IDS 2935 WHAT ARE PLANTS TALKING ABOUT?

Quest 2

I. Course Information

Spring 2022

Meeting Day/Time: T10:40 AM – 11:30 AM, R10:40 AM – 12:35 PM

Location: Weimer Hall (WEIM) room: 1076 (Tuesdays), Mechanical & Aerospace Eng B (MAEB) room 0229 (Thursdays)

Primary General Education Verbatim Statement: Biological Sciences (B)

Biological science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the life sciences. Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern biological systems. Students will formulate empirically-testable hypotheses derived from the study of living things, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.

Writing Designation (if seeking): No writing designation

A minimum grade of C is required to earn general education credit. More information on grades and grading policies can be found here: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Instructor Information

- Samuel Martins – sj.martins@ufl.edu
- Office: 2413 Fifield Hall; Box 110680
- Office hours: Friday, 3:00 – 5:00 PM. Emailing for an appointment will ensure that there will be no waiting time.
- Phone: (352) 273-4649

Teaching Assistant Information (TBA)

- Beatriz Franceschi – beatrizdetoledof@ufl.edu
- Office location: Fifield Hall
- Office hours: TBA (and by appointment)

Course Description

Plants are essential for the survival of the majority of life forms on Earth as they provide us oxygen, wood, food, fiber, medicine and other resources. In the movie *The Martian*, one of the first approaches that Matt Damon took on the new planet was to engineer a way to grow potatoes to survive on the hostile planet.

We have on Earth a vast diversity of eatable plant species, but yet less than 0.1% are actually consumed. Plants have been inhabiting this planet for hundreds of millions of years, and we humans have been interacting with plants for hundreds of years. Even though it seems a long time, we don't yet fully understand plants, despite the discoveries made in the plant science field over the years. Due to our ignorance, our society still faces issues, such as hunger and malnutrition, desertification, soil erosion, pests and plant diseases. Frequently emerging pathogens and pests are threatening our plants, killing trees and reducing crop yields. Are plants crying out for help and we can't hear? Do plants talk? Do plants get sick? Do plants remember? Do plants feel? These and other intriguing and scientifically pressing questions will be addressed in this course through the lenses of how we can better understand plants and what we can do to mitigate issues associated with plant mistreatment. Once we better understand plants, we will have a better place to live and preserve our resources for the present and future generations. This is a multi-disciplinary course within plant science and addresses topics about plant physiology, plant pathology, entomology, and microbiology.

Required & Recommended Course Materials (to purchase/rent)

What a Plant Knows: A Field Guide to the Senses by Daniel Chamovitz (2012). Additional readings will be distributed in class or added on the course site in Canvas.

II. Coursework & Schedule

There will be 11 quizzes, 2 tests (two-stages), 1 experiential learning assignment, 2 group assignments, 1 self-reflection and multiple participation opportunities, such as answering and making questions, replying to online polls, providing feedback, etc. The grading scale is built on a point-based system, with "extra credit" points built in.

There will be 2 two-stage tests: one mid-term and one non-comprehensive final. The test questions will be 50% compiled from the questions the students created for the quizzes and the remaining 50% will be new questions created by the instructors. Students will complete an individual copy of the exam questions alone first, which will account for 70% of their test grade. Then, students will work together in small groups (3-4 people) to answer the same exam questions – each group will submit one set of answers that they will collaborate and agree on and everyone in each group will receive the same score, which accounts for 30% of the grade.

1. List of Graded Work

Assignment	Description	Requirements	Points
Quizzes	11 quizzes at 3 points each (total=33)	The 3 lowest grades will be dropped	24
Test 1	Will cover the first half of the course material		13
Test 2	Non-cumulative		13
Experiential Learning	Searching for Signs of Plant Interactions		10
Group Assignment I	Tests on Plant Senses Using the Scientific Method		10
Group Assignment II	Plants Can Save the World!		10
Self-reflection	Genetically modified food: Pros vs Cons		10
Participation	See Rubric for More Details		10
*__Total points__			**100**

*A satisfactory grade will be earned with the equivalent of a "C-" grade or better (70-100 points).

2. Weekly Course Schedule

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
Week 1 Jan 6	Topic	Introductions Course Overview	
	Summary	This first week you will get to know me (instructor and the TA) and your classmates and become familiar with the course structure.	
	Readings/Works	Course Syllabus	
	Assignment	Think-Pair-Share	
Week 2 Jan 11 - 13	Topic	Why Do Plants Matter? Are Plants Aware? Organic Molecules The Plant Cell Structure	
	Summary	In this week we will discuss the importance of plants to our planet and learn how plants are acutely aware of the world around them. We will also identify the types of organic molecules, their structural components and functions, which will help us to understand the signaling molecules that plants use to interact with their surroundings. We will explore inside of a plant cell and understand the cell components and their functions.	
	Readings/Works	Why Humans Couldn't Exist Without Plants (1 page) Epilogue: The Aware Plant (from page 135 to 141). Charmovitz D, 2012. Plants turn caterpillars into cannibals (2 pages) Plant Cell Structure (2 pages)	
	Assignment	Quiz 1; Online poll	
Week 3 Jan 18 - 20	Topic	What is the Scientific Method? The Plant Structure	Form groups for Group Assignment II

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
		Plant Signaling Molecules	and assign the topics
	Summary	In this week we will begin to talk about the steps of the scientific method. We will also explore plant morphological features and study aspects of plant physiology related to the plant signaling molecules, such as plant hormones and volatiles, which plants use to communicate.	
	Readings/Works	Plants and Their Structures (4 pages) Science at FMNH - Early Land Plants (5:35 min video)	
	Assignment	Quiz 2; Online poll	
Week 4 Jan 25 - 27	Topic	Scientific Method: Step 1: Observation/Question (Guest Lecture: Suzanne Stapleton) Mutations: The Raw Material for New Features Environmental Pressure and Life Selection Plants	
	Summary	In this week we will talk about the first step of the scientific method: observation and question. We will also discuss the impact of mutations and environmental pressures on creating different types of cells, organisms, and populations, ranging for example from photosynthetic to carnivorous plants.	
	Readings/Works	How are gene mutations involved in evolution? (1 page) Are Giant Sequoia Trees Succumbing to Drought? (10 pages)	
	Assignment	Quiz 3; Online poll	
Week 5 Feb 1 - 3	Topic	Scientific Method: Step 2: Hypothesis Do Plants See? Do Plants Smell?	Form groups for Group Assignment I and assign the topics

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
	Summary	In this week we will talk about the second step of the scientific method, hypothesis. We will also start talking about plant senses and will start with sight and smell. We will discuss ways that plants communicate with one another and with other organisms from different kingdoms.	
	Readings/Works	What a Plant Sees (pages 9 to 26). Chapter 1, Charmovitz D, 2012. What a Plant Smells (pages 27 to 48). Chapter 2, Charmovitz D, 2012. Climate Change May Make Plants More Fragrant (2 pages)	
	Assignment	Quiz 4	
Week 6 Feb 8 - 10	Topic	Scientific Method: Step 3: Experiment Do Plants Feel? Do Plants Remember?	
	Summary	In this week we will talk about the next step of the scientific method, experiment. We will also continue to talk about plant senses and will cover the sense of touch and explain the ways that plants can remember by responding differently to the same event that happened in the past.	
	Readings/Works	What a Plant Feels (pages 49 to 70). Chapter 3, Charmovitz D, 2012. What a Plant Remembers (pages 113 to 134). Chapter 6, Charmovitz D, 2012. Plants Can Sense Animal Attacks Coming (2:34 min audio) Do Plants Think? (3 pages)	
	Assignment	Quiz 5; Online poll	
Week 7 Feb 15 - 17	Topic	Scientific Method: Step 4: Data Analysis Do Plants Hear? Proprioception: The Plant's 6th Sense	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
	Summary	In this week we will talk about the next step of the scientific method, data analysis, and discuss ways to present results. We will also look at plants' sense of hearing and learn how plants know where things are. We will examine the plant's response to gravity and look at some examples such as the sunflower, which daily responds to the sunlight.	
	Readings/Works	What a Plant Hears (pages 71 to 90). Chapter 4, Charmovitz D, 2012. How Does a Plant Know Where It Is? (pages 91 to 113). Chapter 6, Charmovitz D, 2012. Plants May Let Out Ultrasonic Squeals When Stressed (2 pages)	
	Assignment	Quiz 6; Online poll	
Week 8 Feb 22 - 24	Topic	Scientific Method: Step 5: Report/Conclusion	Test 1
	Summary	In this week we will talk about the final step of the scientific method, report and conclusion. We will do the first test for the first half of the course this week.	
	Readings/Works	Tiny Microbes, Big Yields: Enhancing Food Crop Production With Biological Solutions (3 pages)	
	Assignment	Kahoot; Test 1	
Week 9 Mar 1 - 3	Topic	The Good Interactions: Do Plants Cooperate Among Themselves? Plant Interactions with Other Organisms: Plants and Beneficial Microbes The Bad Interactions: Plant Diseases & Weeds	Submit Experiential Learning: Searching for Signs of Plant Interactions
	Summary	Now that we have seen the plant senses, we will explore plants' interactions with the world around them. In this week we will see examples of good interactions and bad interactions. We will look at the relationship between plants and beneficial microbes, such as bacteria and fungi, as well as virus. We will explain where these microbials and virus are	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
		found in the plant and what the benefits are of having them around. We will also see ways that plants cooperate with their neighbors. We also will talk about diseases and weeds, which are part of the bad interactions, which come with a cost for the plant. We will talk about how plants compete with each other for space, nutrients, and water and sometimes with parasite plants as well.	
	Readings/Works	The Plant Disease Doughnut, a Simple Graphic to Explain What is Disease and What is a Pathogen (2 pages) What are Weeds and Why do we Care? (2 pages) Hungry Planet: Stories of Plant Diseases (3 pages)	
	Assignment	Quiz 7	
Week 10 Mar 15 - 17	Topic	The Bad Interactions: Pests (Guest Lecture: Morgan Byron) Student Presentations for Group Assignment I: Tests on Plant Senses Using the Scientific Method	Present Group Assignment I
	Summary	In this week we will finalize the bad interactions talking about pests. We will also discuss the impacts that the development of agriculture has had on human populations. Students will present their assignment I.	
	Readings/Works	Where Did Agriculture Begin? Oh Boy, It's Complicated (2 pages) Monoculture Farming in Agriculture Industry (7 pages)	
	Assignment	Quiz 8	
Week 11 Mar 22 - 24	Topic	Plant Domestication: The Issue of the Large-Scale Monoculture Plants and the Carbon Cycle Plants and Soil Health (Guest Lecture)	Group Assignment II: Plants Can Save the World! (written part)

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
	Summary	In this week we will discuss the benefits that modern agricultural systems have brought us (eg. increase in population), together with ecologically destructive impacts and other challenges that we currently face when dealing with plants in food production. We will talk about the impact of agriculture on native (forest) and crop plants, such as the impact of deforestation on sequestering carbon by plants. We will also go over the factors that make up healthy soil, which will help to grow healthier and stronger plants.	
	Readings/Works	Can Trees Save Us from Climate Change? (1:19 min audio) Healthy soil is the foundation of productive, sustainable agriculture (1 page & 2 min videos) NASA Satellites Watch Earth 'Breathe' in Awesome Time-Lapse Video (5:03 min video)	
	Assignment	Quiz 9; Online poll	
Week 12 Mar 29 - 31	Topic	Student Presentations for Group Assignment II: Plants Can Save the World!	Group Assignment II: Plants Can Save the World! Presentations
	Summary	In this week students will present in groups (15 min each presentation) about a solution to a current problem through the use of a plant.	
	Readings/Works	No Readings This Week	
	Assignment	Quiz 10	
Week 13 Apr 5 - 7	Topic	Plants and Pesticides Plants, GMOs, and Food Security CRISPR and Agriculture (Guest Lecture)	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
	Summary	In this week we will explore and debate on the use of biotechnological approaches used in agriculture, such as genetically modified organisms (GMOs) and clusters of regularly interspaced short palindromic repeats (CRISPR). Are they friends or foes? We will also discuss the impact that pesticides have had on agriculture.	
	Readings/Works	GMOs – Top 3 Pros and Cons (2 pages) Potential Health Effects of Pesticides (5 pages) These Charts Show Every Genetically Modified Food People Already Eat in the U.S. (4 pages) The Food of the Future (51:44 min video) CRISPR in Agriculture: An Era of Food Evolution (6 pages)	
	Assignment	Quiz 11, Debate	
Week 14 Apr 12 - 14	Topic	Biofortification: Fighting the "Hidden Hunger" (Guest Lecture) Growing and Managing Plants with AI (Guest Lecture)	
	Summary	In this week we will discuss the role of biofortification in bringing food with more nutritional value home and the impact of the "hidden hunger," or micronutrient deficiency, on the human population. We will end the week talking about how artificial intelligence has transformed the way we grow and manage plants.	
	Readings/Works	Biofortification: It All Starts with A Seed (2:42 min video) The Futuristic Farms That Will Feed the World (6:19 min video) Agriculture's Improving Image: Drones, satellites & data analysis drive a new agricultural revolution (2 pages)	
	Assignment	Quiz 12, Self-Reflection Assignment Due	Self-Reflection
Week 15	Topic	Are Plants Crying out for Help?	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
Apr 19 (Tue)			
	Summary	In this final week we will go over the journey we have been on from the first plants that showed up on Earth, their evolution process, and discuss what we learned about plants' senses. We will identify the benefits and issues that the advent of agriculture brought us as well as the new technologies currently being used to mitigate the challenges we face while growing plants. We will discuss the evidence that plants have showed us that we need to change the course of our actions in order to preserve our planet.	
	Readings/Works	New Research On Plant Intelligence May Forever Change How You Think About Plants (23:48 min audio) When plants cry out for help, their neighbors start screaming, too (2 pages)	
Apr 16 (Thurs)	Assignment	Test 2	
	Final (Review Test II		

III. Grading

1. Statement on Attendance and Participation

Attendance and Participation:

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

- Participation: Consistent informed, thoughtful, and considerate class participation is expected and will be evaluated using the rubric below. The instructor will inform you of your participation grade to date when we reach the mid-term exam. The instructor and/or TA will keep track of your participation during the class every time that you engage in one of the participation categories listed in the table below. The 70% and 30% participation levels will be determined based in the total points possible (High Quality level = 100%) in each category.

Participation Grading Rubric:

Participation Activity	High Quality (100%)	Average (70%)	Needs Improvement (30%)
Jigsaw activity during class	Participating in all the Jigsaw activities, except 1 (=3 points)	Participating in 70% of the Jigsaw activities (=2.5 points)	Participating in less than 70% of the Jigsaw activities (=2 points)
Ask or Answer Questions, Make Comments, Other Activities	Being at top 70% of the group (=3 points)	Being between the 70% and 40% of the group (=2.5 points)	Being below 40% (= 2 points)
Provide class feedback on paper at the end of each class	Provide feedback at the end of each class on paper. You can miss 2. (=2 points)	Provide 70% of the total feedback (=1.5 points)	Provide less than 70% of the total feedback (=1 points)
Participating in Trivia (Kahoot)	Participating in 2 kahoots (=2 points)	Participating in 1 kahoot (=1.5 points)	Missing both kahoots (=0 points)
Total points possible	**10**	**8**	**5**

2. Grading Scale

For information on how UF assigns grade points, visit: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

A	94 – 100% of possible points		C	74 – 76%
A-	90 – 93%		C-	70 – 73%
B+	87 – 89%		D+	67 – 69%
B	84 – 86%		D	64 – 66%
B-	80 – 83%		D-	60 – 63%
C+	77 – 79%		E	<60

IV. Quest Learning Experiences

1. Details of Experiential Learning Component

Searching for Signs of Plant Interactions

By the end of week 9, students are expected to be familiar with plant senses and some of the interactions (the good and the bad ones) that plants have with the environment and other organisms. Students should submit an essay (minimum 700 words; max 1,000 words) of the interaction that they identified (signs of plant responses or interactions with biotic and abiotic factors) (Due on: March 5th). In the essay the student will show a picture of the plant and explain the plant's responses and/or interaction, location, and why the interaction is happening. The following week, students will present their findings during class via PowerPoint. This assignment will be in groups of 3 to 4 (max) students.

2. Details of Self-Reflection Component

Genetically modified food: Pros vs Cons

After debating in class about the use of biotechnological approaches to grow and manage plants, students will be asked to write a self-reflection essay about their point of view on the use of biotechnological approaches in agriculture (minimum 700 words; max 1,000 words). There is no right or wrong side. You won't be evaluated based on your point of view. The justifications and points you make will be assessed in the self-reflection. Students are supposed to submit the assignment a week after the debate.

The self-reflection should cover at least the following points:

- Are you pro or anti GMOs?
- What is the main reason that makes you pro or anti GMO?
- Give a real example that justifies your perspective on this issue.
- Present at least 2 more reasons that make you pro or anti GMO and give examples.

- What are the possible consequences in the short and long term with or without GMOs, depending on the side you defend? If you are pro GMO you will talk about the consequences without it and vice-versa.

3. Group Assignment I

Tests on Plant Senses Using the Scientific Method

Following the steps of the Scientific Method, students will be asked in groups (3 to 4 students) to develop and explain each step using an experiment about plant senses, which will be presented in the classroom and should be executed by the group. Students are expected to develop this assignment throughout the course as the instructor goes over each step of the scientific method. For each step, students are welcome to discuss with the instructor any questions or concerns about their project, and it is recommended not to wait until the last minute. Students should present using PowerPoint (8-12 min) the Scientific Method steps, and provide a written essay by March 17th, following the guided steps below:

- *Step 1. Observation/question:* Ask a question and explain what makes you ask that question.
- *Step 2. Research topic area:* Do background research and present a research paper(s) and/or other resources that relates to your question.
- *Step 3. Hypothesis:* Construct a hypothesis and the prediction of the result of your hypothesis following the model: "If _____[I do this] _____, then _____[this]_____ will happen."
- *Step 4. Test with experiment:* Students will do an experiment about plant senses to test your hypothesis and prediction. Examples of experiments will be presented in the classroom. Students are expected to present the material list and experimental procedure.
- *Step 5. Analyze data:* once your test is completed students will analyze the data collected and check if the results support the hypothesis or not. To do so, students will use tables and graphs to present the result and draw a conclusion based on your results.
- *Step 6. Report conclusions:* Communicate your results in a written report (3 pages max) and through a PowerPoint presentation (5 min max) during class.

4. Group Assignment II

Plants Can Save the World!

Students will identify a plant/tree that can be used to mitigate a problem that our society faces.

A few examples of problems that can be remediated by using plants are, but are not limited to:

- Plant used to control human or plant parasites (nematodes)
- Phytoremediation: the use of plants to remediate contaminated soils
- Plants that mitigate soil erosion
- Plants and human health (e.g. anxiety, Alzheimer, Parkinson's disease, etc.)
- Plants and air pollution mitigation
- Plant disease control with other plants
- Hidden hunger solved with plants
- Plants used to solve crimes
- Others

Students are welcome to identify other environmental, agricultural, human, etc. issues and select a specific plant to develop their work. Once the plant and problem are identified, each group needs to send this information to the instructor/TA two weeks after the first day of class. A google doc will be created and shared with everyone with the group names. Each group is encouraged to take a look at the doc before choosing their plant and problem, to prevent topic overlap from happening.

Each group will have 8 to 12 minutes to present about their topic on Thursday of week 12. Students will have the option between recording the presentation on YouTube to be presented in class or presenting live in class. The presentation can be in the format of music, a play, PowerPoint presentation, poster or combination of these. If a musical or theatrical form is chosen, the presenters are encouraged to provide a script of the song or play.

In addition to the presentation, a written report (minimum 700 words; max 1,000 words) should be submitted via Canvas a week before the day of the presentations. The following subtopics should be part of the written report and presentations:

- What is the problem that your group selected and what impact does the problem have on our society?
- Are there methods used to mitigate the problem that you selected? If yes, is there any drawback about using these method(s)?
- Common name and scientific name of the plant that your group chose
- Origin and distribution of the plant
- Ideal conditions to grow it
- Include some special characteristics of the plant (eg. it is used for decoration because of the beauty of the flower, the wood is highly valuable in the marketplace, etc.)
- How can the plant mitigate the problem that you selected? If possible, explain the mechanism
- How widely the plant is/can be used/applied
- Is it economically viable to use the plant compared to other methods?
- What is your opinion about the use of the plant? Do you have an opinion on something that needs to be changed/improved?

Important note: For any assignment, if you submit it late, your score will be reduced by 0.5 points per day. For example, if you submit your assignment that is worth 10 points 2 days after the deadline, your submission will earn a maximum of 9 points.

5. Group Assignment III

Jigsaw Activities

During some classes students will be divided in groups of 3 to 4 students and given a specific topic related to the lecture. The students in each group will work together to understand the topic thoroughly. Then the students from each group will be reconfigured into new groups that include one member of each of the original student groups. In these new groups, each student will explain their topic to the members of the new group. In the end, the objective is to give out the main points of the lecture as “jigsaw pieces” to the first student groupings, and to then rearrange students to complete the “puzzle” of material being covered, with the intention of a deeper understanding and engagement from the students. The Jigsaw activity is an efficient way to learn the course material in a cooperative learning style, and it encourages listening, engagement, and empathy by giving each member of the group an essential part to play in the academic activity.

V. General Education and Quest Objectives & SLOs

1. This Course's Objectives—Gen Ed Primary Area and Quest

Biological Sciences Objectives ➔	**Quest 2 Objectives ➔**	**This Course's Objectives ➔** (This course will….)	**Objectives will be Accomplished By:** (This course will accomplish the objective in the box at left by…)
Biological science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the life sciences.	Quest 2 courses provide instruction in the history, key themes, principles, terminologies, theories, or methodologies of various social or biophysical science disciplines that enable us to address pressing questions and challenges about human society and/or the state of our planet.	… present the value of plants to life on Earth … discuss how plants are aware of their surroundings more than we humans think … introduce students to organic signaling molecules, plant cell machinery, and plant structure … discuss the various forms of plants on Earth and the facts which allow such diversity to exist	… recognizing the value of plants to human beings … demonstrating the type of molecules that plants use to communicate with each other and with other organisms … describing the diversity of plant forms on Earth and the evolution power behind the diversity process
Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern biological systems.	Students learn to identify and analyze different social or biophysical science methods and theories and consider how their biases and influences shape pressing questions about human society and/or the state of our planet.	… Stimulate students to question our understanding/biases about plants and to find similarities between plants and humans based on the senses … identify the good and bad interactions that plants have with the environment, other plants and other organisms.	… analyzing intriguing and scientifically pressing questions about plant senses by connecting plant with human senses, such as: a) Vision: plant's responses to light; b) Smell and Communication: plant's responses to volatile chemicals;

Biological Sciences Objectives ➔	Quest 2 Objectives ➔	This Course's Objectives ➔ (This course will….)	Objectives will be Accomplished By: (This course will accomplish the objective in the box at left by…)
			c) Hearing: human ears can't hear plants, but other plants or animals might. d) Touch: plant's responses to tactile stimulation; e) Proprioception: plant's responses to gravity; f) Memory: plant's long- and short-term responses to environmental stimulus. … discussing the types and the impact of good and bad interactions of plants with the environment and other living organisms.
Students will formulate empirically-testable hypotheses derived from the study of living things, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.	These courses emphasize clear and effective analysis and evaluation of qualitative or quantitative data relevant to pressing questions concerning human society and/or the state of our planet.	… Evaluate the impacts that the development of agriculture has had on human populations.	… evaluate the relationship between plants and humans regarding pests & plant diseases, food supply, climate change, desertification, soil erosion, and biological resources. … discussing the positive and the negative effect of agriculture and what can we do to improve it.

Biological Sciences Objectives ➔	Quest 2 Objectives ➔	This Course's Objectives ➔ (This course will….)	Objectives will be Accomplished By: (This course will accomplish the objective in the box at left by…)
Biological science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the life sciences.	Students reflect on the ways in which the social or the biophysical sciences impact individuals, societies, and their own intellectual, personal, and professional development.	… promote critical thinking regarding methods currently used with agricultural plants, such as: monoculture system, GMOs, pesticides, fertilizers.	… discussing, debating and reflecting in class the pros and cons of methods and biotechnologies used for plant cultivation in our society

2. This Course's Student Learning Outcomes (SLOs)—Gen Ed Primary Area and Quest

	Biological Sciences SLOs ➔ Students will be able to…	Quest 2 SLOs ➔ Students will be able to…	This Course's SLOs ➔ Students will be able to…	Assessment Student competencies will be assessed through…
Content	**Identify, describe, and explain** the basic concepts, theories and terminology of natural science and the scientific method; the major scientific discoveries and the impacts on society and the environment; and the relevant processes that govern biological and physical systems.	**Identify, describe, and explain** the cross-disciplinary dimensions of a pressing societal issue or challenge as represented by the social sciences and/or biophysical sciences incorporated into the course.	**Identify, describe, and explain…** … the importance of plants to our planet. … the similarities of human senses and plant senses.	Class participation, quizzes, review test 1

	Biological Sciences SLOs ➔ Students will be able to…	Quest 2 SLOs ➔ Students will be able to…	This Course's SLOs ➔ Students will be able to…	Assessment Student competencies will be assessed through…
Critical Thinking	**Formulate empirically-testable hypotheses** derived from the study of physical processes or living things; apply logical reasoning skills effectively through scientific criticism and argument; and apply techniques of discovery and critical thinking effectively to solve scientific problems and to evaluate outcomes.	**Critically analyze** quantitative or qualitative data appropriate for informing an approach, policy, or praxis that addresses some dimension of an important societal issue or challenge.	**Analyze** and **Evaluate**… … how plants interact with their surroundings: the good and bad interactions. … the impact of the advent of agriculture on human population growth and on the environment. … how we can better understand plants and what can we do to mitigate issues associated with plant misuse (e.g. pests, diseases, pesticide overuse, soil erosion, etc.) in order to preserve our planet.	Class participation, quizzes, review test 2, experiential learning
Communication	Communicate scientific knowledge, thoughts, and reasoning clearly and effectively.	**Develop and present**, in terms accessible to an educated public, clear and effective responses to proposed approaches, policies, or practices that address important societal issues or challenges.	**Develop and present…** … the importance of a selected plant in mitigating an important environmental issue. … solutions to the negative impact that modern forms of growing and managing plants have brought us. … parts of the course material in a cooperative learning style in a small group of students (3 to 4 students)	Class participation, quizzes, review test 2, group projects, Jigsaw activities

	Biological Sciences SLOs ➔ Students will be able to…	Quest 2 SLOs ➔ Students will be able to…	This Course's SLOs ➔ Students will be able to…	Assessment Student competencies will be assessed through…
Connection	N/A	**Connect course content** with critical reflection on their intellectual, personal, and professional development at UF and beyond.	**Connect course content** with their own personal beliefs and behaviors regarding the pros and cons of modern technological approaches used to grow plants in our society.	Class participation, quizzes, review test 2, discussion (debate), self-reflection

VI. Required Policies

1. Students Requiring Accommodation

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

2. UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

3. University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

4. Counseling and Wellness Center

UF Counseling Services provides resources on campus for students having difficulties which may interfere with their academic performance. Programs are available for general therapy, stress management, anger management, math confidence, career counseling, LGBTQ support, and many other specific needs. Resources available to you include:

1) University Counseling Center, 301 Peabody Hall, 392-1575;

2) Student Mental Health Center, 392-1171;

3) Sexual Assault Recovery Services (SARS), **Student Health Care Center,** 392-1161;

4) Career Resource Center, Reitz Union, 392-1601.

Contact information for the Counseling and Wellness Center: https://counseling.ufl.edu/, 392-1575 for more information; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

5. The Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at http://writing.ufl.edu/writing-studio/ or in 2215 Turlington Hall for one-on-one consultations and workshops.

6. Policy on Recordings

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live due to Covid restrictions. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

7. Technical Support

If you experience difficulties with accessing components of the Canvas site, including the syllabus and grades, contact the UF help desk immediately. If they are not able to resolve your problem, contact the instructor with your help desk ticket number and a description of the problem and steps taken to resolve it.