



## **BIO282**

### **Introductory Biology Laboratory**

### **Stevens Institute of Technology**

### **Spring 2023**

**Course Lecturer: Prof: Denver Baptiste**

**Course Schedule:** Thursday; 8:00-10:50am (section A); 11:00-1:50pm (section B) 2:00-4:50pm (section C) and Friday 2:00-4:50pm (section D)

**Contact Info:** [djnbapti@stevens.edu](mailto:djnbapti@stevens.edu)

**Office Hours:** by appointment in-person or *via zoom*

**Teaching assistants:**

Zahra Hashemi - [zhashemi@stevens.edu](mailto:zhashemi@stevens.edu)

Kylee Wrath - [kwrath@stevens.edu](mailto:kwrath@stevens.edu)

#### **LAB COURSE DESCRIPTION**

This laboratory course consists of hand-on activities that will familiarize the students with a variety of laboratory techniques used in the broad field of cellular and molecular biology to study both prokaryotic and eukaryotic cells.

#### **OBJECTIVES AND GOALS:**

- Understand the use of model systems and current techniques to explore mechanisms of cellular and molecular biology
- Gain knowledge in data collection, analysis, interpretation of results, and experimental design
- Communicate science content in both written and oral format
- Complete group work in a lab setting
- Understand the larger context of how disease states affect cellular function

#### **LEARNING OUTCOMES**

- Explain and apply each step of the scientific method, including designing an experiment, testing your hypothesis, and the use of experimental controls
- To understand molecular and cellular biology techniques used to study the prokaryotic and eukaryotic cells, including but not limited to, sample preparation for microscopy, polymerase chain reaction and gel electrophoresis.

### **Students will be evaluated based on**

- In-class participation (20%)
- Weekly Quizzes (25%)
- Lab notebook (25%)
- Lab report (30%)

### **Grading Procedures**

- Attendance is required. Class attendance will also help you master the course material. In the case of illness, a doctor's note will be accepted at the discretion of the course instructor.
- Quizzes are available on canvas for an entire week. **Therefore, no make-up will be given for a missed quiz.**

**ARRIVE TO LAB ON TIME!** The beginning of each lab will include a brief description of the exercise, details on the procedures that will be used and important safety measures to be taken during the lab. Failure to arrive on time will mean missing critical information; thus, you will not be able to perform the lab for that week.

### **WEEKLY QUIZZES**

At the end of each lab period a quiz will be given on canvas to be completed before the next class. The quiz will cover the learning goals and background information of the day's experiment. The quizzes must be completed before the following class at midnight.

### **LAB NOTEBOOK**

A bound notebook is required to record everything conducted in the lab (preferably a composition notebook). Instruction on how to complete entry for each lab will be posted on canvas. Each lab experiment counts for 10 points. The lab notebook must be handed in for evaluation by the last lab period in February and the last lab period of April. You will be graded on these entries. Proper lab notebook entries will help with your final lab report.

### **LAB REPORT**

One lab report must be completed at the end of the course, this is separate from the lab entries. Instructions on how to complete the lab report will be posted on canvas and the details discussed in class. The lab report deadline will be one week after your final lab.

### **IN-CLASS PARTICIPATION**

Active class participation (including attendance) is very important. DO not be hesitant to raise your hand and speak, ask questions, answer questions, share what you have been reading. Any course material relevant to the question is appropriate, so do not hesitate to ask. Remember that having an inquisitive mind is vital for science and learning.

## COURSE MATERIALS AND OTHER REQUIREMENTS

There is no lab manual for this course. Handouts and other assigned articles will be posted on Canvas prior to the class session in which they will be discussed.

A laboratory notebook is required. The laboratory notebook is a documented, and primary record of laboratory observations. **A lab notebook and safety goggles are mandatory.**

**STUDENTS MUST FOLLOW SAFETY RULES FOR THE LABORATORY. FAILURE TO DO SO WILL RESULT IN THE STUDENT BEING DISMISSED FROM THE LAB**

## GRADING SCALE

Percentages and grades are shown below. **ALL GRADES ARE COUNTED; NONE ARE DROPPED NOR ARE THEY CURVED.**

A	over 100 %	to 93.00 %
A-	92.99%	to 90.00 %
B+	89.99%	to 87.00 %
B	86.99%	to 83.00 %
B-	82.99%	to 80.00 %
C +	79.99%	to 77.00%
C	76.99%	to 73.00%
C-	72.99%	to 70.00 %
D+	69.99%	to 67.00 %
D	66.99%	to 60.00 %
F	59.99%	and below

## TECHNOLOGY REQUIREMENTS

### Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Canvas

### Technology skills necessary for this specific course

- Live web conferencing using Zoom

### Required Equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Microphone: built-in laptop or tablet mic or external

### microphone Required software

- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint

## ACADEMIC INTEGRITY

### Undergraduate Honor System (100-400 level)

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the [Honor System Constitution](#). More Information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at <http://web.stevens.edu/honor/>

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes, and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

*"I pledge my honor that I have abided by the Stevens Honor System."*

### Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violation online at [www.stevens.edu/honor](http://www.stevens.edu/honor).

## LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

### *Disability Services Confidentiality Policy*

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

For more information about Disability Services and the process to receive accommodations, visit <http://www.stevens.edu/office-disability-services>. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at [pgehman@stevens.edu](mailto:pgehman@stevens.edu) or by phone (201) 216-3748.

## INCLUSIVITY

### *Name and Pronoun Usage*

As this course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

### *Inclusion Statement*

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse



and innovation. In this class, the perspective of people of all races, e, gender expressions and gender identities, religions, sexual orientation, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.



You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

## **MENTAL HEALTH RESOURCES**

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression) and who can visit the office in person. CAPS is open from 9:00 am – 5:00 pm Mondays, Wednesdays, Thursdays, and Fridays and from 9:00 am – 7:00 pm on Tuesdays during the Fall and Spring semesters; appointments are highly encouraged. For those students who cannot visit the Stevens campus for an in-person appointment, you can contact a local mental health care provider for an in-person appointment, or if you are enrolled in the Stevens Student Health Insurance, you may call Care Connect for 24/7 mental health support at 1-888-857-5462.

## **EMERGENCY INFORMATION**

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year-round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text “Home” to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive please email the CARE Team at [care@stevens.edu](mailto:care@stevens.edu). A member of the CARE Team will respond to your concern as soon as possible.



**COURSE SCHEDULE** (the instructor reserves the right to modify the course schedule and deadlines as necessary to assure the course objectives are met or exceeded. The student will be promptly informed of any such change):



<b>BIO282 Lab - Spring 2023</b>	
<b>Section A: Thu, 8-10:50</b>	
<b>Section B: Thu, 11-1:50</b>	
<b>Section C: Thu, 2-4:50</b>	
<b>Section D: Fri, 2-4:50</b>	

<b>weeks</b>	<b>Date</b>	<b>Lab Activities</b>	<b>Learning Objectives</b>
1	<b>01/19/23</b> - Th - <b>01/20/23</b> - F	<b>1) Introduction</b> <b>2) Lab Safety</b> <b>3) Introduction to Macromolecules</b>	1) Introduction to lab safety 2) Understand and detect macromolecules found in food; Understand the structure of carbohydrates, proteins, lipids and Nucleic Acids.
2	<b>01/26/23</b> Th <b>01/27/23</b> F	<b>Cell Structure:</b> Use of the light microscope to visualize different types of eukaryotic cells	1) Describe the different intracellular and extracellular components forming Eukaryotic cells; 2) An introduction to the light microscopy; Explain the function of different parts of the microscope
3	<b>02/02/23</b> - Th - <b>02/03/23</b> F	Staining onion bulbs to visualize dividing cells (mitosis)	Describe the role cell division plays in growth, tissue repair, and reproduction; Describe the principle of cell cycle regulation and control; Explain how traits are transmitted to the next generation
4	<b>01/19/23</b> - Th - <b>01/20/23</b> F	Gram stain technique and bacterial visualization using the light microscope	Describe the general bacterial cell structure and function; Describe the structure of the Gram-positive and Gram-negative bacteria; Appreciate theoretical and technical aspects of the Gram staining procedure
5	<b>02/09/23</b> - Th - <b>02/10/23</b> F	Bacterial transformation using pGLO expressing (green fluorescence protein) GFP, practical.	Understand molecular cloning techniques: Understand inducible gene expression regulation; Understand the use of GFP as a reporter gene
6	<b>02/16/23</b> - Th - <b>02/17/23</b> F	Data analysis and interpretation of the results from pGLO transformation	Colony counting and transformation efficiency.





7	<b>02/23/23</b> - Th - <b>02/24/23</b> F	DNA isolation of transformed colonies	Set up the apparatus required and follow the general workflow associated with DNA isolation
8	<b>03/02/23</b> - Th - <b>03/03/23</b> F	DNA Fingerprinting, I: perform restriction digest of DNA samples	Explain the function of DNA polymerase in DNA replication and synthesis; Perform a PCR experiment and carry out a gel electrophoresis that separates DNA according to its size Interpret the unique signature of the human genome
9	<b>03/09/23</b> - Th - <b>03/10/23</b> F	DNA fingerprinting II: data analysis interpretation of the results	Agarose gel electrophoresis to separate the digested DNA. Visualization of DNA fragments using UV transillumination. Analysis of results of DNA fragment sizes and interpretation of results.
10	<b>03/23/23</b> - Th - <b>03/24/23</b> F	PV92 Informatics: part I Experiment for Final Report	DNA extraction from cheek cells and polymerase chain reaction (PCR) of extracted DNA.
11	<b>03/30/23</b> - Th - <b>03/31/23</b> F	PV92 Informatics: part II Experiment for Final Report	Gel electrophoresis of PCR samples and interpretation of results
12	<b>04/06/23</b> - Th  - <b>04/07/23</b> No classes	PV92 informatics: part III Experiment for Final Report	Gel electrophoresis determine students' genotype for Alu insertion; Perform Hardy-Weinberg analysis on class results.  Good Friday, no Lab on Friday
13	<b>04/13/23</b> - Th - <b>04/14/23</b> F	CRISPR/Cas9 Introduction	Preparation for VR Experience  Friday Class will also perform Gel electrophoresis
	<b>04/20/23</b> - Th - <b>04/21/23</b> F	CRISPR/Cas9 VR Simulation	CRISPR-Cas9 Virtual Reality Simulation to repair the Mutation that cause sickle cell anemia.  <i>Final Lab</i>