

BIOC 205: BIOCHEMISTRY I

Fall 2016

Class Time and Location:

Class Sessions: Mon, Wed, and Fri, 10:50 A.M. - 11:40 A.M. (Stafford 101)

Recitation/Problem Sessions (Med Ed 300) & Exams (Med Ed 100): Mon, 4:00 P.M. – 6:00 P.M.

Instructor/Course Director:

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Teaching Assistants:

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Course Description:

Biochemistry I is the first half of the Biochemistry I/II course series, and it introduces the chemistry of amino acids, proteins, carbohydrates and lipids. Chemical and thermodynamic principles are fundamental to the course, and will be used to understand the basis for enzymes and their mechanisms, as well as the bioenergetics of metabolic processes. This course introduces the core metabolic pathways of glycolysis, the citric acid cycle, and oxidative phosphorylation, while the remainder of the main metabolic pathways in humans, the integration of metabolism, and the structure, function, and metabolism of nucleic acids and information transfer is covered in Biochemistry II.

Prerequisites:

Two semesters of organic chemistry (CHEM 141/143 and CHEM 142/144 or equivalent) are required.

Textbook:

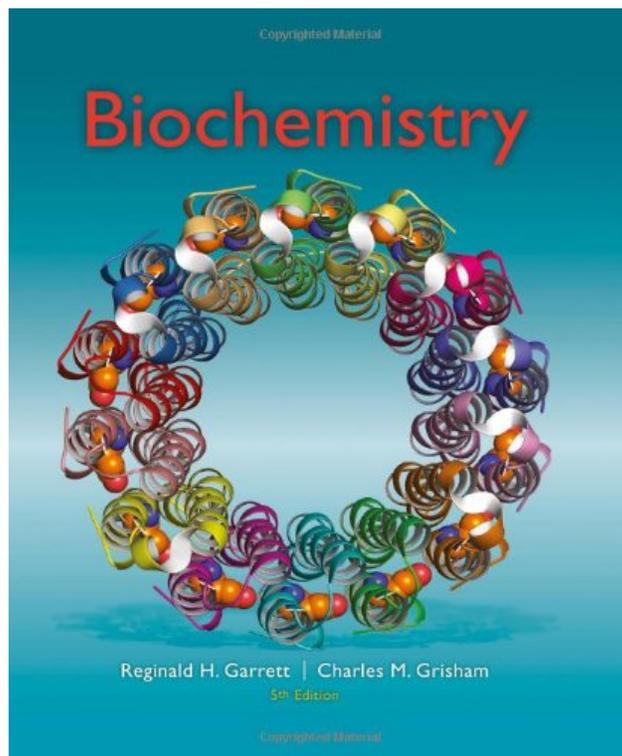
Biochemistry, 5th Edition, by R.H. Garrett & C. M. Grisham, 2013, Brooks/Cole, Cengage Learning, Belmont., CA, ISBN # 978-1-133-10629-3.

Textbook Reserve:

Copies of the textbook and solutions manual are available on two-hour reserve in the Bailey/Howe Library.

Textbook Supplement:

We will be using UVM Blackboard (<http://bb.uvm.edu>) with this course. Copies of lecture slides and other handout material, as well as audio recordings of the lectures and problem/review sessions will be available in the “Course Materials” section of Blackboard in individual folders organized by date. The course calendar and this introductory sheet, and any other relevant course information will be available in the “Course Information” section.



Evaluations and Grading:

Overall grades for the course will be based on the University of Vermont's percentage/letter/point grade system shown in the table below.

Percentage	Grade	Grade Points
97 - 100	A+	4.00
93 - 96	A	4.00
90 - 92	A-	3.67
87 - 89	B+	3.33
83 - 86	B	3.00
80 - 82	B-	2.67
77 - 79	C+	2.33
73 - 76	C	2.00
70 - 72	C-	1.67
67 - 69	D+	1.33
63 - 66	D	1.00
60 - 62	D-	0.67
0 - 59	F	0.00

Participation & Preparation (10%): Class attendance is not taken in this course, but the iClicker system will be used to assess students' participation and preparation. At the start of each class, we'll have a question related to the assigned textbook material that students should have read to prepare for the lecture (see the course calendar for the assigned reading). Students will earn one point for being present and submitting a response with their iClicker, and a second point for answering the question correctly. There will be occasional "written" daily questions on index cards (such as for drawing chemical structures), and additional non-credit or bonus clicker questions may be asked during lecture.

Problem Sets (10%): Working problems and thinking about the material consistently is one of the best paths toward mastering biochemistry, so to ensure that students have ample opportunity to work problems in the course and earn points for doing it, graded problem sets will be assigned each week. These problem sets will be available on Blackboard, and hard copies will be handed out in class. Paper copies of the completed problem sets will be due on Friday at the beginning of class on the dates indicated in the course calendar. The problem sets will typically contain several questions (some may be from the textbook) and one or more of them will be selected for grading by the teaching assistants following whatever rubric and scoring they decide is appropriate for that question. *You can use any and all resources for completing these problem sets, including your classmates.* So indeed you may work on these problem sets together, however, each individual must turn in their own copy of the completed problem sets, not photocopies of their classmates' work. Since these questions, or more likely variations of them, are going to be found on the exams, it behooves one to actually work and understand the problems to ensure preparation for the exams. Note that there are also additional, optional problems from the book provided for each session on the course calendar. These are not required, and some may be especially challenging, but working/understanding these problems is an excellent way to ensure that you understand the material. The teaching assistants will be available to help you with these additional problems in the evening review sessions and during their office hours. **LATE SUBMISSIONS:** We are willing to grant extensions on the submission deadlines for the problem sets on a case-by-case basis; however, these requests must be made prior to the submission deadline. Problem sets submitted late without a planned extension will incur a 10% penalty per day.

Exams (80%): The remaining 80% of one's course grade will be obtained from the four examinations given at roughly equal intervals throughout the semester (see the course calendar for dates). The exams are not specifically cumulative, but there will be concepts covered throughout the course that will be built upon in subsequent sections, so there is a cumulative nature to each of the exams. And, if students perform poorly on a certain question from a previous exam, it may come up again on a subsequent exam. Thus, *it is important to go over your exam and make sure you understand what you got wrong and why*, so that you can answer it correctly if asked again. While the fourth exam will certainly focus on the metabolism covered in the last quarter of the course, it will also have some cumulative concepts and other integrated information. It will be the most cumulative of all the exams, so it has also been labeled as the "Final".

Overall Grading: To determine the overall grade for the course, the three main assessment sections above will be broken down as follows:

Participation & Preparation	10%
Problem Sets	10%
Exam 1	14%
Exam 2	18%
Exam 3	22%
<u>Exam 4 (Final)</u>	<u>26%</u>
Total	100%

The weighting of the percentages for each exam is initially broken down by the number of lectures and amount of content in that exam; however, it is further adjusted by progressively weighting the exams higher as the course proceeds. This process reduces the weight on early exams while the students are becoming familiar with the exam format, and increases the weight of later exams, at which point the students should be well versed in the instructor's style and expectations.

Participation, Preparation, and Problem Set Grading: Although these sections of the course are offered to help students keep up a consistent pace of learning, there are also here to offer relief from assessment by examinations only. They are for the students' benefit, and as such, there is leeway in the scoring - one does not need to earn all the points in either of these sections to receive the full 10% credit. The scores for the Participation/Preparation and Problem Set sections of the course will each be calculated individually according to the rubric below.

<i>% of available points earned</i>	<i>% added to course</i>
80-100	10%
70-79.9	9%
60-69.9	7%
50-59.9	5%
40-49.9	3%
30-39.9	2%
0-29.9	1%

Because we know that students have a number of obligations such as interviews, professional meetings, family emergencies, etc. the rubric is designed to allow students to miss a certain number of classes or problem sets without any penalty. I would still appreciate knowing if you have to miss class, because at the end of the semester, if a student is on the edge of getting a certain amount of points, a demonstration that they have made an effort to be conscientious in their participation and assignments can be helpful in making a decision on a close score.

Extra Credit: Opportunities for extra credit may come up throughout the course in the form of extra questions on exams, extra clicker questions, or other avenues.

Rules for use of iClickers and portable electronic devices:

Each student is expected to enter their own response using their registered iClicker remote or electronic device with REEF polling. If students are found entering responses using their classmates' remotes, each student will lose ALL Participation & Preparation points for the semester. Students may use electronic devices such as laptops and tablets in class for taking notes if they wish, and electronic PDF copies of the day's slides will be available by the start of each class session. The use of portable electronic devices in class for non-class activities is discouraged, however, as adults, you will be allowed to make your own decisions with regard to the investment of your time, and your ability to multi task and effectively focus on the material being delivered. Although we will not be specifically policing the use of electronic devices for non-class activity, one's ability to take in the material and engage in class activity certainly goes down with other distractions, and any disruption of class due to the use of electronic devices will not be tolerated.

Lecture Slides and Lecture Audio:

Paper copies of the lecture slides will be provided for each class period – these slides will lack some information so that you can answer questions and make your own notes on your slides during lecture. Full versions of the slides with all the material and notes that the instructor has added will be available on Blackboard after class. The audio from each lecture will be recorded in mp3 format and this will also be available on Blackboard after class. These audio files are not meant to be a replacement for coming to lecture! They are meant for those who are auditory learners, those that would like to listen to the lecture again and refine their notes, those that miss class, or those that want to use it in any way that enhances their understanding of the material. Please note that while we try to record every lecture, it is not an automated process, so we may forget and there can be technical difficulties. It's possible that a lecture may not get recorded for various reasons, so don't rely on them as a substitute for attending lecture.

Problem/Recitation/Review Sessions:

Problem sessions will be led by the teaching assistants and the course instructor during the Monday afternoon sessions (4:00 P.M. – 6:00 P.M.) when there is not an exam. These sessions will be focused on peer-to-peer learning in groups with the weekly problem sets as a framework. These sessions can also involve the working of book problems, the review of daily clicker questions, exam reviews, or other activities to help students with the course material. We will also make an effort to record the audio from these sessions.

Academic Integrity:

With respect to examinations, the use of iClickers, and any relevant course activities, we tightly adhere to the University's policy on academic integrity. Please review it at:

<http://www.uvm.edu/~uvmppg/ppg/student/acadintegrity.pdf>

Missed Classes and Exams: Any student who will miss an exam must contact the instructor BEFORE the exam is scheduled to begin. If this is done, a make-up exam can usually be arranged. If the instructor is not contacted by the time the exam begins, an excuse from your Dean's office or other documentation will likely be required. Students are expected to attend all regularly scheduled classes, except for those occasions warranting an excused absence under the University of Vermont Attendance Policy.¹ For the specific cases of absence indicated below, students should make arrangements with their instructor to make up missed work:

Illness: Students need to submit appropriate documentation from the Center for Health and Wellbeing or another medical professional when exams are missed due to illness. This documentation needs to be presented to the Instructor as soon as possible, and no later than one week following the absence.

Religious Holidays: Students should submit to their instructor in writing their documented religious holiday schedule for the semester by the end of the second full week of classes.

Athletic Academic Conflicts: A "Notice of Class Absence Due to Competition" memo should be submitted by the end of the second full week of classes.

Other absences may be excused on a case-by-case basis.

Grade Appeals: Adjustments in exam scores must be made within one week following the release of the grades. With regard to appeals on overall course grades, students should contact the instructor as soon as possible, and no later than the tenth day of instruction of the semester following the assignment of the grade in question, as per the University of Vermont's policy:

<http://www.uvm.edu/~uvmppg/ppg/student/gradeappeals.pdf>

¹ <http://www.uvm.edu/academics/catalogue2013->

[14/?Page=allpolicies.php&SM=policymenu.html&category=academic_policies&policy=Rights%20and%20Responsibilities%20of%20Undergraduate%20Students](http://www.uvm.edu/academics/catalogue2013-14/?Page=allpolicies.php&SM=policymenu.html&category=academic_policies&policy=Rights%20and%20Responsibilities%20of%20Undergraduate%20Students)

BIOC 205 - Biochemistry I - Course Calendar - Fall 2016

Lectures (Stafford Hall, Room 101): Mon/Wed/Fri; 10:50 A.M. – 11:40 A.M.
 Problem sessions (Med Ed 300) and Exams (Med Ed 100): Mon 4:00 P.M. – 6:00 P.M.

Textbook: Garrett & Grisham Biochemistry, 5th Edition
 Course Director/Instructor: Jay Silveira

Date	Lecture	Topic	PS Due	Textbook Reading	Optional Additional Problems	Exams
8/29 (M)	1	Intro/Biomolecules & Bonding		1.2-1.4 (pp. 4-17)	Ch. 1: 4a-b, 5a-d, 7-10	EXAM 1 (Lectures 1-9) Monday, Sep 26 4:00 – 6:00 P.M. Med Ed 100
8/31 (W)	2	Water, pH & Buffers		2.1-2.4 (pp. 30-47)	Ch. 2: 1,3-8, 10,13,16,21,23	
9/2 (F)	3	Amino Acids Overview	PS #1	4.1-4.6 (pp. 77-93)	Ch. 4: 13	
9/7 (W)	4	The Amino Acids Part I		4.1 (pp.79-83)		
9/9 (F)	5	The Amino Acids Part II	PS #2	4.1 (pp.79-83)		
9/12 (M)	6	The Amino Acids Part III		4.1 (pp.79-83)	Ch. 4: 2,4-9,14,16,18,19	
9/14 (W)	7	Proteins – 1 ^o Structure		4.7 (pp. 93-97); 5.1 (pp. 101-105)	Ch. 4: 15	
9/16 (F)	8	Proteins – 2 ^o Structure	PS #3	6.1-6.3 (pp. 141-153)	Ch. 6: 1,4,8,9	
9/19 (M)	9	Proteins – 3 ^o & 4 ^o Structure		6.4 (pp. 153-180); 6.5 (pp. 180-188)	Ch. 5: 1; Ch. 6: 10,11	
9/21 (W)	10	Antibodies		A.D.L. (p. 184); Fig. 6.45 (p. 186); S.F. (pp. 982-984)		EXAM 2 (Lectures 10-19) Monday, Oct 17 4:00 – 6:00 P.M. Med Ed 100
9/23 (F)	11	Protein Purification	PS #4	5.2 (pp. 105-111)	Ch. 6: 7	
9/26 (M)	12	Protein Analysis		5.3-5.4 (pp. 112-123)	Ch. 5: 2-5	
9/28 (W)	13	Enzyme Kinetics		13.1-13.2 (pp. 407-414); 13.6 (pp. 435-436)		
9/30 (F)	14	Michaelis-Menten	PS #5	13.3 (pp. 414-423)	Ch. 13: 1-3,9-12,16	
10/3 (M)	15	Inhibition of Enzymes		13.4 (pp. 423-429)	Ch. 13: 4,5,7	
10/5 (W)	16	Regulation of Enzymes		15.1-15.4 (pp. 481-492); S.F. (pp. 497-509)	Ch. 15: 1,2,7,10,12,15	
10/7 (F)	17	Enzyme Mechanisms	PS #6	13.5 (pp. 429-435)		
10/12 (W)	18	Catalytic Mechanisms I		14.1-14.5 (pp. 447-462)	Ch. 14: 11-18	
10/14 (F)	19	Catalytic Mechanisms II	PS #7	14.6 (pp. 463-476)	Ch. 14: 1,3,5,9,11	
10/17 (M)	20	Monosaccharides		7.1-7.2 (pp. 193-204)	Ch. 7: 1,5	EXAM 3 (Lectures 20-30) Monday, Nov 14 4:00 – 6:00 P.M. Med Ed 100
10/19 (W)	21	Polysaccharides		7.3-7.4 (pp. 204-217)	Ch. 7: 4,14,17,18	
10/21 (F)	22	Lipids	PS #8	8.1-8.7 (pp. 233-249)	Ch. 8: 2-6	
10/24 (M)	23	Thermodynamics – Laws & ΔG		3.1-3.4 (pp. 51-59)	Ch. 14: 10; Ch. 3: 1,3,5,6,15	
10/26 (W)	24	ATP Hydrolysis		3.5-3.8 (pp. 59-70)	Ch. 3: 8, 10,11	
10/28 (F)	25	Metabolism Overview I	PS #9	17.1-17.2 (pp.551-557)	Ch. 17: 1-3	
10/31 (M)	26	Metabolism Overview II		17.3 (pp.557-565)	Ch. 17,4-9,12,15	
11/2 (W)	27	Introduction to Glycolysis		18.1-18.2 (pp. 577-580); 18.5 (pp. 595-598)		
11/4 (F)	28	Reactions of Glycolysis I	PS #10	18.3 (pp. 580-588)		
11/7 (M)	29	Reactions of Glycolysis II		18.4 (pp. 588-595)	Ch. 18: 1-2, 4-5,7-9,11-13,15-16	
11/9 (W)	30	Regulation of Glycolysis		18.3-18.4 (pp. 581-2, 585-6, 594-5);18.6 (p. 598)	Ch. 18: 3, 17, 21	
11/11 (F)	31	Pyruvate Dehydrogenase	PS #11	19.1-19.2 (pp. 609-618)	Ch. 19: 4,9	EXAM 4 (Lectures 31-40) Friday, Dec 16 10:30 A.M. – 1:15 P.M. Med Ed 100
11/14 (M)	32	Citric Acid Cycle Reactions		19.3-19.4 (pp. 618-625)	Ch. 19: 1,7,10,16,17	
11/16 (W)	33	Citric Acid Cycle Integration		19.5-19.7 (pp. 625-631)		
11/18 (F)	34	Citric Acid Cycle Regulation	PS #12	19.8 (pp. 632-635)	Ch. 19: 21	
11/28 (M)	35	Free Energy & Redox Reactions		3.9 (pp. 70-73)	Ch. 20: 1,2	
11/30 (W)	36	Electron Transport Chain I		20.1-20.2 (pp. 643-651)	Ch. 20: 7	
12/2 (F)	37	Electron Transport Chain II	PS #13	20.2-20.3 (pp. 652-661)	Ch. 20: 14,15,18	
12/5 (M)	38	ATP Synthase		20.4 (pp. 661-670)	Ch. 20: 6	
12/7 (W)	39	Oxidative Phosphorylation I		20.5-20.6 (pp. 670-674)		
12/9 (F)	40	Oxidative Phosphorylation II	PS #14	20.5-20.6 (pp. 670-674)	Ch. 20: 5, 8-13,17,20	