

Biochemistry I

BCM 475 (Fall 2016)

Instructors:

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Introduction

This course covers a number of important biological and biomedical topics. It is meant to prepare you for careers in biomedical professions (graduate school, medical school, lab technician, etc.). For those taking the MCAT, all of the topics in this course are relevant. For those of you that are biochemistry majors, this course is the first part of a two-part sequence in biochemistry.

You will learn about the four different types of macromolecules in biochemistry (proteins, nucleic acids, lipids, and carbohydrates), and study their structures and functions. You will see how thermodynamic principles govern biochemical reactions. In addition, we will cover topics including enzyme kinetics, mechanisms, regulation. During the second half of the course, we will focus on how biological systems harness energy from the four types of macromolecules. We will explore core metabolic pathways, including glycolysis, citric acid cycle, and oxidative phosphorylation. In addition, we will cover other catabolic and anabolic processes that take place in the cell (e.g. fatty acid metabolism, amino acid metabolism). Biochemistry builds upon themes and materials from other courses, including General Biology, General Chemistry, and Organic Chemistry. For this reason, we remind you that CHE 325 (Organic II) is a prerequisite for this course.

Required Materials

- a) **Textbook:** Biochemistry (8th edition) by Berg JM, Tymoczko JL, and Stryer L (2015). The bookstore stocks the unbound version of the text, bundled together with online access to the Sapling Learning Environment.
- b) **Sapling Online Homework:** This is bundled together with the textbook at the bookstore. If you purchase the textbook separately, you will have to purchase access to Sapling Homework separately.
- c) **Clickers:** All students need to:
 - a. **Create a Student Turning Account:**
On the course blackboard site, click on the Clickers link for instructions on how to do this.
 - b. **Purchase a License:**
<https://answers.syr.edu/pages/viewpage.action?pageId=43992472>
Students using this technology for the first time must purchase a physical clicker from the bookstore.
If you already own a physical clicker or purchased a Clicker+License Bundle you may be eligible for a mail-in rebate (available only in 2016). To qualify you need your original receipt and packaging. If you qualify, the 1-year and 4-year license to use with your current clicker are free after mail-in rebate. Details are available at the link below.
Pricing and Rebate Information:
<https://answers.syr.edu/display/clicker/Device+and+License+Pricing>

RESOURCES

All lectures will be in LSC 001. The textbook will be used extensively. Email announcements will be sent to syr.edu accounts. Office hours will be 8:15AM-9:15AM Fridays (Roy Welch, ending 10/21; Carlos Castañeda, starting 10/21). Matthew Allen's office hours will be during recitation times on Mondays between 7:00 and 9:00PM. Please note that there will be no recitation meetings on Monday, August 29, or Monday, September 5. There will also be no recitations on scheduled exam days. The location of office hours will be in LSC 214.

GRADES

BCM475 will have the following grading scheme:

Exams 1-3: Each is worth 20%

Final Exam: 27%

Sapling Online Homework: 10%

Clickers: 3%

The grading scale will be such that the average score will represent a C+. All letter-grade numerical boundaries will be chosen to minimize assignments of different letter grades to two students whose performance is essentially identical. Completion of any incomplete will require taking the missed exam(s) in Fall 2017, which is the next time this course will be offered.

a) Examination Policies: The dates and times (M 7:00 PM – 9:00 PM) for the three exams are as indicated in the syllabus. The final exam will be on Friday, December 16 between 3:00 PM and 5:00 PM in LSC 001. **There is no possibility to make up an exam in BCM 475.** A student presenting a *valid excuse* (defined below) who has missed one exam, can have the averages of the remaining two exams used as the score for the missed exam. A student with a second or third "miss" will receive a grade of zero for the additional missed exam(s). *In order to receive a passing grade in BCM 475, a student must take the comprehensive final exam.* A student who fails to take the comprehensive final exam at the scheduled date and time, may gain the right to take a make-up final exam (2 hours in length) provided that a valid excuse is presented.

A valid excuse: A valid excuse is a written and dated document that is presented to the instructor *within three days of the missed exam*. A valid medical excuse must *be signed by a physician* and it must be evident from the excuse that the student was unable to write the exam at the specified date/time. A valid student-athlete excuse is an official document provided to the instructor by the Athletic Office stating the reason for the absence. The student-athlete excuse must be provided within the first two weeks of class in order for it to be valid.

b) Sapling Online homework: Weekly assignments will be given on Mondays consisting of around 20 questions. Assignments will be due on Sundays around 9 pm. These assignments are meant to test your understanding of the material covered in class. The assignments are to be completely entirely online using Sapling Learning. A few questions on exams will be derived from Sapling online homework, so it is imperative that you complete these assignments on your own. Difficult problems will be reviewed during recitation sessions on Mondays at 7 pm. Note that if you experience any technical difficulties, please email support@saplinglearning.com explaining the issue.

c) Clickers: Clicker questions will count, and will generally be assigned a point value (either 1, 2, or 3 pts per question). There will generally be three questions during a lecture; one is based on the reading for that lecture. If you score 75% or higher with clicker questions over the semester, you will be granted the full 3% toward your final grade. The other grade brackets will be: 50-74%, 2%; 25-49, 1%; 0-24, 0%.

Lecture and Recitation Attendance

Attendance is not recorded during the lecture or the recitation, and is not part of the student's grade. However, students must attend lectures in order to receive credit for the clicker questions that form part of the lecture. No credit will be awarded if clicker questions are not answered during class and recorded by Turning Technologies. It is the student's responsibility to ensure that they attend class, that they bring their clicker, and that their clicker is operating correctly. Credit is awarded for answering clicker questions correctly.

ACADEMIC INTEGRITY:

Syracuse University's academic integrity policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The university policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same written work in more than one class without receiving written authorization in advance from both instructors. The presumptive penalty for a first instance of academic dishonesty by an undergraduate student is course failure, accompanied by a transcript notation indicating that the failure resulted from a violation of academic integrity policy. The presumptive penalty for a first instance of academic dishonesty by a graduate student is suspension or expulsion. SU students are required to read an online summary of the university's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice. For more information and the complete policy, see <http://academicintegrity.syr.edu>.

Complete academic honesty is expected of all students. Any incidence of academic dishonesty, as defined by the SU Academic Integrity Policy (see <http://academicintegrity.syr.edu>), will result in both course sanctions and formal notification of the College of Arts & Sciences. In this course, all submitted writings, calculations, and/or graphical work that counts towards the grade must be the creation of individual students, and not the result of a partnership or group effort; no student may receive help from any other student during in-class written examinations.

DISABILITIES:

If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), <http://disabilityservices.syr.edu>, located in Room 309 of 804 University Avenue, or call (315) 443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue "Accommodation Authorization Letters" to students as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible. Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. Our goal is to create learning environments that are useable, equitable, inclusive and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, we invite any student to meet with us to discuss additional strategies beyond accommodations that may be helpful to your success.

FAITH-BASED OBSERVANCES:

SU's religious observances policy, found at http://supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, BCM475 students will be provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance, provided they notify the instructor by email before the end of the second week of classes (i.e. by Sept. 9). An online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class.

BCM 475 Course Schedule for Fall 2016

L	Day	M	D	Chapter	Topic	Notes
1	Monday	8	29	1	Biochemistry: an evolving science	Pgs. 1-22
2	Wednesday	8	31	2	Protein Composition and Structure	Pgs. 27-40
3	Friday	9	2	2	Protein Composition and Structure	Pgs. 41-61
4	Wednesday	9	7	3	Exploring Proteins and Proteomes	Pgs. 65-85
5	Friday	9	9	4	DNA, RNA, and the Flow of Genetic Information	Pgs. 86-114
6	Monday	9	12	4	DNA, RNA, and the Flow of Genetic Information	Pgs. 115-129
7	Wednesday	9	14	5	Exploring Genes and Genomes	Pgs. 135-164
8	Friday	9	16	6	Exploring Evolution and Bioinformatics	Pgs. 169-187
9	Monday	9	19	7	Hemoglobin: Portrait of a Protein in Action	Pgs. 191-210
10	Wednesday	9	21	8	Enzymes: Basic Concepts and Kinetics	Pgs. 215-229
11	Friday	9	23	8	Enzymes: Basic Concepts and Kinetics	Pgs. 230-243
12	Monday	9	26	---	Review Session	CH 1-8
X	Monday	9	26	7pm	EXAM 1: A-L: HEROY GEOLOGY AUDITORIUM M-Z: PHYSICS STOLKIN AUDITORIUM	EXAM 1 AFTER CH 8
13	Wednesday	9	28	9	Catalytic Strategies	Pgs. 251-264
14	Friday	9	30	9	Catalytic Strategies	Pgs. 265-281
15	Monday	10	3	10	Regulatory Strategies	Pgs. 285-295
16	Wednesday	10	5	10	Regulatory Strategies	Pgs. 296-308
17	Friday	10	7	11	Carbohydrates	Pgs. 315-336
18	Monday	10	10	12	Lipids and Cell Membranes	Pgs. 341-362
19	Wednesday	10	12	13	Membrane Channels and Pumps	Pgs. 367-378
20	Friday	10	14	13	Membrane Channels and Pumps	Pgs. 379-391
21	Monday	10	17	14	Signal Transduction Pathways	Pgs. 397-418
22	Wednesday	10	19	15	Metabolism: Basic Concepts and Design	Pgs. 423-431
23	Friday	10	21	15	Metabolism: Basic Concepts and Design	Pgs. 432-445
24	Monday	10	24	---	Review Session	CH 9-15
X	Monday	10	24	7pm	EXAM 2: A-L: HEROY GEOLOGY AUDITORIUM M-Z: PHYSICS STOLKIN AUDITORIUM	EXAM 2 AFTER CH 15

25	Wednesday	10	26	16	Glycolysis	pgs. 449-469
26	Friday	10	28	16	Regulation of Glycolysis & Gluconeogenesis	pgs. 469-487
27	Monday	10	31	17	PDH complex and Intro to Citric Acid Cycle	Pgs. 495-506
28	Wednesday	11	2	17	The Citric Acid Cycle	Pgs. 506-517
29	Friday	11	4	18	Reduction Potentials	Pgs. 523-529
30	Monday	11	7	18	Respiratory Chain and Proton Gradient	Pgs. 529-544
31	Wednesday	11	9	18	ATP Synthase	Pgs. 544-558
32	Friday	11	11	20	Pentose Phosphate Pathway	Pgs. 601-612
33	Monday	11	14	21	Glycogen Metabolism	Pgs. 617-627
34	Wednesday	11	16	21	Glycogen Metabolism	Pgs. 627-638
35	Friday	11	18	22	Fatty Acid Metabolism	Pgs. 643-652
36	Monday	11	28	---	Review Session	CH 16-21
X	Monday	11	28	7pm	EXAM 3: A-L: HEROY GEOLOGY AUDITORIUM M-Z: PHYSICS STOLKIN AUDITORIUM	EXAM 3 AFTER CH 21
37	Wednesday	11	30	22	Fatty Acid Metabolism Part 2	Pgs. 653-672
38	Friday	12	2	23	Protein Turnover and Amino Acid Catabolism	Pgs. 681-693
39	Monday	12	5	23/24	Urea Cycle, Biosynthesis of Amino Acids	Pgs. 693-706, 719-721, 734-738
40	Wednesday	12	7	27	The Integration of Metabolism	Pgs. 801-811
41	Friday	12	9	27	The Integration of Metabolism	Pgs. 812-822
X	Friday	12	16	ALL	CUMULATIVE FINAL LOCATIONS TBA	3:00 – 5:00 pm

* On exam days (exams 1,2,3),

Those students whose last names begin with A-L will go to Heroy Geology Auditorium.

Those students whose last names begin with M-Z will go to Physics Stolkin Auditorium.