

BIOLOGY 14: PHYSIOLOGY WINTER 2021

Instructor: Robert Hill, Ph.D. robert.hill@dartmouth.edu
Slack Channel: dart-prd-lti-44605.slack.com
Class Meetings: Online via Zoom, Tuesday and Thursday from 10:20-11:10 AM OR 11:15-12:05 PM
Office Hours: Online via Zoom, Wednesdays 10:00-11:00 AM, Fridays 4:00-5:00 PM

Lab Director: Nicolas Sylvain, Ph.D. nicolas.r.sylvain@dartmouth.edu

Teaching Assistants: Nawat Bunnag nawat.bunnag.gr@dartmouth.edu
Madeleine Grau madeleine.s.grau.gr@dartmouth.edu
Xin Li xin.li-2.gr@dartmouth.edu
Genaro Olveda genaro.e.olveda.gr@dartmouth.edu

Teaching Science Fellow: Victoria Nedder victoria.joanna.nedder@dartmouth.edu

COURSE DESCRIPTION

This course focuses on the structure and function of cells, tissues, organs, and organ systems, and how combinations of these generate homeostatic mechanisms and adaptive responses that allow organisms to survive environmental changes. It will cover topics in human, animal, and plant physiology, often using a comparative approach and will also include select examples of pathophysiology. Topics include mechanisms underlying biological control (hormones, neurons) and coordinated body functions (reproduction, circulation, respiration, osmoregulation, digestion). The systems studied will also be considered on an integrative level, by analyzing how different organisms adapt to environmental demands and stresses (changes in ion and water balance, temperature, oxygen levels, pressure) and move through their environment (navigation, locomotion, exercise). Lectures are supplemented by lab sessions that include dissection, experimentation, and discussion of primary research articles, and serve as an introduction to physiological techniques, animal models, and scientific investigation.

LEARNING OUTCOMES

By the end of this course, students should be able to:

- 1) Demonstrate a fundamental understanding of how the human body works and how we are similar and different from other organisms.
- 2) Apply this knowledge to make logical inferences about pathological conditions or adaptations in humans and other organisms.
- 3) Describe how the scientific method is used to gain physiological knowledge, including the roles of hypotheses, predictions, experimental design, and statistical analyses.
- 4) Design and execute physiological experiments and communicate the results in a scientific report.
- 5) Critically read and evaluate the primary literature in the field of physiology and discuss this literature with peers and other scholars.

LECTURES AND CLASS MEETINGS

Lectures will be provided as videos to be watched at home prior to class meetings. Lecture videos, PowerPoint slides, worksheets and the Zoom link and password for class meetings will be made available on the course Canvas website. For the first lecture and class meeting on Thursday, January 7, the entire class will meet at 10:20 AM via Zoom. Starting Monday January 12th, half the class will attend class meetings 10:20-11:10 AM and the other half of the class will attend class meetings from 11:15 AM-12:05 PM. Class meetings will be used to review lecture material and participate in group activities (usually in the form of worksheets). Lab sessions are synchronous, and students are required to attend a lab session at a specific time once per week during most weeks of the course. See the class schedule and lab syllabus for details.

COURSE MATERIALS / RESOURCES

There is no required textbook for the course. All the materials needed will be provided on the Canvas website. This includes lecture videos, PowerPoint slides of the lectures, worksheets and all lab materials. If you would like a textbook to supplement the lecture material, we recommend Principles of Animal Physiology by Christopher D. Moyes and Patricia M. Schulte, Pearson Benjamin Cummings, 3rd edition, 2016.

EVALUATION

Four quizzes worth 18.75% each will account for 75% of the overall grade. Quizzes will be held on Mondays during the term and the final quiz will be held during the final exam period (see class schedule). Quizzes will cover material from lectures, worksheets and labs. Quizzes will be taken through the Canvas website. Each quiz will be 1.5 hours in length. You may take the quiz anytime between 8:00 AM – 8:00 PM Eastern Time on the day of the quiz, but once you start the quiz, you must complete it in 1.5 hours. You must start the quiz before 6:30 PM Eastern Time to have the full time for the quiz. Unless students have made alternative arrangements with Prof. Hill prior to the start of the quiz, students who do not take the quiz during the schedule time will receive a quiz grade of zero. To maintain fairness to all students in the course, accommodations for taking a quiz at a different time will only be made in emergency situations, such as serious illness or family crises. The lab grade will be determined by quizzes, short answer assignments, discussions and lab reports. Please see the lab syllabus for the breakdown of grades for the lab section. Altogether, the lab activities account for 25% of the final grade. Any requests to re-evaluate the points assigned to quiz questions, lab assignments or lab reports must be submitted within one week of receiving the results of the quiz, assignment or lab report. Requests to change grades will not be accepted more than a week after receiving the grade. A clear written explanation of why the question, assignment or lab report should receive additional points must be provided. Quiz questions should be submitted by email to Prof. Hill. Lab grade questions should be submitted by email to Dr. Sylvain. Grades will be determined by the percentage of the total points possible. While 90% or above will be A or A- and more than 60% will be required to pass the course, the grades associated with the remainder of the scores may be adjusted slightly depending upon the distribution of the class. Typical (but not necessarily final) percentages and corresponding grades are: ≥ 93 (A); 90-92 (A-); 87-89 (B+); 83-86 (B); 80-82 (B-); 77-79 (C+); 70-76 (C); 66-69 (C-); 61-65 (D); ≤ 60 (E).

HONOR PRINCIPLE

During this course, it is expected that students will abide by the Honor Principle. The Dartmouth College Student Handbook (page iii) states "Fundamental to the principle of independent learning are the requirements of honesty and integrity in the performance of academic assignments, both in the classroom and outside. Dartmouth operates on the principle of academic honor, without proctoring of examinations. Students who submit work which is not their own or who commit other acts of academic dishonesty forfeit the opportunity to continue at Dartmouth." If you have any questions or concerns regarding this during the course, please contact Prof. Hill. Honor Principle: <http://student-affairs.dartmouth.edu/policy/academic-honor-principle>.

STUDENTS WITH DISABILITIES

Students with disabilities, including invisible disabilities such as chronic illnesses and learning disabilities are encouraged to arrange for accommodations that might be helpful. Please contact Prof. Hill privately as soon as possible, preferably during the 1st week of class, to discuss possible accommodations. In particular, students requiring disability-related academic adjustments and services must consult the Student Accessibility Services (SAS) office (Carson Hall, Suite 125, 646-9900). SAS Office: <http://www.dartmouth.edu/~accessibility/facstaff/index.html>

STUDENT WELLNESS

The academic environment at Dartmouth can be challenging, the terms can be intensive, and classes are sometimes not the only demanding part of your life. There are a number of resources available on campus to support your wellness, and you are encouraged to use these resources and take care of yourself throughout the term. These resources include: Undergraduate Deans: <http://www.dartmouth.edu/~upperde/>, Counseling and Human Development: <http://www.dartmouth.edu/~chd/>, Student Wellness Center: <http://www.dartmouth.edu/~healthed/>

At Dartmouth, we value integrity, responsibility, and respect for the rights and interests of others, all central to our Principles of Community. We are dedicated to establishing and maintaining a safe and inclusive campus where all have equal access to the educational and employment opportunities Dartmouth offers. We strive to promote an environment of sexual respect,

safety, and well-being. In its policies and standards, Dartmouth demonstrates unequivocally that sexual assault, gender-based harassment, domestic violence, dating violence, and stalking are not tolerated in our community.

The Sexual Respect Website (<https://sexual-respect.dartmouth.edu/>) provides a wealth of information on your rights and obligations with regard to sexual respect and resources that are available to all in our community. As a faculty member, we are obligated to share disclosures regarding conduct under Title IX with Dartmouth's Title IX Coordinator. Should you have any questions, please feel free to contact Dartmouth's Title IX Coordinator Kristi Clemens (Kristi.Clemens@Dartmouth.edu)

STUDENTS' RELIGIOUS OBSERVANCES

Some students may wish to take part in religious observances that occur during the academic term. If you have a religious observance that conflicts with your participation in the course, please contact Prof. Hill as soon as possible to discuss appropriate accommodations. All discussions will be confidential.

LABORATORIES

There are six labs during the term. See the class schedule for the weeks during which labs are held. Labs will be conducted via zoom and are scheduled for 3 hours. Students are required to attend their assigned lab during the scheduled time. Switching lab sections will not be allowed once labs are assigned. Please see the lab syllabus, the Canvas website and individual lab instructions for detailed descriptions of each laboratory.

CLASS SCHEDULE

DATE	TOPIC
<hr/>	
Week 1	NO LAB
Thu 1/7	Lecture 1: Course Intro / Molecules and Cells
<hr/>	
Week 2	Lab 1: Neurobiology 1
Thu 1/12	Lecture 2: Nervous System 1
Thu 1/14	Lecture 3: Nervous System 2
<hr/>	
Week 3	Lab 2: Neurobiology 2
Tue 1/19	Lecture 4: Nervous System 3
Thu 1/21	Lecture 5: Endocrine System
<hr/>	
Week 4	NO LAB
Mon 1/25	QUIZ 1
Tue 1/26	Lecture 6: Muscle
Thu 1/28	Lecture 7: Locomotion / Exercise
<hr/>	
Week 5	Lab 3: Cardiovascular Anatomy and Function
Tue 2/2	Lecture 8: Cardiovascular 1
Thu 2/4	Lecture 9: Cardiovascular 2
<hr/>	
Week 6	Lab 4: Cardiopulmonary Anatomy and Function
Mon 2/8	QUIZ 2
Tue 2/9	Lecture 10: Respiratory
Thu 2/11	Lecture 11: Low O ₂
<hr/>	
Week 7	NO LAB
Tue 2/16	Lecture 12: Gastrointestinal system 1
Thu 2/18	Lecture 13: Gastrointestinal system 2
<hr/>	
Week 8	Lab 5: GI function
Mon 2/22	QUIZ 3
Tue 2/23	Lecture 14: Ion and water balance
Thu 2/25	Lecture 15: Plant physiology
<hr/>	
Week 9	Lab 6: Renal function
Tue 3/2	Lecture 16: Reproduction
Thu 3/4	Lecture 17: Immune
<hr/>	
Week 10	NO LAB
Tue 3/9	Lecture 18: Thermoregulation
<hr/>	
Tue 3/16	QUIZ 4
<hr/>	