

CHE-255
Biochemistry
Fall 2009
Gustavus Adolphus College

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Textbook: Lehninger Principles of Biochemistry, Nelson & Cox, 5th Ed., 2008, Worth, NY, NY

Laboratory Manual: Chemistry 255—Fall 2009, Biochemistry Lab Manual

Supplies: Safety glasses
Laboratory notebook (any type)

Class Meeting: Nobel 222 MWRF 11:30 am-12:20 pm

Laboratory Meeting: Nobel 207 M 1:30 pm – 5:20 pm
T 1:30 pm – 5:20 pm

Office Hours: My scheduled office hours for this course are the following:

Wed: 8:00-9:00 am

Thurs: 9:00-10:00 am

If these times are not convenient, contact me and we will arrange a time to meet. I am frequently in my office or research lab (Nobel 206A) and am certainly willing to talk with you about class if I am available. I will not, however, be available 30 minutes immediately preceding class. I do answer questions about class via email, however, my response will likely not be immediate.

Additionally, I have set aside a weekly time in which I will be available for ‘The Biochemistry Working Party’ (BWP), from 11:30 to 12:20 on Tuesdays in Nobel 222. The BWP is an open forum group session for discussing material, working problems, asking questions, and deepening your understanding of biochemistry.

Course Overview

Biochemistry involves the study of biological processes at a molecular level. Building on a foundation of coursework in biology and chemistry, we will explore the structure, function, interactions and chemical properties of the four major types of biological macromolecules: proteins, nucleic acids, lipids, and carbohydrates. In addition, we will study the principles and details of bioenergetics and metabolism to gain an understanding of the energy flow required for survival of a living organism.

The biochemistry laboratory is a fundamental part of the course, designed to complement the lecture. It will give you some practical experience into biochemical techniques, including protein purification, enzyme kinetics, and electrophoresis. Biochemistry laboratory is not just about performing experiments; laboratory groups will also spend time discussing, preparing for experiments, analyzing results, and designing your own experiment. An introduction to and practice in scientific writing is a major component of the laboratory portion of the course.

Tentative Calendar for the Semester

I have included a calendar of topics for the semester. However, if we need more time on a particular lecture subject, I will adjust the calendar appropriately. Due dates for significant assignments/exams are shown in bold. Lecture assignments are due by 5:20 on the due date. The laboratory schedule and associated pre-lab lecture are shown in italics (and bolded italics for assignments). Laboratory assignments are due at 1:30, unless noted otherwise. For a complete lab schedule, please see the following page or your lab manual. BWP is the Biochemistry working party.

Su	Mon	Tues	Wed	Th	Fr	Sat
	Sept 7—	8—no class	9—intro, foundations (ch 1)	10—cells and biomolecules (ch 1)	11— <i>prelab, exp 1</i>	12
13	14—chemical foundations (ch 1) <i>lab--exp 1</i>	15—'BWP' <i>lab--exp 1</i>	16—water (ch 2)	17—water & buffers (ch 2)	18— <i>prelab, exp 2</i>	19
20	21—buffers (ch 2) <i>lab--exp 2</i> SR 1 due	22—BWP <i>lab--exp 2</i> SRI due	23—amino acids (ch 3)	24—amino acids (ch 3)	25— 1^o lit discussion	26
27	28—amino acids and methods (ch 3) <i>lab-writing disc and pH problems</i>	29--BWP <i>lab-writing disc and pH probs</i>	30—proteins, structure (ch 4)	Oct 1— proteins-structure & folding (ch 4)	2—proteins folding (ch 4)	3
4	5— Exam 1 (ch 1-4) <i>no lab</i>	6—Nobel <i>no lab</i>	7—Nobel NO CLASS	8—proteins folding and function (ch 5)	9— <i>prelab—exp 3, week 1</i>	10
11	12—Hb and myo (ch 5) <i>lab--exp 3, week 1</i> SR 2 due	13—BWP <i>lab--exp 3, week 1</i> SR 2 due	14—Hb and myo (ch 5)	15—Hb and myo (ch 5)	16— <i>prelab—exp 3, week 2</i> Prot struct I due	17
18	19—enzymes <i>lab--exp 3, week 2</i> DAQ 1 due, midterm lab notebooks due	20—BWP <i>lab--exp 3, week 2</i> DAQ 1 due, midterm lab notebooks due	21—enzymes (ch 6)	22—enzymes (ch 6)	23—enzymes (ch 6) Lit summary due	24
25	26—reading break NO CLASS	27—reading break NO CLASS	28—enzymes (ch 6)	29—enzymes (ch 6)	30— <i>prelab, exp 3, week 3</i> Prot struct II due	31
Nov 1	2—carbs (ch 7) <i>lab—exp 3, week 3</i>	3—BWP <i>lab--exp 3, week 3</i>	4— Exam 2 (ch 5 & 6)	5—carbs (ch 7)	6— <i>prelab, exp 4</i>	7
8	9—nucleic acids (ch 8) <i>lab--exp 4</i>	10—BWP <i>lab--exp 4</i>	11—nucleic acids (ch 8) initial draft of long report due	12— <i>prelab exp design</i>	13—lipids (ch 10)	14
15	16—lipids (ch 10) <i>lab--exp design</i> DAQ 2 due 1st Proposal drafts due	17—BWP <i>lab--exp design</i> DAQ 2 due 1st Proposal drafts due	18— lipids/membranes (ch 10 & 11) Pr. response due	19-- 5 minute lit reports to class and brief write up due	20— 5 minute lit reports to class and brief write up due membranes (ch 11)	21
22	23—The biochemistry of thanksgiving <i>lab--exp design, week 2, consultations</i>	24—BWP <i>lab--exp design, week 2, consultations</i>	25—break	26--break	27—break	28
29	30—membranes and transport (ch 11) <i>lab--exp design, week 3</i> Final proposal due	Dec 1—BWP <i>lab--exp design, wk 3</i> Final proposal due	2--membranes transport (ch 12) Final long report due	3-bioenergetics (ch 13)	4-glycolysis (ch 14 & 15)	5
6	7—glycolysis (ch 14 & 15) <i>lab--exp design, week 4</i>	8--BWP <i>lab--exp design, week 4</i>	9-- Exam 3	10—TCA cycle (ch 16)	11—TCA cycle (ch 16)	12
13	14—oxidative phosphorylation (ch 18) <i>lab--exp design presentations final lab nbks due</i>	15—BWP <i>lab--exp design presentations final lab notebooks due</i>	16	17-finals begin	18	19

- Our final exam is scheduled for Monday 12/21 from 3:30 to 5:30 pm!

CHE-255 Laboratory Schedule and due dates

<u>Dates:</u>	<u>Topic</u>
9/14, 9/15	Expt 1: Introduction to Basic Techniques
9/21, 9/22	Expt 2: pH-Dependence of Tyrosinase <i>Short report + DAQ 1 for Expt 1 due</i>
9/28, 9/29	Writing discussion; pH & pK _a problems <i>Literature reading, questions for discussion, quantitative literacy problems</i>
10/5, 10/6	NO LAB—NOBEL CONFERENCE
10/12, 10/13	Expt 3: Purification of Mushroom Tyrosinase <i>Short report + DAQ 2 for Expt 2 due</i>
10/19, 10/20	Expt 3: (cont'd) <i>Anion exchange separation data analysis & questions (DAQ 3) due</i> <i>Midterm lab notebooks due at end of lab period</i>
10/26, 10/27	NO LAB—READING BREAK
11/2, 11/3	Expt 3: (cont'd)
11/9, 11/10	Expt 4: Kinetic Analysis of Tyrosinase <i>Expt 4 DAQ at end of lab period</i> <i>Expt 3 formal report initial draft due on Wed. 11/11 at 11:30 am</i>
11/16, 11/17	Tyrosinase Experimental Design <i>Peer responses on formal reports due on 11/18 by 11:30 am</i> <i>1st draft Tyrosinase experimental design proposal due at end of lab period</i>
11/23, 11/24	Writing Consultations Tyrosinase Experimental Design & Preparation
11/30, 12/1	Tyrosinase Experimental Design & Preparation <i>Final draft Tyrosinase exptal design proposal due by end of lab</i> <i>Final draft of Expt 3 formal report due, including response to peer review on 12/2 by 5:00 pm</i>
12/7, 12/8	Tyrosinase Experimental Execution & Interpretation
12/14, 12/15	Tyrosinase Experimental Presentations <i>Final lab notebooks due after presentations</i>