BIOL454/554 Biochemistry II

Tu, Th 3:30-4:45 PM Virtual Class Meeting

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Hours: 9-11 T,Th or by appointment

Objectives and Description

The course description has not been revised for many years. I have suggested a revision of that description, but have decided to teach a course more similar to what has been taught recently rather than teaching to the existing description. We will cover protein structure and function with emphasis on bioinformatic tools, metabolism with an emphasis on topics not extensively covered in Biochemistry I such as nitrogen, lipid, nucleotide, secondary metabolism, the integration and regulation of metabolism in humans/higher eukaryotes, and aspects of biotechnology such as vaccine and drug design and biotechnology applications. We will also read original biochemical literature.

The objective of this course is to build on the knowledge that students have from biology, chemistry, and Biochemistry I or its equivalent to:

- Stimulate thoughts and approaches to biochemistry typical of a professional in the discipline, such as a graduate student or researcher
- Present and discuss content richer and distinct from that in Biochemistry I or from other courses, such as molecular biology, likely to have been taken by students already.

The primary subject areas to be covered include:

- Protein structure and characterization
- Amino acid, nucleotide, lipid, and secondary metabolism
- Analysis of metabolism and biochemical pathways and their control
- Applications of biochemistry

This course is intended primarily for those engaged in advanced study in the life sciences, but it may be useful to premedical students who want a much deeper understanding of biochemistry.

Learning Outcomes: In accordance with UI Learning Outcomes, it is expected that students will:

- Learn & Integrate: Students will apply their previous knowledge of chemistry to biology to gain a basic understanding of the molecular basis of life.
- Think & Create: Students will be expected to apply the concepts and approaches learned here to solve future academic and professional problems.
- Communicate: Students will be expected to better communicate with others using the combined languages of chemistry and biology.
- Clarify Purpose & Perspective: It is expected that all students will gain important insights into biochemistry as a subject and how this subject relates to their personal goals

- Practice Citizenship: I hope that students will share knowledge with one another and with colleagues both inside and outside class, thereby practicing academic citizenship

Text and resources

I understand that many students will already have **Principles of Biochemistry**, Lehninger, 7th edition. I will direct students to readings in that text, but if you have an earlier edition or a different text, please feel free to use that. I won't be using the text in a very direct fashion. I will direct students to resources on the web, including professional-level resources such as the documentation of programs and databases. I will post links or descriptions of such materials to the Blackboard LMS for the course.

Grading, Exams

To encourage students to be prepared for lecture, each week will have an online "quiz" that may cover material covered during the last period or material that I will have asked you to read prior to that week's lectures. There will be roughly 12 such quizzes, but only the best 10 scores will count. These will comprise 10% of the final grade.

There will be 4 exams given as take home exams, as I think best meet learning objectives for each section. I will provide a sample exam prior to each exam so that students have a model to guide preparation. Exams will have small "recall" sections, but focus on essay/problem solving. Exams will be available at the same time as class normally occurs and I will be available online for clarifications during those exam periods. The online lecture classes will not be held on the days of exams. Each exam will be 15%, for a total of 60%

In addition to the "hour" exams, each student will be expected to write a short paper analyzing one or two figures (describing experiments) that I will provide from the biochemical research literature. The format for these papers will be more fully described, but it will be essentially that of the biochemical literature-with an introduction, results, and discussion section. I will accept drafts of these papers and provide feedback in an ungraded manner, if desired by the individual student. Drafts on which students expect feedback must be submitted not less than 1 week before the due date. This paper will also count 10% of the grade.

Graduate students must complete an additional assignment. This will be the development of an exercise or problem suitable to the course as well as the solution or approach. The 10% "paper" grade for graduate students will be based on both the paper described above and this exercise.

I see value in a comprehensive examination, which will be during the regular final exam period listed on the syllabus. Again, I expect this to be largely problem/analysis based, similar to the hour exams but using the 2 hour final exam period. The final will count as 20% of the final grade.

Grades will be based on 10% for quizzes, 10% for the paper, 15% per "hour" exam (60% total); 20% on the final exam. I also will award 2% extra credit for completing the survey prior to the first Zoom meeting.

Make-up Examinations: Make-up examinations will be given for a valid reason (eg. Illness or family emergency) or by prior arrangement because of necessary obligations and responsibilities to the

University of Idaho (field trips, UI sports, or attendance at professional meetings). These missed exams must be made up in a timely manner. Multiple exams on one day are not valid excuses for rearranging exam dates; plan accordingly.

Academic Integrity, Civility and Assistance

Academic Integrity: Any cases of cheating, such as giving or receiving assistance during an exam, plagiarism, falsification of records, or similar behavior will be handled according to the Student Code of Conduct, Article II-Academic Honesty (p16-17, Policies & Information of Interest to Students, (2009-10). No personal listening devices during exams.

The University of Idaho provides no means of proctoring remote exams, so all exams and quizzes will be "open book/web". Quizzes may contain recall or exercises, while exams will be largely problem-based. I expect that students will not collaborate on quizzes or exams-your work should be your own. In writing your papers, though drafts and the final paper should be your own, I encourage that you discuss the paper with others in the class.

University of Idaho Classroom Learning Civility Clause: In any environment in which people gather to learn (including online environments), it is essential that all members feel as free and safe as possible in their participation. To this end, it is expected that everyone in this course will be treated with mutual respect and civility, with an understanding that all of us (students, instructors, professors, guests, and teaching assistants) will be respectful and civil to one another in discussion, in action, in teaching, and in learning. Should you feel our classroom interactions do not reflect an environment of civility and respect, you are encouraged to meet with your instructor during office hours to discuss your concern. Additional resources for expression of concern or requesting support include the Dean of Students office and staff (5-6757), the UI Counseling & Testing Center's confidential services (5-6716), or the UI Office of Human Rights, Access, & Inclusion (5-4285

CENTER FOR DISABILITY ACCESS AND RESOURCES REASONABLE ACCOMMODATIONS STATEMENT: • Reasonable accommodations are available for students who have documented temporary or permanent disabilities. All accommodations must be approved through the Center for Disability Access and Resources located in the Bruce M. Pitman Center, Suite 127 in order to notify your instructor(s) as soon as possible regarding accommodation(s) needed for the course. • Phone: 208-885-6307 • Email: cdar@uidaho.edu • Website: www.uidaho.edu/current-students/cdar

Proposed schedule for BIOL454/554. Please note that this is subject to revision as the course proceeds.

Date	Day	Topic	Reading	Quiz
14-Jan-21	Thursday	Course objectives, student objectives, assumptions, review		
1/19/2021	Tuesday	The Proteome	3	1
1/21/20201	Thursday	Protein characterization	3	
1/26/2021	Tuesday	Protein structure determination	4	2
1/28/2021	Thursday	Protein structure and visualization	4, Web	
2/2/2021	Tuesday	Protein variation	Web	3
2/4/2021	Thursday	Protein structure prediction, docking, modeling	Web	
2/9/2021	Tuesday	Exam1		
2/11/2021	Thursday	Biochemical Tools	Web	
2/16/2021	Tuesday	Nitrogen/Amino Acid Metabolism	18	4
2/18/2021	Thursday	Amino Acid Metabolism	22	
2/23/2021	Tuesday	Nucleotide Metabolism	22	5
2/25/2021	Thursday	Nucleotide Metabolism	22	
3/2/2021	Tuesday	Lipid Metabolism	17	6
3/4/2021	Thursday	Lipid Metabolism	21	
3/9/2021	Tuesday	Exam2		
3/11/2021	Thursday	Secondary, specialized metabolism	Web	
3/16/2021	Tuesday	Spring Break		
3/18/2021	Thursday	Spring Break		
3/23/2021	Tuesday	Integration of Mammalian Metabolism	Web	7
3/25/2021	Thursday	Integration of Mammalian Metabolism	Web	
3/30/2021	Tuesday	Metabolic control and analysis	Web	8
4/1/2021	Thursday	Biochemical Literature	Web	
4/6/2021	Tuesday	Biochemical Literature	Web	9
4/8/2021	Thursday	Exam3		
4/13/2021	Tuesday	Biofuels, Bioproducts	Web	10
4/15/2021	Thursday	Medical Biochemistry	Web	
4/20/2021	Tuesday	Vaccines, Diagnostics	Web	11
4/22/2021	Thursday	Drug Discovery	Web	
4/27/2021	Tuesday	Coronavirus-update and integration	Web	12
4/29/2021	Thursday	Exam4		
5/4/2021	Tuesday	Biochemical Careers		
5/6/2021	Thursday	Review		
5/10/2021	Monday, 3-5 PM	Final Exam		