BIOC 206: BIOCHEMISTRY II
Spring 2017

Class Time and Location:
Class Sessions: Mon, Wed, and Fri, 10:50 A.M. - 11:40 A.M. (Stafford 101)
Recitation Sessions & Exams: Thursday, 4:30 P.M. – 6:30 P.M. (Room C443, Given Building)

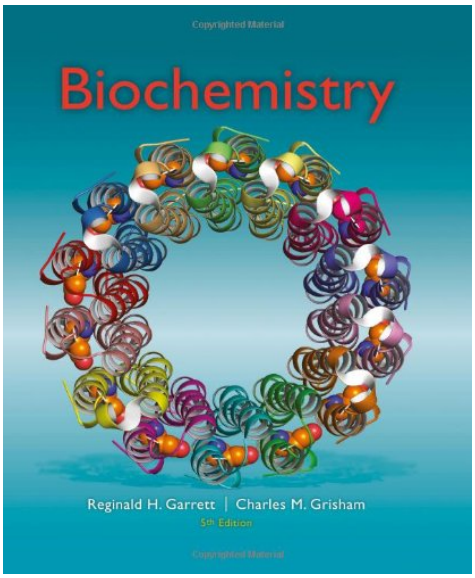
Instructor/Course Director:
Christopher Francklyn Ph.D (Course Director).
B401 Given Building
Office Phone: 656-8450
Email: Christopher.Francklyn@uvm.edu
Office Hours: by appointment; generally free 1:00-2:00 MW

Greg Gilmartin, Ph.D
Stafford Building 222B
Office Phone: 656-8808
Email: Gregory.Gilmartin@uvm.edu
Office Hours: Friday afternoon 1:00-5:00PM

Teaching Assistants

Course Description:
Biochemistry II is the second half of the Biochemistry I/II course series, and it continues the survey of Biochemistry that was initiated in Biochemistry I. In this second portion, we focus on two broad areas. In the first half of the course Dr. Francklyn will finish the discussion of cellular metabolism, including the synthesis and breakdown, and transport of lipids, and the synthesis and breakdown of amino acids, and how the metabolism of carbohydrates, lipids, and amino acids is integrated within cells and across organs. In addition to these topics, we also examine how the understanding of lipids gives rise to membranes and membrane biology, and how carbohydrates can be organized into complex intracellular and extracellular polymers. In the second half of the course, Dr. Gilmartin will discuss the structure, function, and metabolism of nucleic acids and information transfer.

Prerequisites:
Two semesters of organic chemistry (CHEM 141/143 and CHEM 142/144 or equivalent) are required. Generally, students who enroll in BIOC206 have already taken the first course in the series BIOC205. If you have not, you should visit with the Course Director to make sure that your preparation is adequate.



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

(There is now a 6th Edition Available, but it is not essential to purchase this if you have the 5th edition.)

Textbook Reserve:
Copies of the textbook and solutions manual will be 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 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.

Assessment:

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

Online quizzes	10%
Group Project	10%
Exam 1	15%
Exam 2	15%
Exam 3	25%
Exam 4 (Final)	25%
Total	100%

Final grades are assigned essentially as described by the University percentage grading system shown below. Instructors retain the option to adjust the correspondence between percentage and final grade to calibrate the performance of the class against historical grading trends, and to resolve cases of individual students whose percentages land right on the line:

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

.

Weekly on line quiz (10%):

There will be a total of four weekly quizzes from Dr. Francklyn to monitor your progress through the course and test your knowledge. Each week a quiz is offered, Blackboard will make the quiz available (for 20 minutes) at your convenience from Friday noon to the following Monday at 8:00Am. Each quiz has 10 multiple choice questions and may include an additional one point bonus question. Blackboard will score your on-line quiz immediately. We encourage you to do these quizzes on your own and without reference to notes and the textbook in order to give you the most accurate picture of your knowledge about the material. In essence, please consider an honor system to be in place with respect to the online quizzes. Prior to actually taking the quiz, we encourage you to work together to review the lectures, work sample problems, and challenge each other.

Extra Credit: Opportunities for extra credit may also come up throughout the course in the form of extra questions on exams.

In Class Project (10%): This in class exercise concerns "integrating metabolism", i.e., understanding how several key organs in your body manage your fuel and energy resources in response to different metabolic states. The goal of the exercise is to break the class into groups, each focused on a particular organ or disease. The goal of each group (4-5 students) is to become the 'knowledge base' for their particular organ/disease, and than be prepared to share that knowledge with the rest of the class. The organs & diseases are as follows: (a) Brain; (b) Heart; (c) Liver; (d) Muscle; (e) Adipose; (f) Kidney); (h) Diabetes.

At the first class meeting, we will draw cards out of a hat to assign each member of the class to a particular group. Absent students will be randomly assigned by the instructor. The groups will then organize, split up duties. These consist of researching the topic, developing and presenting the Powerpoint, and writing the Review article. Each group will schedule an orientation meeting with Dr. Francklyn to talk about the scope of the projects. At that meeting, each group signs up for the date upon which it will make its presentation: *first come, first served. Hence, the sooner your group schedules a meeting, the better its selection of presentation dates.* The groups will then develop the specific content, which consists of a Powerpoint lecture (see examples on Blackboard) worth 5% of final grade, and a "Review Article" that covers various topics that are developed and bylined by the individual members of the group (remaining 5%). Note that each student's contribution to the Review will be graded *individually*. The Powerpoint presentations (in their near final form) are due at the end of the first day of presentations, March 4th. The Reviews are due at the end of the in class presentations (March 21th).

The in class presentations will take place on **Friday 3/3, Monday 3/6, Wed 3/8, and Friday 3/10**. The presentations come in the form of a 20 minute short lecture (using Powerpoint, overheads, or chalk) with members of the group taking turns. After each presentation, there is a five minute Q/A while the second group sets up. Each group gets graded (by instructor) and members of the winning group receive a prize, bragging rights, and bonus points with respect to grading. Grading/evaluation is based on clarity of presentation, depth of knowledge, and general evidence of hard work and scholarship. Cribbing all of your work from one bogus website will generally be frowned upon. Penetrating and insightful questions from the audience (a.k.a 'stump the chumps') will also garner extra credit points for the questioner.

To start, read and re-read Chapters 17 and 27 in your book, but also don't be afraid to venture out on the web and PubMed (the ***real source***) for additional information. **What is the content for this exercise?** Here is the essential/compulsory section of what should be included for each organ:

- What does your organ expend most of its energy (ATP) doing? (Be specific, i.e. what enzymes require ATP)
- In what form, if any, is energy stored in your organ?
- From what specific compounds (carbs, FA's, amino acids, etc.) does your organ derive most of its energy?
- What biosynthesis does your organ do; in particular, does your organ export any fuel sources to other organs?
- Where does your organ receive its fuel sources? How much comes from what is stored locally, how much from other organs?
- What hormones does your organ secrete and/or respond to?

Special note for disease groups. I have chosen Diabetes and Cancer as the special disease groups, which will have content different from the classical organ groups. For the Disease groups, the goal is to outline in clear and direct language how the disease leads to a *widespread metabolic programming of the cells of the body*. For Diabetes, you have to outline how either Type I or Type II Diabetes (you will need to explain these) fundamentally changes the glucose metabolism of all cells, which is the characteristic feature of these diseases. There are profound changes in the energy metabolism that you will need to discuss, both in the context of a basic "diabetic" cell, and in the context of how different organs in the body are affected. The case manual posted on Blackboard (under "Additional Reading and Notes"), which I have borrowed from our Med Student small group

section, is quite instructive here. Don't feel that it has to be rigidly adhered to. (You needn't get into the minutiae of different types of insulin, for instance.) For the cancer groups, my suggestion is to focus on the ***altered metabolism of a prototypical cancer cell; with an eye to how these create therapeutic opportunities for new treatments.*** I can help the Cancer group develop some additional specialized content.

To make matters more interesting, each group should also consider how all of your answers will change as a consequence of the following states (we'll get to as many of these as we can)

immediately after eating (the fed state)
some time after eating (the fasting state)
under starvation conditions
bonus squared:, what hormones control eating behavior, and how do they work. See page 892 for a first pass into this very interesting topic.

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.

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.

Review Sessions:
Depending on the level of TA support that is offered, we will attempt to have at least one review session prior to each exam.

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:

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

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