Protein Structure and Function
Syllabus for Spring 2024 Term

GENERAL INFORMATION

RUTGERS CATALOG DESCRIPTION

50:115:422 Protein Structure and Function (3): Basic structural principles of polypeptides, mechanisms of enzyme catalysis, biophysical techniques used in the determination of protein structure, protein folding, protein-protein interactions, protein engineering. **Prerequisite:** 50:115:403 (General Biochemistry I).

AT THE GRADUATE LEVEL

56:115:522 Protein Structure and Function (3): Basic structural principles of polypeptides, mechanisms of enzyme catalysis, biophysical techniques used in the determination of protein structure, protein folding, protein-protein interactions, protein engineering. **Prerequisites:** No formal prerequisites but students should consult with the instructor and with their research/program advisors to confirm that the course is appropriate for their background and their course of study.

Course Format:	Lectures
Instructor:	**Dr. Guillaume Lamoureux** Office: Joint Health Sciences Center 216C Office Hours: By appointment Email: guillaume.lamoureux@rutgers.edu Website: http://lamoureuxlab.org/teaching.html
Lectures:	Mondays from 6:00 PM to 8:50 PM Location: Joint Health Sciences Center 202
Textbook:	**Kessel & Ben-Tal, *Introduction to Proteins: Structure, Function, and Motion*, Second Edition.** (The electronic version of the textbook is available from the Robeson Library website. If you are considering using another textbook as main reference, please check with the instructor first.)

COURSE OBJECTIVES

By the end of the course, students will be expected to understand the main concepts and techniques related to protein structure and function and to develop an appreciation for current research in the field. The following topics will be covered: (1) Protein structure, (2) Techniques for protein structure determination and prediction, (3) Protein stability and denaturation, (4) Protein engineering, (5) Protein folding and dynamics, (6) Protein-ligand interactions, (7) Enzyme catalysis.

COURSE GRADE

The final grade for the course is composed as follows: **30% for the reports from literature, 40% for the oral presentation (10% for the detailed outline and 30% for the presentation itself), and 30% for the final exam**. The minimum passing grade for the course is 60%.

ONLINE COURSE MATERIAL

All material for the course will be posted on Canvas (https://canvas.rutgers.edu). Please consult the website regularly and set your notifications so that you get informed of any updates.

ADDITIONAL READING
The Kessel & Ben-Tal textbook is meant as a focus point only. It is your responsibility to seek out additional reading material if you miss any of the background knowledge or if you wish to consolidate your understanding. Please consult the instructor if you are not sure where to find the additional information you might need.

BEFORE EACH LECTURE
At the beginning of each new lecture, you are expected to have read the textbook sections covered in the previous lecture (see Calendar below) and to come prepared with follow-up questions. You are also expected to have at least browsed the material to be covered during the new lecture and to come with specific learning objectives in mind, having already identified the notions that may be more challenging.

REPORTS FROM LITERATURE
During the first week of class, each of you will be asked to choose a protein (or class of proteins), for which five (5) short "reports from literature" will have to be submitted during the term. Each report will focus on a topic of the course and will require you to search the literature for additional information about your assigned protein. The reports are not expected to be more than one page long but need to be prepared according to the standards of peer-reviewed literature. Specific instructions for each report will be posted ahead of time.

ORAL PRESENTATIONS
You will be asked to prepare and deliver a 20-minute oral presentation on a topic related to the course, chosen from a list provided ahead of time. The presentation is meant to be pedagogical—in the style of a short lecture or "journal club" presentation—and should be prepared so that your classmates are able to understand the topic. The presentation will be followed by a question period, during which students and instructor will be allowed to ask questions. The presentation will be evaluated on the quality and correctness of the material and on the clarity and effectiveness of the delivery. Although you will not be directly evaluated on your answers to the questions from the audience, consider these as a good opportunity to get feedback from the class and to rectify any misconception about the material you presented.

The oral presentations will be held on **April 22**. You will also be asked to submit a detailed outline of your presentation **at least one week ahead of the presentation**. This outline should describe what you intend to present with enough detail that the instructor can give you feedback on what you should consider adding or removing from your presentation.

FINAL EXAM (ORAL)
The final exam will be a one-on-one oral exam lasting about 30 minutes and composed of two parts: (1) a "specialized" part, in which you will be asked questions related to a topic or paper you will have been assigned to read ahead of time, and (2) a "general" part, in which you will be asked questions about the material of the course in general. You will be evaluated on your overall understanding of the concepts and terminology and on your ability to use them in discussing a topic or analyzing a problem. You will not be expected to have memorized any of the biochemical/biological data (molecular structures, protein classes, enzyme classes, etc.) and will be allowed to briefly consult the textbook during the exam—to see a table or a figure, for instance.

Note that the topics for the "specialized" part of the exam will be chosen from the same list of topics used for the oral presentations—excluding the one you prepared for your own oral presentation.

ACADEMIC INTEGRITY
Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy. As per the policy, all suspect-

ed violations will be reported to the Office of Community Standards. Academic dishonesty includes (but is not limited to): cheating, plagiarism, aiding others in committing a violation or allowing others to use your work, failure to cite sources correctly, fabrication, using another person's ideas or words without attribution, re-using a previous assignment, unauthorized collaboration, sabotaging another student's work. If in doubt, please consult the instructor. Please review the Academic Integrity Policy at http://academicintegrity.rutgers.edu.

CHATGPT AND OTHER AI-BASED TOOLS

You are welcome to use large language models like ChatGPT to refine your understanding of a topic or to get a sense of where to look for the answer to a question—just like you are welcome to use the internet. However, the text produced by such models (1) is not yours, and therefore reproducing it in part or in totality without acknowledgement constitutes plagiarism, and (2) does not cite any sources, and therefore does not meet the basic requirements of scholarly work.

STUDENTS WITH DISABILITIES

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the registration form at https://webapps.rutgers.edu/student-ods/forms/registration.

CALENDAR OF LECTURES

Please note that this calendar may change as the semester proceeds. The "Reading" column lists the sections of the Kessel & Ben-Tal textbook you are expected to read. The letter "R" at the end of a line means that you are also expected to submit a "report from literature" by the end of that week.

Date		Topics	Reading	
Jan. 22	Lecture	Introduction, Proteins in living organisms	1.1, 1.2	
Jan. 29	Lecture	Noncovalent interactions in biomolecules	1.3	
Feb. 5	Lecture	Primary and Secondary protein structure	2.1, 2.2, 2.3	R
Feb. 12	Lecture	Tertiary protein structure	2.4	
Feb. 19	Lecture	Quaternary structure, PTMs	2.5, 2.6	R
Feb. 26	Lecture	Structure determination and prediction	3.1, 3.2, 3.3	
Mar. 4	Lecture	Structure determination and prediction (cont'd)	3.4, 3.5, 3.6, 3.7	R
Mar. 11		SPRING RECESS (no classes)		
Mar. 18	Lecture	Protein stability, Protein engineering	4.1, 4.2, 4.3, 4.4	
Mar. 25	Lecture	Protein dynamics	5.1, 5.2, 5.3, 5.4	R
Apr. 1	Lecture	Protein-ligand interactions	8.1, 8.2, 8.3	
Apr. 8	Lecture	Protein-ligand interactions (cont'd)	8.4, 8.5, 8.6	
Apr. 15	Lecture	Enzyme catalysis	9.1 to 9.6	R
Apr. 22	Presentations	TBA		
Apr. 29	Final exam	TBA		