

**BIO382**  
Biological Systems (Lecture)  
Stevens Institute of Technology  
Spring 2023

**Instructor:** Prof. Paola DiMarzio

**Canvas Course Address:** <https://sit.instructure.com/courses/64875>

**Course Schedule:** Mon, Wed, 11-11:50am (MBSH 203) and Tue 12:30-1:20pm (Babbio 319)

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

**Virtual Office Hours:** Monday 11-12am or by appointment in-person (EAS 319) or *via zoom*

**Teaching Assistants:**

Felicia Spadavecchia: [fspadave@stevens.edu](mailto:fspadave@stevens.edu)

Samira Twinkle: [stwinkle@stevens.edu](mailto:stwinkle@stevens.edu)

**PREREQUISITE(S):** BIO381 or equivalent – It is anticipated that students have a prior knowledge of basic structure and function of the cell, cell's macromolecular composition, understand basics of gene expression (transcription, translation), cell division, cell communication, receptor ligand interaction, cell signaling and energy production.

**Lab Course Description:**

This is a one semester course which consists of a **3-hour lecture** (3 credits) and **3-hour lab** (1 credit). During lecture time we will cover the functioning of Biological Systems of the nervous, musculoskeletal, endocrine, cardiovascular, respiratory, digestive, and renal systems in the human body. The anatomy of the mammalian organs and body is studied through in-lab dissections and the corresponding histology, microscopic anatomy, is reviewed and identified. Students will learn how to record human physiological measurements such as EMG, EKG, blood pressure, and respiratory volumes and function. Students will also conduct hands-on experiments, analyze data, and interpret the results.

**Objectives and Goals:**

- Identify and explain the structure and function of the major body systems and explain their relationship with one another in maintaining homeostasis.
- Develop dissection skills and laboratory techniques relevant to the field of anatomy and physiology, respectively.
- Communicate science content in both written and oral format.

### **Learning Outcomes:**

**By the end of this course the student will have demonstrated the ability to:**

- Describe the levels of organization of living organisms.
- Define and describe mechanisms involved in homeostatic regulation of the body.
- Develop dissection techniques with awareness of infection control and safety.
- Understand the use of laboratory equipment and physiology data acquisition systems.
- Use critical thinking and scientific problem-solving (i.e., collecting, analyzing, and summarizing data) to make predictions, recommendations and decisions, both independently and cooperatively.

### **Grading Procedures**

- 3 Exams (*Exam 1*, Feb 21<sup>th</sup>; *Exam 2*, April 3<sup>rd</sup>; *Exam 3*, TBA) (40%)
- Mastering A&P – weekly Homework (10%)
- Group presentations (10%)
- In-class participation (case-studies, in-class activities and attendance) (10%)
- Laboratory (30%)

### **Weekly Homework**

Homework will be assigned at the end of each week. It will cover the learning goals and background information of the weekly topics discussed in class. The homework must be completed before the following class. **Note that the homework is available on canvas for the entire week, thus no make-up will be given for a missed homework.** In the case of an illness, a doctor's note will be accepted at the discretion of the course instructor.

### **In-class participation**

Class attendance is required. Class attendance will also help you master the course material. Active class participation, especially during the case study discussions, is very important and even though you might feel hesitant to raise your hand and speak, please do so; ask questions, answer questions, trigger discussions, share what you have been reading. Any course material relevant question is appropriate, so do not hesitate to ask. Remember that having an inquisitive mind is vital for science and learning. **Note that in-class participation is a combination of case-studies and in-class activities (8%) and attendance (2%)**

- **Case Study Discussions:** there will be at least three case study discussions. Each case study will be posted on Canvas before the in-class discussion. After reviewing the case study and related questions, the class will engage in a discussion with the instructor or TAs. Most of the case study's questions will be discussed in class, while others might be posted on canvas under the heading 'assignments'.
- **In-class activities:** at certain times, group activities will be held in-class. Students will be grouped and asked to answer questions related to the previous class lecture.

### **Group presentations**

At the end of the course groups of 4-5 students will be tasked with presenting a scientific review article about a physiology topic of your choosing (to be approved by the professor or TAs). The presentation will last approximately 10 minutes and should be clear and polished. Microsoft PowerPoint or similar programs (i.e. video) can be used to prepare visual aids. All members of each group are expected to participate in preparation and presentation. More information on the presentation will be provided later in the semester.



### **Course Materials**

- Textbook: Martini F., *Essentials of Anatomy & Physiology*, 8th edition, Pearson, 2020 (ISBN-13: 978-0135203804) with online Mastering A&P Enroll in the following Online MasteringA&P to complete the weekly posted assignments.
- Additional resources: Silverthorn, D. U., *Human Physiology*, 8e, Pearson, 2019

### **Grading Scheme:**

**ALL GRADES ARE COUNTED; NONE ARE DROPPED NOR ARE THEY CURVED.**

Grade	Range	
A	100%	to 93%
A-	<93%	to 90%
B+	<90%	to 87%
B	<87%	to 83%
B-	<83%	to 80%
C+	<80%	to 77%
C	<77%	to 73%
C-	<73%	to 70%
D+	< 70	to 67%
D	<67%	to 60%
F	<60%	to 0%

### **Academic Integrity**

#### **Undergraduate Honor System**

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 violations online at [www.stevens.edu/honor](http://www.stevens.edu/honor).

## **LEARNING ACCOMODATIONS**

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 in order 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 <https://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.

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, ethnicities, gender expressions and gender identities, religions, sexual orientations, 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

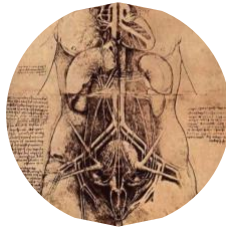
respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

**BIO382 Spring 2023 COURSE SCHEDULE** (the instructor reserves the right to modify the schedule as well as the deadlines as necessary to assure the course objectives are met or exceeded. The student will be promptly informed of any such change):

Week	Date	Lecture	Chapters
1	18-Jan	Introduction to Anatomy and Physiology	1
2	23-Jan	Cell-to-Cell Communication and The Tissue Level of Organization	4 and 6*
3	30-Jan	The Nervous System: Neurons, Electrically Excitable Tissues, Action Potentials	8 and 8*
4	6-Feb	The Muscular System: Muscle Contraction, Synaptic Transmission	7
5	13-Feb	Cardiovascular System: The Heart	11
6	20-Feb	Cardiovascular System: Blood vessels and Circulation (exam #1; 2/21)	12 and 15*
7	27-Feb	The Respiratory System	15
8	6-Mar	Gas Exchange and Transport	18*
13-Mar		<b>Spring Recess (12-18 March) - No Classes</b>	
9	20-Mar	The Urinary System: The Kidneys	18
10	27-Mar	The Urinary System: Fluid and Electrolyte Homeostasis	20*
11	3-Apr	The Endocrine System: Thyroid and Adrenal Glands (exam 2; 4/3)	10 and 23*
12	10-Apr	The Skeletal System (case study #3)	6
13	17-Apr	Gonads and The Reproductive System	19
14	24-Apr	The Digestive System: Digestion, Absorption (case study #3)	16
15	1-May	Students' presentation	<i>The end...</i>
<b>Final Exam (exam 3; TBA)</b>			



**\*these chapters are from the Silverthorn, D. U., Human Physiology, 8 Edition, Pearson; pdf copies will be posted on canvas in the apposite module.**



**BIO382 Laboratory**  
**Biological System Laboratory**  
Stevens Institute of Technology  
Spring 2023

**Instructor:** Prof. Paola DiMarzio

**Canvas Course Address:** <https://sit.instructure.com/courses/64877>

**Course Schedule:** Tuesday; 8-10:50 (LA) and 2-4:50pm (LB)

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

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

**For policies and general course informations see the main BIO382 syllabus**

**Teaching Assistants:**

Felicia Spadavecchia: [fspadave@stevens.edu](mailto:fspadave@stevens.edu)

Samira Twinkle: [stwinkle@stevens.edu](mailto:stwinkle@stevens.edu)

**Lab Course Description:**

This laboratory course discusses the fundamental concepts of human physiology, including the reproductive, neural, muscular, cardiovascular, respiratory, renal, endocrine, and sensory systems, using computer simulations. The laboratory sessions will familiarize the students with techniques such as the measurement and analysis of EKGs, as well as blood pressure and respiratory volumes and function.

**Objectives and Goals:**

- Explain essential anatomical and physiological concepts using appropriate terminology.
- Develop dissection and lab skills with awareness of infection control and safety.
- Collect and analyze physiological data using data-acquisition systems (i.e., EMG, EKGs, blood pressure, as well as respiratory volume)

**Learning Outcomes:**

**By the end of this course the student will have demonstrated the ability to:**

- Be familiar with physiological measurements and analysis such as, EMG, EKGs, blood pressure, and respiratory volumes.
- Understand and identify the different functions of the human body systems
- Use critical thinking and scientific problem-solving (i.e., collecting, analyzing, and summarizing data) to make predictions, recommendations and decisions.
- Communicate science content in both written and oral format.
- Ability to work in teams.



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

- Attendance (10%)
- Weekly Quizzes (30%)
- Lab Notebook (30%)
- Lab report (30%)

### **Grading Procedures**

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

**ALL GRADES ARE COUNTED; NONE ARE DROPPED NOR ARE THEY CURVED.**

**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; so, 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. The quiz will cover the learning goals and background information of the day's experiment. The quizzes must be completed before the following class. There will be approximately 13 quizzes.

### **Lab Report**

A lab report must be completed at the end of the course. Instructions on how to complete the lab report will be posted on canvas and the details discussed in class.

### **Lab Notebook**

A bound notebook is required to record everything conducted in the lab. Instructions on how to complete the lab notebook will be posted on canvas. Each lab experiment counts for 10 points.

### **In-class Participation - Attendance**

Active class participation including attendance is very important and even though you might feel hesitant to raise your hand and speak, please do so; ask questions, answer questions, trigger discussions, share what you have been reading. Any course material relevant question is appropriate, so do not hesitate to ask.

### **Course Materials and Other Requirements**

There is no lab manual for this course. Handouts and additional didactic material will be provided.

This laboratory course will follow the readings associated with the BIO382 lecture course as much as possible (Silverthorn, D. U., Human Physiology, 8e, Pearson, 2019).

A laboratory notebook is required. The laboratory notebook is a documented, and primary record of laboratory observations.

**A lab notebook, safety goggles, and a lab coat are mandatory.**

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



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

Week	Date	Lab Activity
1	24-Jan	Lab Safety and Tissue Level of Organization (Epithelial and Connective Tissue such as, Areolar, Adipose, Blood)
2	31-Jan	Lab Safety and Tissue Level of Organization (Muscle, Nervous, and Connective Tissue such as Cartilage, Tendons, and Bone Tissue)
3	7-Feb	Brain and Eye Dissection
4	14-Feb	BIOPAC Recording of EMG; Skeletal Muscle
5	21-Feb	Heart Dissection; Heart Sounds
6	28-Feb	BIOPAC-Recording of EKG
7	7-Mar	Measure of Blood Pressure and Exercise Physiology ( <u>Lab Notebook Submission</u> )
<b>Spring Recess - No Classes: 12-18 March</b>		
8	21-Mar	Respiratory System: Mechanics of Ventilation
9	28-Mar	Kidney dissection and Urinalysis
10	4-Apr	The Science of Opioid Dependence: part I-III; 1) designing a research study to find genetic links to opioid dependence; 2) conducting the research study)
11	11-Apr	The Science of Opioid Dependence: part IV; 3) analyzing data and making a claim; 4) calculate allele frequencies and analyze <i>p</i> -values
12	18-Apr	<i>Research animal model: Caenorhabditis elegans</i> : part I (observation of wild type vs. mutant pops)
13	25-Apr	<i>Research animal model: Caenorhabditis elegans</i> : part II (chemotaxis experiment)
14	2-May	Porcine Dissection ( <u>Lab Report and Lab Notebook Submissions</u> )