

BIOL 6270/8270

Biological Pathways and Metabolism

Fall 2016

Instructor Contact Information:

Dr. Andy Truman

Office: Woodward Hall 486C

Tel: 704-687-5228

Email: atruman1@uncc.edu

Course Meeting Time:

9.30am-10.45am, Tuesdays and

Thursdays

Woodward 255

Office Hours:

9:00AM -10:00 AM, Monday and

Wednesday

[Additional meetings can set up by appointment]

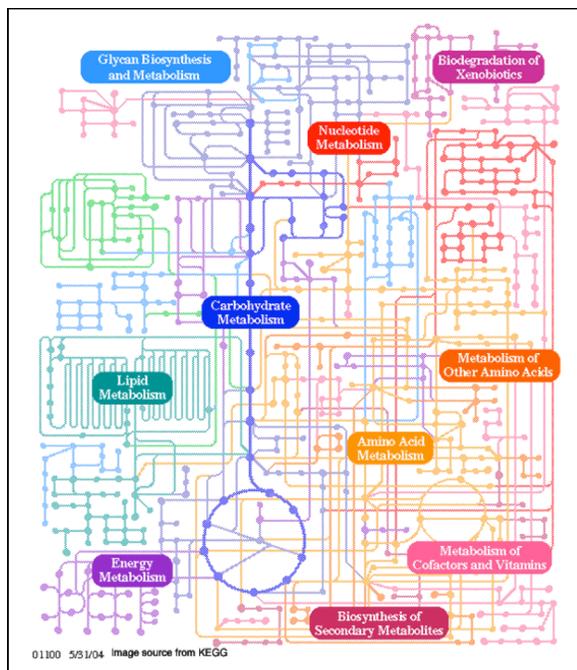
Course Description:

The emphasis of this course will be on both the understanding and knowledge of the metabolic pathways and of current biochemical principles and techniques commonly used in Biology. This is NOT an exercise in memorizing pathways. Rather, the goal is to understand the fundamental principles of how organisms exploit biochemical properties to regulate cellular and organismal function and response to environmental challenges. 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 Objectives:

The following are the main objectives of this in-depth course:

- 1) Provide an overview of biochemical principles focusing on those topics that are most likely to be applicable to the students' research, based on the diversity of research topics in the department.
- 2) Give students up-to-date information on the current techniques in biochemical analyses including methods that apply biochemical principles for detection and characterization of biological molecules (such as enzymatic assays, PCR, ELISA).



3) Offer elements of comparative biochemistry and illustrate evolutionary diversity as well as conservation of the major biochemical pathways;

Specifically the students should

- Have developed an understanding of the fundamental principles governing structure and function of biological (macro) molecules in the context of cell physiology
- Be able to demonstrate evolutionary diversity as well as conservation of biological solutions to common problems
- Be able to discuss current methods in biochemistry and biophysics used to study the structure and function of biological molecules
- Have developed the problem-solving skills in applying biochemical knowledge to problems, examples and case studies in cell physiology.

Overall format: The emphasis of this course will be on both the understanding and knowledge of the metabolic pathways and of current biochemical principles and techniques commonly used in 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 PhD or MS program in Biology or permission of Instructor

Textbook (required):

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.

Grading

Final grades in Metabolism will be based on 300 total possible points from 3 exams (each worth 100 points) plus 100 points from an oral presentation/participation, and another 100 points from a homework assignment = 500 total points.

Grading Scheme: A = 100-90, B = 89-80, C = 79-70, U < 60

Exams

Exams will be take-home. As such, they will not rely on regurgitation of memorized material, but rather on problem solving. 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. All exams must be submitted to me by email or hard copy by the due date and time.

Oral Presentation Guidelines

Presentations should be timed to last 45 minutes followed by discussion. All presentations should be given using MS PowerPoint with **approximately 40 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.

In these presentations, you will be to outline the metabolic pathways/ regulatory mechanisms involved and the experimental approaches used to elucidate the pathway or mechanism.

All presentations should follow the following format:

- Background (statement of the biological problem)
- Metabolic pathways or regulatory mechanisms involved
- Experimental Design
- Results/Expectations
- Conclusions/future directions

All presenters should be willing to entertain questions from other students at any time. In addition, all students will be asked to rate each presenter using a standard form that will be provided.

Students will present in self-nominated pairs. For full credit, the presentation needs to be distributed equally between both students. There are 7 topics available to present on:

- Membrane proteins in disease
- Protein folding in extreme environments
- Regulation of purine and pyrimidine metabolism
- Metabolic regulation in extreme environments
- Host-pathogen metabolic interaction
- The relationship between DNA damage and metabolism
- Diabetes

Topics will be chosen by the students with guidance from Dr. Truman

Course Policies:

This syllabus contains the policies and expectations we have established for BIOL 6270/8270. Please read the entire syllabus carefully before continuing in this course. These policies and expectations are intended to create a productive learning atmosphere for all students. Unless you are prepared to abide by these policies and expectations, you risk losing the opportunity to participate further in the course.

- (1) Dr. Truman will conduct this class in an atmosphere of mutual respect. Dr. Truman encourages active participation by students in class discussions. Each of us may have strongly differing opinions on the various topics of class discussions. The conflict of ideas is encouraged and welcome. The orderly questioning of the ideas of others, including mine, is similarly welcome. However, Dr. Truman will exercise his responsibility to monitor the discussions so that ideas and argument can proceed in an orderly fashion. You should expect that you will **NOT** be permitted to participate further if your conduct during class discussions seriously disrupts the atmosphere of mutual respect we expect in this class.

- (2) **Tardiness, cancellation, and rescheduling:** If Dr. Truman is late in arriving to class, students must wait a full 15 minutes after the start of class before you may leave without being counted absent, or you must follow any written instructions given by Dr. Truman about the possible anticipated tardiness. If a class meeting is going to be cancelled or rescheduled, Dr. Truman will coordinate these events and students will be notified in class or via email or Canvas course website.
- (3) **Disability:** It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact their instructors early in the semester to discuss their individual needs for accommodations. If you have a disability that qualifies you for academic accommodations, please provide a letter of accommodation from the Office of 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. <http://ds.uncc.edu/sitemap>
- (4) **Integrity:** *Students have the responsibility to know and observe the requirements of the UNC Charlotte Code of Student Academic Integrity. This code forbids cheating, fabrication or falsification of information, multiple submissions of work, plagiarism, abuse of academic materials, and complicity in academic dishonesty.* <http://legal.uncc.edu/policies/up-407>
- (5) **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 member prior to the census date of each semester.
- (6) **Electronic devices:** The use of cell phones, beepers, or other communication devices is disruptive, and is therefore **prohibited** during class. Once such disruptive behavior is found in the classroom, Dr. Truman has the right to ask this student leave the classroom. Students are permitted to use computers in class for note-taking and other class-related work only. Those using computers in class for work not related to that class must leave the classroom.
- (7) All students are required to abide by the UNC Charlotte Sexual Harassment Policy and Grievance Procedures (<http://legal.uncc.edu/policies/up-502>) and the policy on Responsible Use of University Computing and Electronic Communication Resources (<http://legal.uncc.edu/policies/up-304>). Sexual harassment, as defined in the UNC Charlotte Sexual Harassment Policy, is prohibited, even when carried out through computers or other electronic communications systems, including course-based chat rooms or message boards.
- (8) **Copyright statement for the course materials:** The images, artwork, videos, and text presented in class and contained within the Powerpoint Presentations on the BIOL 4283/5283 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>

Important note: The standards and requirements set forth in this syllabus may be modified at any time by the course instructor Dr. Truman. Notice of such changes will be by announcement in class or by written or email notice or by changes to this syllabus posted on the course Canvas website.

Tentative Schedule for BIOL 6270/8270 Fall 2016

Meeting	Date	Topics
1	Aug 23	Introduction of the course
2	Aug 25	Protein structure and function-Part 1
3	Aug 30	Protein structure and function-Part 2
4	Sep 1	Protein Folding
5	Sep 6	Post-translational modifications-Part 1
6	Sep 8	Post-translational modifications-Part 2
7	Sep 13	Enzymes/ catalysis/ kinetics
8	Sep 15	Protein interactions
9	Sep 20	Midterm Exam 1
10	Sep 22	Membrane Proteins
11	Sep 27	Membrane Proteins in Disease (Student presentation)
12	Sep 29	Protein folding in extreme environments (Student Presentation)
13	Oct 4	Signal Transduction
14	Oct 6	Bioenergetics
	Oct 11	Student Recess - no classes
16	Oct 13	No class
17	Oct 18	Regulation of purine and pyrimidine metabolism (Student presentation)
18	Oct 20	Glucose Utilization and Biosynthesis
19	Oct 25	Citric Acid cycle
20	Oct 27	Fatty Acids
21	Nov 1	Oxidative Phosphorylation
22	Nov 3	CO ₂ fixation
23	Nov 8	Midterm Exam 2
24	Nov 10	Metabolic regulation in extreme environments (Student presentation)
25	Nov 15	Host-pathogen metabolic interaction (Student presentation)
26	Nov 17	The relationship between DNA damage and metabolism (Student presentation)
27	Nov 22	Diabetes (Student presentation)
	Nov 24	Thanksgiving Break - no classes
28	Nov 29	Protein and amino acid degradation
29	Dec 1	Metabolomics
30	Dec 6	The Warburg effect
	Dec 8	Reading day-no classes
	Dec 13	No classroom meeting; office hour by appointment
31	Dec 15	Final exam (Woodward 154, 2:00PM-4:00PM)

Other Important Dates:

Aug 29	Last day to register, add, drop with no grade via the web * 11:59 pm (New deadline as approved by Faculty Council)
Oct 10	Unsatisfactory Grade emails sent to students
Oct 25	Last day to withdraw from course (s); grade subject to Withdrawal Policy* 11:59 PM

