Biol26a: Plant Biology Syllabus
Summer 2020
Professor: Melissa Kosinski-Collins, SSC 016A, kosinski@brandeis.edu
Office Hours: By appointment 9 am-4 pm EST, Monday-Friday

Course Dates: Monday, June 1, 2019- Sunday, August 9, 2019

Summary

This 10-week online course is designed for students who have taken Bio14 and/or Bio15 (or have permission of the instructor) and are interested in learning the fundamentals of plant biology. The course is intended for students who are familiar with central dogma, structure-function relationship and genetic inheritance, but have not yet applied those concepts in plant systems. We will adopt a molecular and chemical approach as we explore various concepts in plant biology including plant metabolism, structure-function, development, genetics, pathology and taxonomy. The course will be composed of 10, 1-week modules.

Prerequisite: Biol14 and/or Biol15 or permission of the instructor

Learning Objectives

After completion of this course students should be able to:

- Articulate the main biochemical and cellular features that characterize plants.
- Describe the general metabolic processes inherent to plant cells.
- Describe the basic steps of reproduction/development and demonstrate conceptual understanding of plant heredity as it relates to evolution
- Classify and identify plant structures.
- Describe several advances in plant biotechnology and agricultural practices and their impact on society.

Course Format

This course will take place completely online using Latte (Brandeis' learning management system) available at *http://latte.brandeis.edu* . The site contains all course materials and mechanisms for discussion, assignment submission and review of grades and feedback.

This course will consist of 9, one-week modules. The class will consist of mini-lectures, readings, forums, hands-on activities/virtual labs, case studies, and discussions. The course is designed to require an average of 16 hours of non-synchronous course-work hours per week. You may work ahead, but to maintain a cohort among the class, you are required to participate in the forum and peer review process at the same time as your peers.

To facilitate consistency throughout the course, we will adhere to the same weekly set-up for assignment due dates. All assignments are due at 11:59 pm EST. Our course week will start on Monday and end on Sunday of the following week.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Suggested work	• Watch Week's introductory lecture • Course content	• Course content • Reading • Assignment for final project	• Course content • Complete Reading • Assignment for final project	• Complete Assignment for final project • Course content	• Course content	• Course content	• Complete course content
Assignment Due			• Post to forum	• Final project exercise due	• Respond to forum posts from at least two other students	• Peer review of another student's final project exercise	• Final lab, assignment or case study due

Each week, you are expected to:

- Watch weekly introductory course video (~15 minutes, not graded)
- Watch, read and explore the background course content (~3 hours, not graded)
- Complete a lab report or case study based on course content (~4 hours, graded)
- Read a peer-reviewed, scientific paper based on the weekly course content (~2 hours, non-graded)
- Post answers, questions and reflections to the course forum based on the reading (~1 hour, graded)
- Respond to a minimum of 2 forum posts provided by classmates per week (~1 hour, graded)
- Read, research, and complete an exercise relating to your final research project (~5 hours, graded)
- Review another student's final project exercise (~1 hour, graded)

If you have a documented learning disability and would like to have an accommodation made in taking this class, please inform the professor immediately.

Required supplies:

Textbook: There is no required textbook for this course. Required course material and reading will be posted on the course website. It may be beneficial to have any introductory biology textbook available as a background reference text if needed. Supplementary reading will be assigned from OpenStax Biology.

Required Software: Google docs and/or Microsoft office, a microscope app for your phone/computer/tablet (i.e. ioLight Microscope), a device capable of taking digital pictures (tablet/phone/camera)

Required Supplies: Periodically, you will be performing laboratories on your own. The following supplies will be required: Week 2: Leaves/cuttings from 3 different plants; Week 7: 10 different fruits; Week 7: 5 different flowers; Week 7 Seeds from 10 different fruits

Recommended supplies: A headset or headphones with microphone

Grading

Your grade for the course will be determined by your scores on participation in the course forum, a weekly lab or case study assignment, a weekly written assignment leading toward your final project and a final written project which you must present virtually to your classmates.

1. *Weekly lab, assignment or case study:* Your weekly assignments will constitute 45% of your grade.

   Your weekly assignment will consist of completed pre and post lab assignments or case studies due each Monday of the course. Completed, uploaded PDF answers to these assessments will each be worth 5% constituting a total of 45% of your final grade. You should expect each of these assignments to take you approximately 3-5 hours to complete.

2. *Final Project:* Your final project will be 45% of your grade.

   Your final project is broken into several smaller assignments. You will receive feedback from the course instructor and your peers on each of these seven assignments and each will be worth 2% for a total of 14% of your final grade. The feedback you provide to your peers will constitute and addition 6% of your final grade. You will have an opportunity to rework these assignments before incorporating them into your final project.

   Your final project will have both a written component and oral presentation component. The oral presentation is worth 10% while the written document is worth 10% of your score. Your responses to the proposals of your classmates will be worth 5% of your score.

3. *Forum Posts and Responses*: The forum posts and responses will be worth 10% of your final grade.

   Because part of your grade is based on participation, you are required to watch and participate in all lectures, labs and discussions. Failure to complete labs, case study, paper discussions, etc. on time will result in a loss of credit for that assignment.

Late Policy

While it is understood that as working adults with professional, academic, and personal responsibilities that you may encounter an unexpected interruption requiring you to be temporarily delayed in meeting a deadline as outlined in this syllabus, we ask that you make every attempt to meet all due dates as this course is only ten weeks in duration. Late assignments will not be accepted as they disrupt the progression of the course. Your full, timely participation not only ensures that you reap the full benefits of this experience, but that your peers benefit from your engagement and feedback as well.

Confidentiality Statement

We can draw on the wealth of examples from our professional and/or teaching experiences during weekly discussions and in our written work. However, it is imperative that we not share information that is confidential, personal, sensitive, privileged, or proprietary in nature. In addition, we should respect our peers and work under the assumption that what is discussed here stays within the confines of the online classroom.

For your awareness, members of the University's technical staff have access to all course sites to aid in course setup and technical troubleshooting. Rabb School administrative staff have access to all courses for oversight purposes. Participants enrolled in these training courses can expect that individuals other than their fellow classmates and the facilitator(s) may visit their course for various purposes. Their intentions are to aid in technical troubleshooting and to ensure that quality course delivery standards are met. Strict confidentiality of student information is maintained.

Academic Integrity

Conduct inconsistent with the policies on academic honesty in "Rights and Responsibilities" will be treated seriously. All case studies, forum submissions, homework assignments, laboratory write-ups and written documents should be completed independently by the enrolled student. All completed assignments will be submitted to Turnitin for originality comparison. Depending on the severity of the infraction, students violating the course honor code will receive a non-droppable zero on the assignment and/or failing grade in the course.

Syllabus Schedule:

DATE/ Week	Topic	Learning Outcome	Assignment **1. Weekly Lab/Case study/Assignment** **2. Reading/Forum post** **3. Final Project Assignment**
Week 1 June 1-June 7	**Introduction to course and scientific literacy** 1. Digital and informational literacy	• Define criteria to assess the validity of scientific sources • Navigate and access information from GALE Global Issues In Context • List and evaluate at least 4 different types of information sources accessible from the internet • Articulate and defend an opinion on the use of GMO crops	1. Digital literacy Project 2. Introduction of yourself 3. Policy Selection
Week 2 June 8-June 14	**Introduction to plants** 1. Plant domestication 2. Annual versus perennial plants 3. Taxonomy 4. Plant identification	• Identify potential pitfalls in plant domestication • Describe challenges faced by botanists • Define taxonomy as it relates to plant systems • Classify and categorize local flora using GoBotany	1. Laboratory 1 2. "Wild Plants to the Rescue" 3. Annotated Bibliography
Week 3 June 15-June 21	**Plant Cell Structures** 1. Cell wall 2. Membranes organization 3. Plastids 4. Organelles	• Identify structures found in plant cells • Discuss the differences between plant and animal cells • Define osmosis and describe how it impacts plant cell structures	1. Laboratory 2 2. "The Puzzle of Plastid Evolution" 3. Abstract
Week 4 June 22-June 28	**Plant Metabolism** 1. Respiration 2. Photosynthesis 3. C3 and C4 plants	• Define and describe the different structures and molecules of the cell responsible for photosynthesis. • Compare the process of photosynthesis to the process of respiration at both the cellular and molecular level. • Discuss photosynthesis data collected in a virtual experiment by writing an abstract. • Design an experiment to assess the efficiency of various chlorophylls in producing ATP.	1. Photosynthesis Case Study 2. "Tropical Rainforest Carbon Sink declines during El Nino…" 3. Scientific Context of Policy
Week 5 June 29-July 5	**Plant Cells, Tissues and Organs** 1. Collenchymal 2. Mesenchymal 3. Parenchymal 4. Protective tissue 5. Meristem	• Define and describe the different structures and tissues found in plants. • Hypothesize about the possible controls on plant life span.	1. Lab 3 2. "Single-cell telomere length quantification couples telomere length…" 3. Public Opinion of Policy
Week 6 July 6-July 12	**Vascular Tissue** 1. Xylem	• Define and describe the different structures and tissues found in plants.	1. News and Views on Vascular Wilt 2. "Drought impact phloem transport"

	2. Phloem 3. Vascular tissue	• Compare the function and mechanism of control in xylem and phloem. • Defend the relevance of vascular tissue in disease by researching vascular wilt disease.	3. Ongoing research of policy
Week 7 July 13-July 19	**Flower, Fruits and Seeds** 1. Flower structures 2. Fruits structures 3. Seed Structures	• Define and describe the different structures and tissues found in flowers, fruits and seeds. • Compare and contrast the reproductive value of flowers, fruits and seeds.	1. Lab 5 2. Looks matter, changes in flower form affect pollination effectiveness…" 3. Policy recommendation
Week 8 July 20-July 26	**Plant Reproduction** 1. Angiosperms 2. Gymnosperms 3. Monocots vs. dicots 4. Spores 5. Gametogenesis	• Define and describe the different structures involved in reproduction and development. • Compare and contrast the reproductive strategies used in angiosperms and gymnosperms.	1. Op/ed fittest evolutionary strategy between gymnosperms and angiosperms 2. "Evolutionary consequences of self-fertilization in plants" 3. Aggregate report
Week 9 July 22-August 2	**Plant Ecology and Symbiosis** 1. Plant domestication 2. Host relationships 3. Parasites and pathogens	• Define and describe how plants are used in modern agricultural practices • Define relationships in plants • Compare and contrast relationships with respect to plant outcome with bacteria, fungus and other organisms	1. Case study on fungus 2. "The plant Microbiome at Work" 3. Oral Presentation
Week 10 August 3-August 9	**Plants Extinction and Policy Critique**	• Consider the extinction rate of angiosperms • Consider the extinction rate of gymnosperms • Hypothesize on the survival mechanism for endangered species This is our last week of class. Please complete your classmate critique by 9 am on August 8.	1. New and Views on species loss 2. "World's largest plant survey" 3. Critique of classmates' policy