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### BCH 480.B01: Advanced Biochemistry I

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# BCH480 Advanced Biochemistry I

## Fall 2020

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### Contact and basic information:

Instructor: Dr. Stephen Lodmell

Class time/place: MWF 10:00-10:50am in room UH210 and/or by Zoom: <https://umontana.zoom.us/j/95065192235>

Optional open discussion session: Thursdays 5-6pm CHCB304 (tentative) and/or by Zoom

Office: CHCB 202 Office hours: 11-12 MW and by appointment and/or by Zoom

Phone: 243-6393

email: [stephen.lodmell@umontana.edu](mailto:stephen.lodmell@umontana.edu)

Text: Garrett and Grisham Biochemistry, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, or 6<sup>th</sup> ed.

### Overview:

Advanced Biochemistry I builds on the foundations built in Organic Chemistry and in Cell and Molecular Biology. In this first semester of the year-long sequence, we will explore the structure, function, and chemistry of the major building blocks of biological systems, notably amino acids and proteins, carbohydrates, nucleotides and nucleic acids, and lipids. In addition, we will cover 'information metabolism', namely DNA replication and repair, transcription, and translation at the molecular/mechanistic level.

### Prerequisites:

BCH480 is a chemistry-based course, and a good foundation in organic chemistry is important. It is easier to see the logic underlying biochemistry if you understand the chemical principles. It is a good idea to review basic organic principles and reactions prior to and during the study of Advanced Biochemistry I.

### Requirements:

The following components are general requirements for success in this course.

- **Attend class.** Listening, interacting, and asking questions are important for mastery of the material. In general, topics that are emphasized in class are also merit a greater proportion of the material covered on quizzes and exams.
- **Read and study the textbook** and supplemental materials. Unless otherwise specified, you are responsible for reading and understanding all of the material in covered chapters.
- You should **work assigned problems** at the end of each chapter of Garrett & Grisham. These problems will not be collected or graded, but they may resemble questions on upcoming quizzes or exams, so familiarity with them will be advantageous to you.
- Tests and quizzes: There will be a weekly quiz most Fridays (except weeks with a midterm exam), three midterm exams, and a comprehensive final exam. Each exam counts as 25% of your final grade (your lowest midterm score will be dropped). The average of your quizzes will count as 25% of your final grade. You may drop your two lowest quiz grades (including any missed quizzes), but makeup quizzes will not generally be given. The final exam is comprehensive and mandatory and counts as 25% of your final grade.

### Graduate credit:

If you are taking this course for graduate credit, you are required to do an extra increment of work. To satisfy this increment you will give an oral presentation to the class about your own research, emphasizing connections to material covered in class. Alternatively, you may present a lecture about a realm of research from the current literature that is relevant to the course content. Please see me to arrange the presentation.

### Notes and Moodle:

Class notes and PowerPoint presentations will be posted on the course Moodle site. Remember that these notes are what I use as an outline for class preparation. They are not intended to be used as a substitute for coming to class or for studying the text; both of these activities are required for success in the course.

### Accessibility, disabilities, and special accommodations:

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. I will work with you and DSS to provide an appropriate accommodation.

### Learning outcomes for Advanced Biochemistry I

Upon completion of this course, students will:

1. Gain an understanding and appreciation for the chemical basis of biological molecule structure and behavior
2. Understand the chemistry of water, buffers, pH, and how they are important in biochemistry
3. Learn the structure and chemistry of the amino acids
4. Understand the assembly of amino acids into proteins and be able to describe the basic elements of primary, secondary, tertiary, and quaternary protein structure
5. Learn and understand the structure, chemistry, and functions of simple and complex carbohydrates
6. Learn and understand the structure, chemistry, and functions of simple and complex lipids and their assembly into different membrane types
7. Learn and understand the structure, chemistry, and functions of nucleobases, nucleosides, nucleotides, and their assembly into nucleic acid polymers
8. Understand at the molecular level how DNA is replicated, repaired and recombined
9. Understand at the molecular level how DNA is transcribed into RNA copies, and understand the regulation of transcription
10. Understand at the molecular level how RNA is translated into proteins and have a good understanding of the structure and function of the translational apparatus

### General University Policies

University policies on drops, adds, changes of grade option, or change to audit status will be strictly enforced in this course. These policies are described in the current UM catalog. Briefly:

#### Dropping Classes

Through the 15th instructional day, **ALL** classes are dropped in CyberBear.

From the 16th through the 45th instructional day, all classes must be dropped using Drop forms (instructor signature required, advisor signature required for undergraduates). **\$10 fee applies.**

From the 46th to the last instructional day prior to finals week, classes must be dropped using the Drop form (instructor and Dean signatures required, advisor signature required for undergraduates). **\$10 fee applies.**

### Changing Grade Option

Through the 15th instructional day, all grade options are changed in CyberBear.

Changes to/from Audit **MUST** be completed by the 15th instructional day.

From the 16th instructional day to the last instructional day prior to finals week, all grade options must be changed using an Add/change form (instructor signature required, advisor signature required for undergraduates).

### Variable Credit Change

Through the 15th instructional day, variable credits are changed in CyberBear.

From the 16th instructional day to the last instructional day prior to finals week, variable credits must be changed using an Add/change form (instructor signature required, advisor signature required for undergraduates).

### Section Changes (changing section for SAME class only)

Through the 7th instructional day, section changes can be added one of three ways:

1. Directly in CyberBear
2. Registration override forms (instructor signature required)
3. Electronic overrides

From the 8th instructional day to the last instructional day prior to finals week, all section changes must be added using an Add/change form (instructor signature required, advisor signature required for undergraduates). **\$10 fee applies.**

### Academic honesty

In working through homework and writing assignments, students are encouraged to work together to solve problems, to share information or resources, and to test each other's understanding of the material. Those are all acceptable forms of collaboration. However, the written work that each student turns in must be his or her own. Only in this way can faculty judge individual understanding of concepts or information. A good rule of thumb for students to follow is to work together up to the point of committing words to paper. At that stage, each student must work independently. A second key guideline is that once a student has written an out-of-class assignment, it must not be shown to another student in the course. Assignments from two or more students that have significant overlap, in the professional judgment of the faculty member, will be regarded as reflecting a violation of the expectation that students turn in independent assignments. Please note that direct copying of sentences from any published without proper citation is considered plagiarism. **THIS INCLUDES THE INTERNET.** Be sure to put the information in your own words and be aware that the instructor will check literary and Internet resources. Violations will be dealt with according to the Student Conduct Code.

All exams and quizzes are given in Moodle and are 'open book' with respect to your notes, the course textbook and Powerpoints. However, **you may not use the internet or collaborate with any other person for assistance during quizzes and tests.**

## Tentative class topics schedule:

August 19-21	Course Introduction & Chapter 1: Biochemistry is Chemistry
Aug 24-28	Chapter 2: H <sub>2</sub> O, pH, Ionic equilibria
Aug 31- Sept 4	Chapter 3: Thermodynamics
Sept 7	Labor Day; No class
Sept 9-11	Chapter 4: Amino Acids
Sept 14-18	Chapter 5: Protein Primary Structure

### ***Midterm Exam 1 (Chapters 1-5) Fri. 09/18 during class time***

Sept 21-25	Chapter 6: Protein Structure
Sept 28-Oct 2	Chapter 7: Carbohydrates
Oct 5-9	Chapter 8: Lipids
Oct 12-16	Chapter 9: Membranes

### ***Midterm Exam 2 (Chapters 6-9) Fri. 10/16***

Oct 19-23	Chapter 10: Nucleotides & Chapter 11: Nucleic acids
Oct 26-30	Chapter 11: Nucleic acids & Chapter 12: Recombinant DNA
Nov 2-6	Chapter 28: DNA replication, repair, recombination
Nov 9,13	Chapter 29: Transcription
Nov 11	Veterans Day holiday

### ***Midterm Exam 3 (Chapters 10, 11, 12, 28) Fri. 11/13***

Nov 16-18	Chapter 30: Translation
Nov 19-24	Final exams

***Final examination (Comprehensive): Thursday November 19 8am-10am.***

Important dates for Fall 2020 see: <https://www.umt.edu/registrar/calendar.php>)