

Introductory Biochemistry Lab

11:115:313

Course Coordinator

Sharron Crane (Sections 2,3,4,5) email: sharron.crane@rutgers.edu

Office Hours

Please see Canvas page for office hours information

Course Overview

This course is designed to introduce students to many of the important concepts, skills and techniques used in various biochemical analyses. One of the goals of this course is to increase students' understanding of biochemistry and the different analytical techniques and data evaluation methods used in this discipline. Additionally, many of the labs in this course are designed to sharpen students' skills in experimental design, critical thinking and troubleshooting.

Learning Outcomes

Upon completion of this course, you will be able to:

- describe what a chromophore is, and identify chemical properties that allow a molecule to absorb light
- describe the use of a spectrophotometer
- identify and explain some of the many applications of spectrophotometry in biochemistry research
- describe the use of a pH meter, explain the basic concept of buffering, and use the Henderson-Hasselbalch equation to prepare a pH buffer
- use the Beer-Lambert Law to determine the concentration or proportionality constant of a molecule
- generate a standard curve and determine concentration of a substance based on spectrophotometric data
- explain gel electrophoresis and how it is used for protein and nucleic acid analysis
- explain how the molecular weight (and, potentially, the identity) of a protein or nucleic acid fragment can be confirmed
- explain the concept of enzyme kinetics (including inhibition) and use Michaelis-Menten and Lineweaver-Burk plots to determine K_m and V_{max} .
- determine total mass of a solute, solute concentration (e.g., M, g/L, %), and apply dilution factors to determine initial and / or final concentration of a solution

Approximate Grading Breakdown

Prelab quizzes: 10 @ 10 points each: 100 points

In-Class and Homework Assignments: 650 points

Midterm Assignment: 100 points

Final Assignment: 150 points

Total: 1000 points

Expected Grading Scheme (based on %)

≥90: A

85-89: B+

80-84: B

75-79: C+

70-74: C

60-69: D

<60: F

Course Policies

Communication

For email communications, please use the Canvas mail tool or email directly using your scarletmail account. If you email using scarletmail, please include the course number (115:313) in the subject line and be sure to treat all emails as professional communications. We generally respond to emails within 2 business days.

Attendance

Attendance is required. If you must miss lab due to extenuating circumstances, please make sure you have documentation, and please discuss the matter with your Instructor as soon as possible.

Undocumented Absences

If you have an undocumented absence, you will earn a zero the associated assignment. If you are absent more than twice without documentation, your final grade for the course will be an "F."

Quizzes

Prelab quizzes are available on Canvas 24 hours before your scheduled lab time and close when lab starts. You may use your notes, handouts, or the internet but please do not discuss the quiz with anyone. Some of the prelab quizzes will include math problems.

Assignments

Assignments will be submitted directly to Canvas or via the Lab Archives integration.

Some things to keep in mind:

- It is your responsibility to keep track of assignments and their associated due dates and times.
- Late assignments are accepted up to 48 hours after the due date and time. Assignments submitted late will not earn full credit: 20% will be taken off the points value of the assignment (up to a maximum of 20 points), and grading will be based on that. To illustrate:
 - Late submissions of 100+-point assignments lose 20 points
 - Late submissions of 50-point assignments lose 10 points
 - Late submissions of 25-point assignments lose 5 points“Lateness” begins one minute after the due date and time.
- If you do not submit an assignment by the late date and time, you can schedule a meeting with Dr. Crane and make your case. If Dr. Crane decides to accept your assignment, the late grade policy will still apply.
- Submissions are not accepted via email. We do not make exceptions to this policy.
- If you do not agree with how a quiz or assignment was graded, you have two weeks from the day the grade was posted to inquire about it.

Academic Integrity

All members of the Rutgers community are expected to adhere to the University’s [Academic Integrity Policy](#). The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.

- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

I am required to report any suspected violation of the policy to the [Office of Student Conduct](#). What happens after that depends on a number of factors, including the severity of the violation and whether or not it is considered a first offense.

One of the most common offenses is plagiarism, either from an outside reference or from another student's work. When using information from outside sources, you must cite the original source of information. Detailed information about your sources must then be listed in a references section. All outside information must be [appropriately](#)

[paraphrased](#), i.e., conveyed using your own words. If you are unsure of how to use and cite sources, please come to office hours or make an appointment with your Instructor or TA.

Also please be careful to avoid unauthorized collaboration. Although you are encouraged to discuss the data and exercises with each other, all work you submit must be your own. This includes any graphs.

Students agree by taking this course that assignments may be subject to submission for textual similarity review to Turnitin.com (directly or via learning management system) for the detection of plagiarism. All documents submitted to Turnitin.com will be retained as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site.

Students who do not agree should contact the course coordinator (Dr. Crane: sharron.crane@rutgers.edu) immediately.

Students with Differing Abilities

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation according to the [documentation guidelines](#). If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please visit the ODS website and follow the instructions for [getting registered](#).

Temporary Conditions

If you cannot fully participate in the course, or are concerned about your ability to complete your work in a timely manner due to a temporary condition, please register your condition with the [Office of the Dean of Students](#).

Student Wellness Services

Just In Case Web App <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/

www.rhscaps.rutgers.edu/

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Scarlet Listeners

(732) 247-5555 / <http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.

Diversity and Inclusion

One thing that makes Rutgers great is the diversity of our population. We are all here to learn from each other, and learning often takes the form of lively discussion and debate among people with different perspectives. As long as we are respectful to one another, discussion and debate can be valuable experiences. It is my priority to foster learning among students in the Rutgers community, and this requires that my classroom be a safe space for all. If anyone in the class says anything that makes you feel uncomfortable regarding your ethnic, religious, gender, or other identity, please let me know. Additionally, if you prefer to be called a name that is different from the name on my roster, or have a preferred set of pronouns that you would like me to use, please let me know that as well. I want this class to be a positive experience for all of us!

Sample Schedule

Lab Period	Lab Activity
1	Syllabus Review; Introduction to the Lab Quantitative Literacy (may be completed online)
2	pH, Buffers, and the Henderson-Hasselbalch Equation
3	Chromophores
4	Pipetting (may be done first or second week); The Beer-Lambert Law
5	Determination of Protein Concentration
6	Identification of Unknown Substances Using Spectrophotometric Analyses
7	Kinetics of Alcohol Dehydrogenase
8	DNA Extraction; PCR setup

9	Agarose Gel Electrophoresis and Sequence Analysis
10	SDS-PAGE
11	Qualitative Analysis of Carbohydrates
12	"Escape the Lab!" (A Biochemistry Escape Room)
13	Final