Principles of Metabolism  
Biology 303  
Fall 2004

Professor: Bert Boyer, Ph.D.  
Office: West Ridge Research Building Room 232  
Phone: 474-7733  
email: bert.boyer@uaf.edu  
Office Hours: 2-3 pm Tuesday, or by appointment.

Teaching Assistant: Sara Moses

Overview: Biology 303 was developed to provide Biology majors with a basic understanding of intermediary metabolism. Biology majors have the option of taking Biology 303 or Organic Chemistry 321/322. Although pre-health science students are welcome to take Biology 303 as an elective, they should not substitute Biology 303 for Organic Chemistry (check your individual degree program to make sure). Please see your advisor or me if you have any questions about whether or not you should be enrolled in Biology 303.

Biology 303 will be divided into three sections: Section I of the course will focus on reviewing the “fundamentals” of Chemistry and Biochemistry. This section will cover the basics of Chemistry and Biochemistry necessary for this course. Section II introduces the major classes of biomolecules and their molecular properties. Section III covers intermediary metabolism. This section contains a heavy emphasis on the integration of metabolic processes and is intended to help synthesize the basic biochemical concepts learned throughout the semester.

Prerequisites: Biology 105X-106X, 362, 271; and Chemistry 105X-106X. If you do not have the appropriate prerequisites you should see me immediately. If you wish to gain special permission to take this 300 level course without the required prerequisites, please provide me with a written request (e-mail preferred) no later than the second week of class. Your request should include an explanation of why it is necessary for you to take this course out of sequence. In addition, you should include an explanation of why you have not taken Biology 362 and/or 271 prior to this time. I will respond to you by e-mail. If you have enrolled in the course without the necessary prerequisites and without my permission, your name will be withdrawn from the class list (prior to the withdrawal date) or you will receive a failing grade (after the withdrawal date).

Attendance: All students are required to attend class on the first or second meeting to save their place on the class roll (in cases where students are on the waitlist). If you have not attended class by the second class meeting, your name could be dropped from the class. Lecture and lab attendance for the remainder of the semester is encouraged.

Required Text: Principles of Biochemistry; Nelson and Cox 3/e

Recommended Text: Metabolic Regulation, A Human Perspective; Frayn

Lecture/Discussion periods: Students should experience science as a process of inquiry that is based on methods of scientific investigation. Scientific inquiry may include some or all of the following components: observing, questioning, forming hypotheses, predicting, experimenting, analyzing data, and relating concepts and ideas to each other. Lecture and lab periods are meant to function as a catalyst for learning, directing student interactions, activities and discussion.
**Homework and Study Groups:** The objective of assigning “homework” is to help the student recognize the value of establishing a study schedule. The homework consists of problem sets and defined reading assignments outlined in the handout “Lecture Topics and Dates.” I expect all students to have read the chapters prior to the lecture period. Students will be evaluated on their ability to participate in class and laboratory discussions and their performance on exams and homework problems. I strongly recommend the formation of study groups as a means to discuss the reading material. Long-term memory increases when you review the material frequently. “If you don’t use it, you’ll lose it!” Form a study group of 3-5 students and meet at least once a week and before exams. If you are not quite sure what to do or you don’t quite know where to start, come by my office or the TA’s office and we will help. **You are strongly encouraged to work in groups of 3-5 students on the homework problems and the take-home portion of your exams.**

**Exams & Grading:**

- Exam I 100 points
- Exam II 100 points
- Exam III 100 points
- Laboratory Problem sets 200 points
- Lecture Participation 50 points
- Final Exam 200 points

**Total:** 750 points

*Pop quizzes* may or may not be given. They will be short (5-10 min) and administered without notice at any time during any of the class periods throughout the semester. The purpose of the quizzes is to stimulate you to complete your reading assignments before coming to class. Quizzes will be factored into your lecture participation grade.

*Exams* will cover material presented in the lectures, discussion periods or textbook. Exams I-III may have a take home component that will amount from 10-30% of the individual exam grade. You will have 2 days to complete the take home portion of the exam. Turn in one copy of your answers with the names of those that participated in the take home exam-working group (not to exceed 6 students). The in “class portion” of the exam will be taken during the afternoon lab period (2-5 p.m.). See me immediately if you have a course scheduling conflict. **I do not give make-up exams. Mark exam dates on your calendar now.** If you have a legitimate excuse for missing an exam, I will calculate your total grade on the basis of the exams that were taken. No early or late final exams will be given. If you have any questions, please feel free to talk to me about them or send me an email.

**Class notes:** I will attempt to put an outline of my notes and the actual presentations on Blackboard early in the semester, and post a more complete set after the lecture if the content was changed. If you have registered for Biology 303, I will automatically add your name as a user for this class, unless you instruct me not to do so (in writing). Then, every time I update Blackboard, I will send an email notice to all users.
Section I. Fundamentals of Biological Chemistry
1. Sept. 2  Chapter 1            Class introduction & Molecular Logic
2. Sept. 7  Chapter 1&3         Molecular logic & Fund. Biochem.
3. Sept. 9  Chapter 3            Biomolecules
4. Sept. 14 Chapter 4            Water
5. Sept. 16 Chapter 5-7 (excerpts) Amino Acids, Protein structure

Section II. Molecular properties of Biomolecules
6. Sept. 21 Chapter 8            Enzymes
7. Sept. 23 Chapter 8            More on Enzymes and their regulation
8. Sept. 28 Exam I               Exam includes all chapters previously covered
9. Sept. 30 Chapter 9            Carbohydrates
10. Oct.  5 Chapter 11           Lipids 10

Section III. Intermediary Metabolism
11. Oct. 7  Chapter 12           Biological membranes & Transport
12. Oct. 12 Chapter 13 & 14      Biosignaling & Bioenergetics
15. Oct. 21 Chapter 16           Regulation of the Citric Acid Cycle
16. Oct. 26 Exam II              Exam includes all chapters previously covered
17. Oct. 28 Chapter 17           Fatty Acid Oxidation
18. Nov.  2 Chapter 18           Amino Acid Oxidation
19. Nov.  4 Chapter 18           Amino Acid Oxidation
20. Nov.  9 Chapter 19           Oxidative Phosphorylation and Photosynthesis
21. Nov. 11 Chapter 20           Carbohydrate Biosynthesis
22. Nov. 16 Chapter 21           Lipid Biosynthesis
23. Nov. 18 Chapter 22           Nitrogen Metabolism
24. Nov. 23 Exam III             Exam includes all chapters previously covered
25. Nov. 25 THANKSGIVING         Class Holiday
26. Nov. 30 Chapter 23 & Suppl. Text Integration of Metabolism & Review
27. Dec.  2 Chapter 23 & Suppl. Text Integration of Metabolism & Review
28. Dec.  7 Chapter 23 & Suppl. Text Integration of Metabolism & Review
29. Dec.  9 Chapter 23 & Suppl. Text Integration of Metabolism & Review

Dec. 16  8:00-10:00 AM   COMPREHENSIVE FINAL EXAM

Exact dates of the lectures may change, the order should remain the same.