

Biology 3515/Chemistry 3515  
Biological Chemistry Laboratory

Spring 2019

**Course Description and Objectives:**

This course is intended for students who have taken Biology 3510/Chemistry 3510. The laboratory course will cover enzyme kinetics, methods of protein fractionation, and techniques for characterizing proteins. There will be a heavy emphasis on quantitative analysis and the use of computers for data collection, data analysis and molecular modeling. At the end of the course, students will have gained skills in modern biochemical laboratory techniques and methods for data analysis. They will also gain an improved understanding of the relationships between protein structure and function, particularly for enzymes.

**Prerequisites:**

Biology 3510 or Chemistry 3510

**Instructor:**

David P. Goldenberg

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Telephone: 581-3885

E-mail: [goldenberg@biology.utah.edu](mailto:goldenberg@biology.utah.edu)

Office hours:

Tuesdays: 11:00 AM - noon

Wednesdays: 2:00 PM - 3:00 PM

Other times by appointment. The best way to contact me is by e-mail.

**Teaching Assistants:**

Monday: Andrew Sorensen, [andy.sorensen@utah.edu](mailto:andy.sorensen@utah.edu)

Tuesday: Emily Tippetts, [emtippetts@gmail.com](mailto:emtippetts@gmail.com)

Wednesday: Cara Drane, [caraberrell175@gmail.com](mailto:caraberrell175@gmail.com)

Thursday: Ashley Mowery, [u0918138@utah.edu](mailto:u0918138@utah.edu)

**Web page:**

A web site has been prepared for this course to provide a variety of information, including lecture and lab schedules. The web site can be found at:

<http://goldenberg.biology.utah.edu/courses/biol3515>

Updated information will be posted periodically during the semester, and you should make a point of checking for updates before your lab session each week.

**Lectures:**

Tuesday and Thursday, 9:40 - 10:30 AM, Room 208, Crocker Science Center (CSC)

The lectures are an integral part of the class, and regular attendance is expected of all students. Although slides from many of the lectures will be posted on the class web site, these should not be viewed as a substitute for attending class.

## Electronic Device Policy

In order to encourage student engagement and create a more effective learning environment for everyone, the use of cell phones, tablet computers or laptop computers will not be allowed during lectures. Cell phones may be accessed during class only in cases of emergencies.

Exceptions to this policy will be made for students who need to use an electronic device as part of an approved accommodation. See the section below on Special Accommodations for information about applying for an accommodation through the Center for Disability Services.

## Clickers

An audience response system (clickers) will be used to facilitate interactive learning during the lectures. Some responses will be graded and will count for 5% of the course grade. Clickers can be purchased from the University Campus Store and can be sold back to the store at the end of the semester.

Any of the following TurningPoint clicker devices should work:

- ResponseCard NXT
- ResponseCard RF/LCD and RF
- QT and QT2

The QT2 and ResponseCard RF/LCD models should be available at the Campus Store.

**For this class, you do not need a TurningPoint account or license**, and you should not try to register your clicker for this course through the Turning Point Cloud service, though you may need to do this for other courses. Instead, you will need to register your clicker through an “assignment” on Canvas, and registering by the first lecture will count for 5 clicker points up front. Registering by the second lecture will count for 2 points.

Although there is a TurningPoint smart-phone app (ResponseWare) that can, in principle, be used instead of a clicker, it will not be supported for this class. (See the electronic device policy above.)

## Text book:

There is no required text book for this course. There is, however, a *recommended* text entitled “Fundamental Laboratory Approaches for Biochemistry and Biotechnology” (2<sup>ed</sup>), by A.J. Ninfa, D.P. Ballou and M. Benore. Copies of this text are available at the bookstore, and copies will be placed on reserve at Marriott Library. In addition, it may be helpful to review material from a standard biochemistry text, such as those by Berg, Tymoczko and Stryer or by Voet and Voet.

## Laboratory manual:

A special manual, entitled “Laboratory Experiments in Biochemistry” has been prepared for this course and is available at the University bookstore.

## Laboratory sessions:

The class will be divided into four laboratory sections, each meeting once a week on Mon., Tues., Wed. or Thurs. All sections will meet from 1:00 to 5:00 PM. Except for the computer sessions noted below, the laboratory sessions will be held in Room 143 in the Crocker Science Center.

## Computer sessions:

During the weeks of 29 January and 5 February, the lab sections will meet in Room 150 of the Biology Building for computer sessions.

## Lab safety

Some of the reagents you will be handling in the lab are quite caustic and can cause serious eye injury. **Safety glasses will be required for all laboratory sessions.** (Ordinary prescription glasses are adequate.)

Shoes must fully cover your feet for protection from broken glassware and other hazards. Although we will not attempt to enforce a modesty standard, the less skin that you leave exposed, the better for safety!

Lab coats will be provided in the lab, at no cost. You will be advised of procedures for which wearing a lab coat is required, but you are free to wear them at other times, according to your own judgement.

Personal electronic devices, including phones, tablet computers and laptop computers, will not be allowed in the laboratory. This is to avoid both distractions and possible chemical contamination that could be spread outside the lab. There is a classroom immediately adjacent to the lab, and reserved for the course, where you are free to use your laptop for working on lab reports.

## Electronic Laboratory Notebooks:

Students will be keeping notes, storing data and preparing the lab reports using an online electronic notebook system called LabArchives. Shortly before classes start, you should receive an e-mail message containing a web link for setting up a LabArchives account. These links will also be available on the Canvas page for this course.

**When setting up your account it is very important to use your University of Utah UMail e-mail address, of the form uNID@utah.edu. Do not use an alias to your UMail account (such as my.name@utah) or another account, such as a gmail account.** Sorting things out once you once an account has been created using the wrong e-mail address is painful for everyone involved. But, once the account is set up, it is easy to change the e-mail address associated with the account.

After logging on to LabArchives, you should find an online notebook set up for this class, containing a page named "Getting Started". On this page you will find links to some tutorial material, and you should start getting to know the system before your first lab session.

## Laboratory Reports:

For each of the six experiments, a summary report will be due approximately two weeks after the completion of the experiment. The due dates for the individual lab reports are indicated on the Laboratory Schedule on the class web page. This report is to be created within LabArchives and will be submitted electronically as a pdf file. In some cases, the report will also include some molecular modeling exercises.

Reports will be accepted up to 7 days late, but a 10-penalty for each day late will be imposed. Reports will not be accepted after 7 days beyond the due date.

Although you will be working in groups of three in the laboratory, each of you is responsible for writing your own reports. You may certainly consult the instructors, the TAs or other students as you work. **But, the actual work handed in (other than the primary lab data) must be your own. Any, data analysis files, molecular modeling files, text or other material must be clearly distinguishable from that of other students.**

Other sources must be properly cited. Text from other sources must be clearly identified by quotation marks. Furthermore, extensive quotations, even with proper citation, will not be considered satisfactory answers to questions. Copying and pasting does not demonstrate mastery of the material!

**If two or more students turn in work that that is identical, their action will be considered academic misconduct and appropriate sanctions will be imposed. At a minimum, the sanction will include the loss of credit for the copied work, and more severe sanctions may be imposed for more extensive infractions.** (See additional information below regarding Academic Conduct.)

Additional information about the laboratory notebook and reports can be found on pp.1–13 of the laboratory manual.

### **Quizzes:**

There will be three quizzes during the class periods on the following dates:

- Thursday, 7 February
- Thursday, 21 March
- Tuesday, 23 April

Each of the first two quizzes will be about 25 minutes long and will cover material from the lectures and laboratory sessions since the previous quiz. The third quiz will be 50 minutes long and will be cumulative. This quiz will count twice as much as each of the other two.

### **Grades:**

The course grade will be determined the laboratory reports, quizzes and in-class responses, weighted as follows:

- Laboratory reports: 70%
- Quizzes: 25%
- In class clicker responses: 5%

The following represent maximum cutoffs for determining class letter grades:

- A: 92–100% (including A-)
- B: 82–91% (including B- and B+)
- C: 70–81% (including C- and C+)
- D: 60–69%
- E: < 60%

Depending on how things go, the grade cutoffs *may* be revised downwards, *i.e.*, to make the grading more generous. The cutoffs will not be moved upwards to make the grading less generous.

### **Important Dates:**

- Last day to drop (delete) classes: Friday, 19 January (No tuition penalty; class does not appear on record.)
- Last day to add classes: Friday, 19 January
- Last day to withdraw from classes: Friday, 2 March (No tuition refund, “W” appears on transcript.)

## **Excused Absences**

If you must miss a lab session because of illness, family emergency or an official University of Utah activity, please let the lab instructor and your TA know as soon as possible. If it can be arranged, you may be able to do the lab work by joining another lab group on a different day of the week. If this cannot be arranged, you can obtain the lab data from the other members of your group and complete the lab report using that data.

If you miss a lecture because of illness, family emergency or an official University of Utah activity, please notify the instructor. Any clicker points missed because of an authorized absence will not be included in calculating the average for your clicker responses.

## **Unexcused Absences**

Attendance will be taken in each lab session, including the two computer sessions. If you miss a lab session without an accepted excuse, you may complete your lab report using the data recorded by your lab partners. However, there will be a 20-point penalty applied to your lab report grade for each missed session.

If you miss a lecture without an accepted excuse, there will be no make up for any missed clicker questions.

## **Expected Learning Outcomes**

What you learn from this class will depend greatly on your preparation and efforts. Students who are well prepared and who put a conscientious effort into all of the class components can expect to enhance their theoretical and practical understanding of:

- Applications of pH and ionization equilibria in biochemistry.
- Applications of absorbance spectrophotometry in biochemistry.
- Methods of quantitative data analysis, especially curve fitting.
- Protein structure and molecular modeling, including the use of the computer program PyMOL.
- Mechanisms of enzyme catalysis and inhibition, particularly in proteases.
- Analysis of enzyme kinetic data.
- Principles and application of electrophoresis for characterizing proteins.
- Principles and application of chromatography for characterizing proteins.

## **Title IX: Addressing Sexual Misconduct:**

Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veterans status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action (<http://oeo.utah.edu/>, 135 Park Building, 801-581-8365), or the Office of the Dean of Students (<http://deanofstudents.utah.edu>, 270 Union Building, 801-581-7066). For support and confidential consultation, contact the Center for Student Wellness (<http://wellness.utah.edu>, 426 SSB, 801-581-7776). To report to the police, contact the Department of Public Safety (<http://dps.utah.edu>, 801-585-2677(COPS)).

## **Academic Conduct**

In order to ensure that the highest standards of academic conduct are promoted and supported at the University, students must adhere to generally accepted standards of academic honesty. Acts of academic misconduct include cheating, plagiarizing, research misconduct, misrepresenting one's work, and inappropriately collaborating. Suspected cases of academic misconduct will be dealt with according to the rules found in the Student Code ([http://regulations.utah.edu/academics/6-400.php#section\\_5](http://regulations.utah.edu/academics/6-400.php#section_5)). All instances of academic misconduct are recorded in a University database, which is shared by all academic units on campus.

## **Special Accommodations:**

The University seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the instructor and to the Center for Disability and Access (<https://disability.utah.edu/>). CDA will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification.

## **Final Note:**

This syllabus is not a binding legal contract. It may be modified by the instructor when the student is given reasonable notice of the modification.