Production: Catabolism and Bioenergetics – Prof. Amasino</b>				
<b>Lecture</b>	<b>Topic</b>	<b>Day of the Week</b>	<b>Date</b>	<b>Assignment Due</b>
1	Thermodynamics and Bioenergetics	Monday	October 1	
2	Glycolysis	Wednesday	October 3	Quiz 1
3	After Glycolysis: Fermentation or Citric Acid Cycle	Friday	October 5	Quiz 2
4	Citric Acid Cycle	Monday	October 8	Quiz 3
5	Catabolism of Lipids	Wednesday	October 10	Quiz 4
6	Nitrogen Utilization	Friday	October 12	Quiz 5
7	Mitochondrial Electron Transport	Monday	October 15	Quiz 6
8	ATP Synthesis	Wednesday	October 17	Quiz 7
9	Photosynthesis	Friday	October 19	Quiz 8
10	Metabolism and Evolution	Monday	October 22	Quiz 9
		Tuesday	October 23	Quiz 10 (due at 5pm instead of noon)
<b><i>Review Session</i></b>	<b><i>Time and Location TBA *OPTIONAL*</i></b>			
<b><i>Exam 2</i></b>	<b><i>7:15 pm, Location TBA</i></b>	<b><i>Tuesday</i></b>	October 23	

<b>Part 3: Hormonal Control of Fuel Metabolism and Anabolism – Dr. Pennella</b>				
<b>Lecture</b>	<b>Topic</b>	<b>Day of the Week</b>	<b>Date</b>	<b>Assignment Due</b>
1	Metabolism; carbohydrates; hormonal signaling	Wednesday	October 24	
2	Fasting State: Glycogen Breakdown and Gluconeogenesis	Friday	October 26	Quiz 1
3	Starvation state: Amino acid catabolism Gluconeogenesis Ketone bodies	Monday	October 29	Quiz 2
4	Well-fed state: Fuel storage; Insulin signaling; Glycogen synthesis	Wednesday	October 31	Quiz 3
5	Pentose Phosphate Pathway (PPP)	Friday	November 2	Quiz 4
6	Biosynthesis of Fatty Acids (FA) and Triacylglycerols (TAGs)	Monday	November 5	Quiz 5
7	Biosynthesis of Sterols, and Isoprenoids	Wednesday	November 7	Quiz 6
8	Cholesterol Regulation and Lipoproteins	Friday	November 9	Quiz 7
9	Biosynthesis of Amino Acids and Metabolites	Monday	November 12	Quiz 8
10	Biosynthesis and Degradation of Nucleotides; Chemotherapeutic treatments	Wednesday	November 14	Quiz 9
11	Catch-up and review	Friday	November 16	Quiz 10
<b>Review Session</b>	<b>Time and Location TBA *OPTIONAL*</b>			
<b>Exam 3</b>	<b>7:15 pm, Location TBA</b>	<b>Tuesday</b>	<b>November 20</b>	

<b>Part 4: Genetic Information Transfer – Prof. Wildonger</b>				
<b>Lecture</b>	<b>Topic</b>	<b>Day of the Week</b>	<b>Date</b>	<b>Assignment Due</b>
1	Introduction to Information Transfer	Monday	November 19	
2	DNA and Chromosome Structure	Wednesday	November 21	Quiz 1
3	DNA Replication	Monday	November 26	Quiz 2
4	Mutagenesis and Repair	Wednesday	November 28	Quiz 3
5	DNA Recombination	Friday	November 30	Quiz 4
6	Gene Regulation & Epigenetics	Monday	December 3	Quiz 5
7	Transcription	Wednesday	December 5	Quiz 6
8	RNA Processing	Friday	December 7	Quiz 7
9	Translation	Monday	December 10	Quiz 8
10	Molecular Techniques	Wednesday	December 12	Quiz 9
				Quiz 10
<b><i>Review Session</i></b>	<b><i>Time and Location TBA *OPTIONAL*</i></b>			
<b><i>Final Exam (covering Units 1-4)</i></b>	<b><i>Location TBA</i></b>	<b><i>Saturday 5:50-7:05pm</i></b>	<b><i>December 15</i></b>	