What is the course about?

Understanding any important phenomenon in biology ultimately comes down to understanding the structures of the molecules that participate in the relevant biochemical processes and the ways that these molecules interact and react. Biochemistry textbooks are packed to the brim with such information, but from where does this knowledge come in the first place?

A great deal, perhaps a majority, of our knowledge about how biochemical processes work comes from just two basic types of laboratory experiments: First, we explore the mechanisms of biochemical reactions by measuring the rates of various reaction steps. Second, we infer the structures and behavior of biological molecules from the ways that they interact with electromagnetic radiation. A common feature of all such experiments is that they involve making and interpreting quantitative chemical and physical measurements on biochemical systems.

This course is not a laboratory course; it is not intended to merely teach the intimate details of how to use a few specific techniques. Instead, the course covers the basic principles that underlie a wide range of quantitative biochemical experiments. Many of these principles are derived from chemistry, particularly physical chemistry, and from mathematics. The intention is to equip students with some of the basic knowledge they will require to read and critically evaluate the original research literature of the field.

Required Preparation

The course requires knowledge of basic biochemistry at the level covered in a good introductory college biochemistry course (e.g., Bchm 100). I will assume that you already are familiar with fundamental chemistry concepts like Gibbs free energy and chemical equilibria and that you have had at least some previous exposure to basic chemical kinetics. A calculus-based introductory physics course (e.g., Phys 11a,b) is an essential prerequisite; you will need to be able to differentiate and integrate with ease and also to apply calculus to the solution of simple physical problems.
Readings

The second half of the course will use:


This book should soon be in stock at the bookstore. Readings from other texts will be assigned for some sections of the course. You should also have available an introductory biochemistry text in case you need to refresh your memory of some of the background material.

Bchm 104b is a graduate-level course; a major goal of this and other such courses is to develop the facility of students to read the original research literature. Therefore, a significant amount of the reading will consist of articles taken from the literature. Since these articles were written for expert readers, students should expect that understanding these readings will be significantly more challenging than reading texts.

Most readings other than those from the van Holde text can be printed out from the E-Res server (see below). Readings that cannot be put on the server due to copyright restrictions will be placed on reserve in the science library.

The following reference books have also been put on reserve:


Electronic Resources

Links to the electronic resources listed below (as well as those for other courses in which you are registered) are available at http://my.brandeis.edu (follow the “My Courses” link).

1. E-Res server, http://ereserves.publib.brandeis.edu/. You will need to give the password
"eyring" and indicate that you will abide by the applicable copyright restrictions.

2. Course web page, http://www.bio.brandeis.edu/classes/biochem102. Copies of all handouts, problem sets, etc. distributed in lecture will be posted here. If you lose your copy or didn’t get one in the first place, print another copy from the Web.

Course organization

Problem sets. Much of the material covered in the course cannot really be understood just by listening to someone jabber on about it; you have to try it out for yourself. For that reason, the problem sets are the most important part of the course. There will be ~8 problem sets over the course of the semester (that is, a bit less than one a week). Problem sets must be turned in at the end of the lecture on the due date. I will grade and return them, but the grades are merely for your information; problem set grades have almost no effect on your grade for the course. If you turn them in late I will not grade them unless they reach me before I have started grading the problem sets for the rest of the class. Problem set answers will be discussed in detail in the discussion section. Brief summaries of the answers will also be posted on the web site on the day the problem sets are returned. Feel free to collaborate with other students on the problem sets if you feel that this will help your understanding of the material.

Discussion section. Omar Quintero, the teaching assistant, will lead a weekly discussion section. The time and location will be arranged during the second week of the course. The discussion section is an essential part of the course; I expect all students to participate. Among other things, it will discuss the answers to the problem sets and will correct, clarify, and expand upon material presented in the lectures.

Lectures. See the course schedule for dates of lectures. Class starts promptly at 11:10. I usually begin each lecture by summarizing the most important point to be discussed that day, so come on time!

Questions. I welcome your questions both in and out of the lectures. I try to arrange my schedule so that I’m free right after lectures, so that is often a particularly convenient time to talk. You are also welcome to come by my office/lab any afternoon if you would like to talk to me outside of class. If I can’t talk to you immediately when you come by, I will set up an appointment to help you later. You can also call (ext. 6-2377) or email (jeff@brandeis.edu) to set up an appointment if that is more convenient or if I am not around when you come by.

Exams. There will be three exams: two one-hour-long held during regular class hours (see course schedule) and one final during exam period at the end of the term. Exams will be graded by me, not the teaching assistant. Each exam may cover some material all the way back to the beginning of the course. Exams are "closed book"; you may not consult any notes or other reference materials during the exam. If you miss an exam, you will receive a failing grade for
that test. As it is essentially impossible to prepare two equivalent exams in this subject, no makeup exams will be given for any reason. In exceptional circumstances in which a student is absent from an exam due to a documentable emergency beyond the student’s control, a grade of "pass" may be given for a missed exam. **Please note that absences due to extracurricular activities or travel plans are not considered emergencies.** Any student requiring academic accommodations in the exams or lectures should make arrangements with the coordinator immediately upon starting the course; see the Brandeis University Bulletin for details.

**Grades.** Final grades for the course will be determined based on exam scores and your class participation.