

BB490/590: Biochemistry 1 - Structure and Function

~ Syllabus Fall 2020 ~

Description: Examines how the structure and function of biological macromolecules arises from the organic chemistry of the fundamental building blocks. The organic chemistry of biochemistry will be a focus, including the mechanisms by which enzymes catalyze biological reactions.

Course Credits: This course combines 30 hours of in-class (Zoom) instruction with roughly 60 hours of pre-class video lessons, reading and studying for 3 credits.

INSTRUCTOR: Dr. Andy Karplus ; 2133 ALS Bldg ; Andy.Karplus@oregonstate.edu

TA: Amber Vogel ; 2101 ALS Bldg ; vogela@oregonstate.edu

OFFICE HOURS: TA and Instructor office hours will be over Zoom and listed on Canvas

COURSE PREREQUISITES:

- (BI211, BI212, and BI213) or (BI 211H, BI 212H, and BI 213H) or (BI 221, BI 222, and BI 223) or (BI 221H, BI 222H, and BI 223H), all terms of series with a C- or better; CH 332 or CH 336 (organic) with C- or better

LEARNING RESOURCES:

1. Pre-class video lectures on class material and other class materials (powerpoint slides, other materials, example quizzes and exams) provided on Canvas. *There is no substitute for being at class sessions and taking notes*, as quizzes and exams are based on material covered in pre-recorded lectures and class sessions.
2. Class sessions MWF 10:00-10:50 via Zoom. Powerpoint slides will be shared via Canvas. *There is no substitute for being at class sessions and taking notes*, as quizzes and exams are based on material covered in pre-recorded lectures and class sessions.
3. Canvas discussion boards. A discussion board for each topic will be made available for students to ask questions and help each other master the material.
4. Recommended Text: *Biochemistry, 4th Edition* by: Mathews, Van Holde, Appling, Anthony-Cahill. The text is not required, but has useful readings that can enhance and extend material covered. This text is also used in BB491/591 and BB492/592 and for students like you for whom biochemistry might be a career focus, having a full Biochemistry text such as this one on your shelf can provide value beyond these courses themselves.
5. TA and Professor office hours

LEARNER OUTCOMES

Students in this course will be able to:

1. Demonstrate the ability to conceive of and describe all of life's processes as resulting from the spontaneous interactions of real physical molecules (i.e. *Think like a biochemist*);
2. Describe the names, structures and properties of key biochemical building blocks and macromolecules and their relation to function;
3. Use proper technical language to communicate key biochemical concepts and information, and the evidence that supports them;
4. Explain principles of energetics in molecular interactions, biochemical reactions, and enzyme catalysis;
5. Carry out biochemical calculations related to pH, enzyme kinetics, and metabolic reactions;
6. Integrate concepts covered to assess data and propose explanations that fit data presented;
7. Describe glucose and glycogen metabolism pathways and predict their behavior based on given conditions;
8. BB590 students will further be able to extract, organize and present information from the scientific literature regarding a selected biochemical process.

LEARNER EXPECTATIONS

1. Study material before and as it is being covered. Formulate and ask questions using discussion boards to understand concepts/processes as the material is covered as opposed to cramming before exams.
2. Recognize that understanding a complex topic like biochemistry requires mastering considerable background information, assimilating considerable new material, and investing sufficient time and effort to put these together to gain mastery of the material.

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EXAM AND QUIZ DATES - There will be two midterms and a final. The two midterms *will not* be cumulative. The final will have a portion that is equivalent to a third midterm focused on the last part of the course, and a second portion that is cumulative over the whole course.

Quizzes will be on most Mondays during the first ten minutes of class.

Exam 1: Friday October 16 (via Canvas at the regular class time)

Exam 2: Friday November 13 (via Canvas at the regular class time)

Final Exam: Monday December 7 12:00 – 1:50 p.m. (via Canvas)

Quizzes: Sept. 28, Oct. 5, Oct. 12, Oct. 26, Nov. 2, Nov. 23, Nov. 30

BB590 project draft due Nov 6; final presentation due Fri Dec 4 (for details see Canvas)

GRADING SCALE - All grades will be determined on an absolute scale, so there is no disadvantage to any student for helping another. I encourage students to increase their understanding of the concepts and materials through discussing them with other students.

Grades will be assigned according to the following scale*:

B+ 77-80 ; C+ 62-65 ; D+ 47-50
A 83-100 ; B 68-77 ; C 53-62 ; D: 38-47 ; F: <35
A- 80-83 ; B- 65-68 ; C- 50-53 ; D- 35-38

*The cutoffs may be lowered but will not be raised.

Listed below is the how course activities contribute to your final grade.

	BB490	BB590
Weekly Quiz (top 5 of 7 @ 20 pts each)	100	100
Mid-term Exams (2 @ 250 pts each)	500	500
Literature-based project	-	200
<u>Final exam (portion 1=250 pts; portion 2=150 pts)</u>	<u>400</u>	<u>400</u>
TOTAL	1000	1200

QUIZ, EXAM and REGRADE POLICIES

There will be seven quizzes and three exams (including the final) and no makeup quizzes or exams. The lowest two (2) quiz scores will be dropped. Students taking examinations are not allowed to use a calculator, books, or notes of any kind. Other than a pencil/pen and scratch paper, no materials are allowed for use on exams unless explicitly announced by the instructor.

Excused absences will not be given for missing exams due to airline reservations, routine illness (colds, flu, stomach aches, headaches, or other common ailments), various personal challenges, difficult schedules, or misreading the time of an exam, etc. It is assumed that in registering for this course you reserve the time needed to complete it. Life challenges can impact performance, but that is true for all students. Any special arrangements must be made BEFORE an exam.

Regrade requests. It is each student's responsibility to check that their quiz/exam has been properly graded. Regrade requests must be submitted by email within one week after the exam or quiz was returned to the class. An email regrade request for a given quiz/exam must include all concerns related to that quiz/exam and for each concern must include a brief statement of what the student thinks was incorrect about the original grading.

REGISTRATION DEADLINES

Students are expected to meet deadlines as appropriate for changing grading or withdrawing from the class, should that be necessary.

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POLICY ON INCOMPLETES

A grade of I is appropriate when 1) a course requirement has not been completed due to circumstances beyond the control of the student and 2) at least half of the work for the course has been completed at a level of C- or better. For medical problems that prohibited the student from fulfilling a requirement of the course, a note from a doctor is required. The request may be supplied without the note, and the request (if acceptable) will typically be granted, conditional on the note being provided later. For other circumstances, supporting evidence, such as a note from an advisor, will be helpful to the petitioner's case.

REACH OUT FOR SUCCESS - University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at oregonstate.edu/ReachOut. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)

GENERAL OSU POLICIES

Statement Regarding Students with Disabilities: Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at <http://ds.oregonstate.edu>. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Student Conduct Expectations link: <https://beav.es/codeofconduct>

Cheating or plagiarism by students is subject to the disciplinary process outlined in the Student Conduct Regulations. Students are expected to be honest and ethical in their academic work. "Academic dishonesty" is defined as an intentional act of deception in one of the following areas:

- ◆ Cheating-use or attempted use of unauthorized materials, information or study aids
- ◆ Fabrication-falsification or invention of any information
- ◆ Assisting-helping another commit an act of academic dishonesty
- ◆ Tampering-altering or interfering with evaluation instruments and documents
- ◆ Plagiarism-representing the words or ideas of another person as one's own

Behaviors disruptive to the learning environment will not be tolerated and will be referred to the Office of Student Conduct for disciplinary action.

"The goal of Oregon State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action Office."

Oregon State University strives to respect all religious practices. If you have religious holidays that are in conflict with any of the requirements of this class, please see me immediately so that we can make alternative arrangements.

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Tentative Course Calendar and Suggested Readings

Reading assignments listed are very broad *with an intent to expose you to a greater breadth of material than will be covered in class. So these are meant to skim through* before each topic starts with a goal of noticing context and themes, but not trying to learn details. More selective readings to focus on in depth will be provided as we get to each section.

	Date	Topics	Text Reading
Wk 0	9/23	I. Introduction	Syllabus; Ch 1 "How does THAT work?" assignment
	9/25	II. The Matrix of Life	Ch 2
Wk 1	9/28(Q)	"	"
	9/30	III. The Energetics of Life	Ch 3
	10/2	"	"
Wk 2	10/5(Q)	IV. Nucleic Acids	Ch 4
	10/7	"	"
	10/9	V. Intro to Proteins	Ch 5 (pp. 136-158)
Wk 3	10/12(Q)	"	"
	10/14	"	Ch 5 Tools (pp. 161-176)
	10/16	Midterm 1	
Wk 4	10/19	VI. Protein folding and 3D structure	Ch 6
	10/21	"	"
	10/23	"	"
Wk 5	10/26(Q)	VII. Protein Function/Evolution	Ch 7
	10/28	"	"
	10/30	VIII. Carbohydrates	Ch 9
Wk 6	11/2(Q)	"	"
	11/4	IX. Lipids and Membranes	Ch10
	11/6	"	"
Wk 7	11/9	X. Enzymes	Ch 11 (pp. 410-431)
	11/11	Veterans Day Holiday	
	11/13	Midterm 2	
Wk 8	11/16	X. Enzymes cont'd	Ch 11 (pp. 431-450)
	11/18	"	Ch 11 (pp. 451-463)
	11/20	XI. Introduction to Metabolism	Ch 12
Wk 9	11/23(Q)	XII. Carbohydrate metabolism	Ch 13 (pp. 518-540)
	11/25	"	"
	11/27	Thanksgiving Holiday	
Wk 10	11/30(Q)	"	Ch 13 (pp. 540-557)
	12/2	"	Ch 13 (pp. 561-575)
	12/4	BB590 presentations	
	12/7	Final Exam (via Canvas and Zoom Monday December 7 12:00 – 1:50 p.m.)	