

BIOL 6270/8270

Biological Pathways and Metabolism


Spring 2023

Instructor Contact Information:

Dr. Andy Truman

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 @trumanlab

Office: Woodward Hall 486C

Course Meeting Time:

1.00 pm-2.15 pm, Tuesdays and

Thursdays

Woodward 254

Office Hours:

By appointment only

Course Description:

This course focuses on the basic properties of proteins and how proteins work together in cell signaling and metabolism. The format will be primarily lecture at the beginning with student presentations toward the end of the semester. In the lectures, students are expected to be active participants. The dates and topics listed below are tentative and subject to change depending on how much time we need for each topic.

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Overall format: The emphasis of this course will be on understanding and knowledge of signal transduction and metabolic pathways as well as current biochemical principles and techniques commonly used in Molecular Biology. The format will be primarily lecture at the beginning with student presentations toward the end of the semester. In the lectures, students are expected to be active participants. The dates and topics listed below are tentative and subject to change depending on how much time we need for each topic.

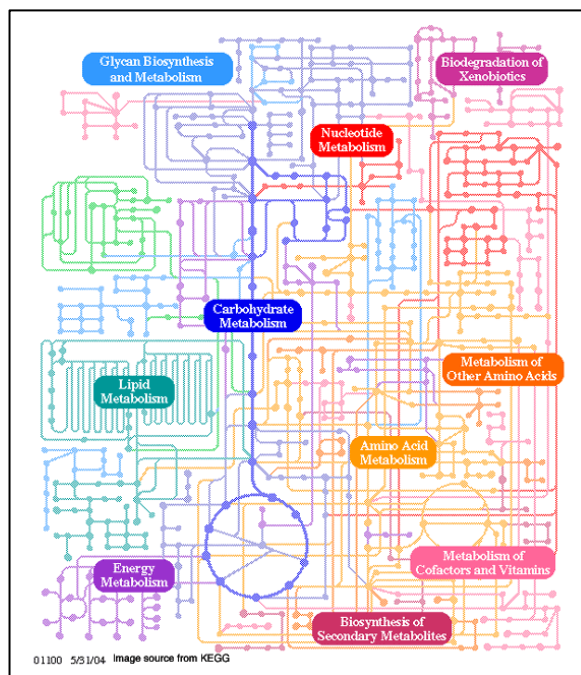
Course Prerequisite:

Admission to the Ph.D. or MS program in Biology or permission of the Instructor

Textbook (highly recommended):

Lehninger Principles of Biochemistry David L. Nelson, Michael M. Cox (6th Ed) W.H. Freeman editor 2012 ISBN-10: 1429234148 ISBN-13: 978-1429234146

Please note that the purpose of the course is not to cover everything that is in the textbook. Rather the textbook(s) should be viewed as a reference in support material for the course. The textbook



does contain excellent practice material that will be very useful and homework assignments will include many of the problems at the end of chapters. If you have an older edition, please make sure that you get the correct homework assignments. Furthermore, additional material will be posted on Canvas.

Exams and Grading

Final grades in Metabolism will be based on:

- 3 take-home, open book exams, 20% each=**60% final grade**
- Oral presentation (Topics in metabolism/signal transduction), **20% final grade**
- Protein folding class assignment, **15%**
- Class participation=**5% final grade**

Grading Scheme: (90-100% = A; 80 ≤ B < 90%; 70 ≤ C < 79%; 60 ≤ D < 69% = D; < 60% = U).

Exams

Exams will be take-home and completed via Canvas. As such, they will not rely on the regurgitation of memorized material, but rather on problem-solving/data interpretation. You may use whatever resources you choose in answering the questions with the exception of living organisms. In other words, by submitting your exam you verify that all of the work is your own and that you have not discussed the questions or answers with anyone else. If you use publicly available resources (website, book, journal articles, etc) you should provide references. Using these as resources is allowed, but copying material without clear citation is a violation of academic integrity. **Note:** specific class dates have been set aside to allow students to take the exams in Room 255 if needed.

All exams must be submitted by the due date and time. Late submissions will be penalized 10% grade per day.

Oral Presentation Guidelines for topics in metabolism/signal transduction

The aim of this task is for students to summarize information from any sources required (textbook, internet etc.) to create a class based on the title. Students will be assessed on the quality of their slides and how clearly concepts are introduced and explained.

Presentations should be timed to last **60 minutes** followed by discussion. All presentations should be given using MS PowerPoint (or equivalent) with **approximately 50 slides** for each presentation. Please email me your pptx file at least one day prior to the presentation for loading on Canvas giving access to all. You will be assessed on formatting (font consistency, image quality, etc), the structure of the presentation, how well topics are explained to the audience and timekeeping.

All presenters should be willing to entertain questions from other students at any time.

Students will **present in pairs as a team**. For full credit, the presentation needs to be distributed equally between both students. There are 10 possible topics available to present on:

- Membrane proteins in disease
- Role of Biomolecular condensates/phase separation in signal transduction
- Epigenetics-DNA modifications and the Histone Code
- The DNA damage response in disease
- The Warburg effect and Metabolomics
- Protein folding in disease
- Diabetes
- Signal transduction in host-pathogen interactions
- Role of glycosylation of proteins and RNA in cell signaling
- Frontiers of structural biology

Course Policies

1. Please read the entire syllabus carefully before continuing with this course. These policies and expectations are intended to create a productive learning atmosphere for all students.
2. The use of cell phones or other communication devices is disruptive, and is therefore prohibited during class!
3. All of the assignments, exams, etc. for classes will be **completely online using Canvas**.
4. The instructor will conduct this class in an atmosphere of mutual respect. They encourage active participation in class discussions. However, they will exercise their responsibility to manage the discussions so that ideas and arguments can proceed in an orderly fashion. If a student's conduct during class discussions seriously disrupts the atmosphere of mutual respect expected in this class, they will not be permitted to participate further.
5. The instructor may modify the standards, requirements and dates set forth in this syllabus at any time. Notice of such changes will be by an announcement in class, or by written or email notice.
6. If the instructor is late in arriving to class, students must wait a full **15 minutes** after the start of class. If a class meeting is going to be canceled or rescheduled, the instructor will coordinate these events and students will be notified in class or via email or Canvas course website.
7. No walking in/out during the class (**unless an emergency**).
8. Students are permitted to use computers during class for **note-taking and other class-related work only**.
9. Students are required to bring **laptop computers** to class to complete class exercises. If students do not have a computer, they may loan a computer from the Atkins Library.
10. Those using computers during class for work not related to that class must leave the classroom.
11. Please use your official UNCC e-mail address for all our communications.
12. It is a student's responsibility to check their e-mail periodically in case there are some changes.
13. Copyright statement for the course materials: The images, artwork, videos, and text presented in class and contained within the Powerpoint Presentations on the BIOL 6/8270 course website will be used for teaching purpose in the context of this course. Students can only use this material for learning, and cannot disseminate these images, artwork, videos, or text in the Powerpoint Presentations for any other purpose. This is in keeping with the policy on responsible use of University computing and electronic communication resources found at <http://legal.uncc.edu/policies/up-307>
14. Grades from assignments and exams become **permanent 1 week** after the grade is issued.

Policy on missing exams due to emergency situations

If you miss an exam because of an emergency situation, a makeup exam **will only be permitted with valid documentation from The Office of Student Assistance and Support Services (SASS)**. SASS can provide notification to faculty of emergency situations, when a student is unable to do so and when the office has been made aware of such emergencies. In such situations, the SASS office may also be able to assist with verification of such emergencies, once a student is able to return to classes. The SASS office does not provide verification of absences for car trouble, weather issues, personal activities, work, weddings, vacations, or University-sponsored events.

Should a student need assistance from the SASS office in verifying an emergency situation, they can submit an online request form and attach supporting documentation. Please note that students are not required to go through the SASS office at any time regarding absence verification, and the SASS office does not have the authority to excuse absences, allow for make-up work, or provide other academic accommodations.

Code of Student Academic Integrity

All students are required to read and abide by the Code of Student Academic Integrity. Violations of the Code of Student Academic Integrity, including plagiarism, will result in disciplinary action as provided in the Code. Definitions and examples of plagiarism are set forth in the Code and on the Student Accountability & Conflict Resolution website. The Code is available from the Dean of Students Office or online at legal.charlotte.edu/policies/up-407. Additional resources are available on the Student Accountability & Conflict Resolution website.

Student rights and responsibilities in obtaining disability qualifications

If you have a disability that qualifies you for academic accommodations, please provide a letter of accommodation from Disability Services in the beginning of the semester. For more information regarding accommodations, please contact the Office of Disability Services at 704-687-4355 or stop by their office in Fretwell 230 (<https://ds.charlotte.edu/>).

UNC Charlotte Sexual Harassment Policy

UNC Charlotte is committed to maintaining an environment conducive to learning for all students and a professional workplace for all employees. The University takes active measures to create or restore a respectful, safe, and inclusive environment for community members that is free from discrimination, discriminatory harassment, and interpersonal violence. If you (or someone you know) has experienced any of these incidents, know that you are not alone. UNC Charlotte has staff members trained to support you in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with civil protective orders, and more. Please be aware that all UNC Charlotte employees, including faculty members, are expected to relay any information or reports of discrimination, discriminatory harassment, or sexual and interpersonal misconduct they receive to the Office of Civil Rights and Title IX. This means that if you tell me about a situation involving these matters, I am expected to report the information. Although I am expected to report the situation, you will still have options about how your case will be handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

If you wish to speak to someone confidentially, you can contact the following on-campus resources, who are not required to report the incident to the Office of Civil Rights and Title IX: (1) University Counseling Center (counselingcenter.charlotte.edu, 7-0311); or (2) Student Health Center (studenthealth.charlotte.edu, 7-7400). Additional information about your options is also available at civilrights.charlotte.edu under the “Students” tab.

Religious accommodations

Students will be provided reasonable accommodations for religious obligations in accordance with University Policy #409: Religious Accommodation for Students (<http://legal.uncc.edu/policies/up-409>). This policy (1) authorizes a minimum of two excused absences each academic year for religious observances as required by the faith of a student; and (2) provides students the opportunity to make up any missed work. Students are asked to submit their request for religious accommodation to faculty prior to the census date of each semester.

UNC Charlotte strives to create an academic climate in which the dignity of all individuals is respected and maintained. Therefore, we celebrate diversity, which includes, but is not limited to, disability, age, culture, ethnicity, gender, language, race, religion, sexual orientation, and socio-economic status.

Tentative Schedule for BIOL 6270/8270 Spring 2023

Meeting	Date	Topics	Textbook chapter or paper to read
1	Jan 10	Introduction of the course	Chapter 1
2	Jan 12	Protein structure and function-Part 1	Chapter 2, 3
3	Jan 17	Protein structure and function-Part 2	Chapter 4
4	Jan 19	Protein Folding	Chapter 4 and Kim et al.
5	Jan 24	Fold-it assignment	
6	Jan 26	Post-translational modifications-Part 1	Needham et al.
7	Jan 31	Post-translational modifications-Part 2	Choudhary and Hendricks et al
8	Feb 2	Student Presentations #1	-
9	Feb 7	Exam 1	
10	Feb 9	Enzymes/ catalysis/ kinetics	Chapter 6
11	Feb 14	Protein interactions	Stynen et al.
12	Feb 16	Membrane Proteins	Chapter 11
13	Feb 21	Student Presentations #2	
14	Feb 23	Signal Transduction I	Chapter 12
15	Feb 28	Spring recess, no class	
16	Mar 2	Spring recess, no class	
17	Mar 7	Signal Transduction II	Chapter 12
18	Mar 9	Student Presentations #3	-
19	Mar 14	Student Presentations #4	-
20	Mar 16	Exam 2	
21	Mar 21	Guest Zoom seminar from Dr. Josh Strauss, Core Cryo-EM Director at UNC Chapel Hill	-
	Mar 23	Glucose Utilization and Biosynthesis	Chapter 14
22	Mar 28	Principles of Metabolic Regulation	Chapter 15
23	Mar 30	Student Presentations #5	
24	Apr 4	Student Presentations #6	
25	Apr 6	Citric Acid (Kreb's) Cycle	Chapter 16
26	Apr 11	Student Presentations #7	
27	Apr 13	Oxidative Phosphorylation	Chapter 21
	Apr 18	Protein synthesis and degradation	Chapter 27
28	Apr 20	Final Exam released	
29	Apr 25	Student Presentations #8	
	May 4	Final Exam due	
	TBD		

Other Important Dates:

January 17	Last day to add, drop with no grade via the web * 11:59 pm (New deadline as approved by Faculty Council)
March 13	Unsatisfactory Grade emails sent to students
March 20	Last day to withdraw from course (s); grade subject to Withdrawal Policy* 11:59 PM