Term Information

Effective Term	Spring 2025

General Information

Course Bulletin Listing/Subject Area	Molecular Genetics
Fiscal Unit/Academic Org	Molecular Genetics - D0340
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	3011
Course Title	Art and Science: Learning with Plants
Transcript Abbreviation	ArtMol learnplants
Course Description	This is a studio/lab course focusing on plant molecular biology and making art. We will engage multiple creative and critical activities, scientific experiments and art projects that will lead us towards new, experiential understandings of plants and their relationships to humans. Students will investigate and observe plant cells and molecules to understand how they respond to their environments.
Semester Credit Hours/Units	Fixed: 4

Offering Information

Length Of Course	14 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture, Recitation
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus, Lima, Mansfield, Marion, Newark, Wooster

Prerequisites and Exclusions

Prerequisites/Corequisites	Any Studio Art course, or any Molecular Genetics course. For instance, Art 2100, 2200, 2300, 2400, 2555, 3000, 3001, 3002, 3003, 3004, 3005, 3006, 3009, 3012, 3014, 3017, 3024, or 3056. Or, for Molecular Genetics: MolGen 2220H, 2690, 3300, 3436, 4500, 4501, 4606, 4581S, 4591S, or 4606.
Exclusions	
Electronically Enforced	Yes

Cross-Listings

Cross-Listings	Art 3011

Subject/CIP Code

Subject/CIP Code	50.0701
Subsidy Level	Baccalaureate Course
Intended Rank	Sophomore, Junior, Senior

Requirement/Elective Designation

Lived Environments
The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- Goal 1 Students will analyze an important topic or idea at a more advanced and in-depth level than the foundations.
- In this context, “advanced” refers to courses that are e.g., synthetic, rely on research or cutting-edge findings, or deeply engage w
- Goal 2 Students will integrate approaches to the theme by making connections to out-of-classroom experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in future.
- Goal 3 Students will explore a range of perspectives on the interactions and impacts between humans and one or more types of environment (e.g., agricultural, built, cultural, economic, intellectual, natural) in which humans live.
- Goal 4 Students will analyze a variety of perceptions, representations and/or discourses about environments and humans within them.

Content Topic List

- Kimmerer, Robin Wall "Corn Tastes Better on the Honor System"
  Bridle, James "Ways of Being Animals, Plants, Machines: The Search for Planetary Intelligence"
  Reese, Hope "How a Bit of Awe Can Improve Your Health
- Evich, Helena Bottemiller "The Great Nutrient Collapse"
  Ro, Christine "Why 'Plant Blindness' Matters - and What You Can Do About It"
  BBC News "PLant Extinction 'Bad News for All Species'"
- Mancuso, Stefano and Alessandra Viola. "Brilliant Green: the Surprising History and Science of Plant Intelligence"

Sought Concurrence

No

Attachments

- GE Theme_Syllabus_3011.pdf: Syllabus
  (Syllabus. Owner: Cole,Susan Elizabeth)
- GE Theme_Lived Environments submission form 3011.pdf: Lived environments submission form
  (Other Supporting Documentation. Owner: Cole,Susan Elizabeth)
- GE Theme_Collaborative Teaching Form 3011.pdf: Collaborative teaching form
  (Other Supporting Documentation. Owner: Cole,Susan Elizabeth)
- Molgen Curricular Map 2023_3011.pdf: Molgen Curricular map
  (Other Supporting Documentation. Owner: Cole,Susan Elizabeth)
- Cover letter for Molgen 3011.pdf: cover letter
  (Cover Letter. Owner: Cole,Susan Elizabeth)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Cole,Susan Elizabeth	02/16/2024 11:25 AM	Submitted for Approval
Approved	Cole,Susan Elizabeth	02/16/2024 11:26 AM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	02/22/2024 01:51 PM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Neff,Jennifer Vankeerbergen,Bernadette Chantal Steele,Rachel Lea	02/22/2024 01:51 PM	ASCCAO Approval

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Feb 16th, 2024

Dear Members of the ASCC,

The Department of Molecular Genetics is delighted to put forward a request for the the creation of a new interdisciplinary General Education Themes course (Lived Environments) , to be titled "MOLGEN/ART-3011, Art and Science: Learning with Plants". This course builds on a successful course led by Amy Young (Art) and Iris Meier (Molecular Genetics) which has been offered as "ART 5101 - Aspects of Art and Technology II"

The departments have worked together to create a hingh-impact, co-instructed, interdisciplinary course that will introduce students to plant molecular biology and its relevance in today's society, while supporting their engagement in the artistic process to increase their understanding of the critical relationships between plants and human society.

As designed, the course fulfills the expectations for a four-credit, high impact course positioned in the "Lived Environments" theme.

Sincerely,

Susan E Cole

Susan Cole, Ph.D.
Associate Chair of Molecular Genetics

ART 3011 / MOLGEN 3011

Art and Science: Learning with Plants

Course information

Instructor:
- Amy Youngs, Associate Professor, Department of Art, College of Arts and Sciences
- Iris Meier, Professor, Department of Molecular Genetics, College of Arts and Sciences

Email: meier.56@osu.edu & youngs.6@osu.edu

Day and Time: Mon/Wed, 3:55 pm - 6:40 pm
Section: GE Theme: Lived Environments
Location: Hopkins Hall 356 & Jennings 014
- Please note the 2 locations, we will move between them and keep you updated as to where class meetings will be held. Please check the schedule and news updates in Carmen.

Prereqs: Any Studio Art course, or any Molecular Genetics course. For instance, Art 2100, 2200, 2300, 2400, 2555, 3000, 3001, 3002, 3003, 3004, 3005, 3006, 3009, 3012, 3014, 3017, 3024, or 3056. Or, for Molecular Genetics: MolGen 2220H, 2690, 3300, 3436, 4500, 4501, 4606, 4581S, 4591S, or 4606.

Course Description

This course is a studio/lab course focusing on plant molecular biology and making art. We will engage multiple creative and critical activities, scientific experiments and art projects that will lead us towards new, experiential understandings of plants and their relationships to humans. Students will investigate and observe plant cells and molecules to understand how they respond to their environments. We learn their strategies and solutions and resiliencies/tolerances with special consideration for the impacts of climate change. We will investigate the human impact on plants and our own health, sustainability, and the lived environment.

Course Content, Format, and Delivery:

This course consists of lectures on science and art, scientific experiments, readings, demonstrations, individual and collaborative art projects, group discussions, critiques, writing, and a group exhibition.

Students will conduct experiments such as cultivating plants in laboratory settings, microscopy, mutant analysis, the use of reporter genes, and experimental design. Students will gain basic knowledge of plant cells and molecules, structure and function, growth and development, diversity, and issues in modern plant biology as related to plant-human interactions.

Artistic methods, such as observation, speculation, synthesis, manipulation, construction, and presentation will be employed in the development and creation of individual artworks. Students learn basic techniques for digital art making, such as microscopic photography, videography and editing in software. At the end of the semester, students will exhibit their creative projects from their scientific and art making practices at the Art & Technology Student Exhibition.

This course is an in-person, hands-on, process-oriented studio. It is a 4-credit-hour, 14-week course consisting of 2 hour and 45-minute class periods, two days per week, for 5.5 hours of time spent on direct instruction per week. Students should expect to spend an additional 6 hours outside of class time, per week, independently completing exercises, labs, homework, reading, writing/drawing in lab notebook, and creating artwork.

Course Goals / Rationale

Goals and Expected Learning Outcomes (ELOs) common to all General Education Themes

1. Goal 1: Successful students will analyze an important topic or idea at a more advanced and in-depth level than the foundations. In this context, "advanced" refers to courses that are e.g., synthetic, rely on research or cutting-edge findings, or deeply engage with the subject matter, among other possibilities.

2. Goal 2: Successful students will integrate approaches to the theme by making connections to out-of-classroom experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in future.

ELOs related to Goals 1	Course activities and assignments to meet these ELOs
ELO 1.1 Engage in critical and logical thinking.	In the course activities, such as class discussions following the course lectures, readings, watching and reviewing videos, participating in critiques, peer reviews regarding their own art projects and related artists' professional practice, students will: • critically investigate environmental impact on plants and humans. • logically recognize interdependence between them. • consider the effectiveness of various scientific and artistic strategies for communicating these topics. In the lab experiments for the Assignment #1 – "Group scientific presentation of science lab results" and the Assignment #3 – "Research Notebook", students will: • learn to ask scientific questions and design an experiment. • Learn to interpret scientific data and judge their robustness and relevance • Practice applying scientific and artistic techniques in their research notebooks.
ELO 1.2 Engage in an advanced, in-depth, scholarly exploration of the topic or ideas within this theme.	Students will engage in advanced artistic assignments: In Assignment #4 – "Making it Visible", students will: • explore image analysis and manipulations/microscopic imagery. • make plant cells visible through their artistic perspectives. • practice art making techniques.

	• visualize the cellular/molecular and reflect on their own relationships to the world at this scale. In Assignment #5 – "Speculative Fiction for Plants and Humans", students will: • advance their creative scholarly explorations through a process of collaboration and realization of a professional artwork. • further cultivate a better understanding of the lived environment through in-depth artistic forms. • Communicate an aspect of the science investigated in the course through the artwork, requiring in-depth comprehension. • present their artworks in the Art & Technology Student Exhibition at the end of semester.

ELOs related to Goals 2	**Course activities and assignments to meet these ELOs**

ELO 2.1 Identify, describe, and synthesize approaches or experiences.	The course activities offer students disciplinary and interdisciplinary approaches:
	• science experiments and art projects that explore aesthetics and meaning-making in both science labs and art studios.
	• field trips.
	• visiting artists and scientists.
	
	In Assignment #2 - "Plant Noticing: Ways of Knowing, Ways of Showing, and Ways of Understanding", students will:
	• practice multiple modes of learning about a plant
	  ○ observation, recording, sensorial, and textual.
	  ○ make connections between different academic disciplines.
	• identify the plant and seek scientific knowledge about it.
	• synthesize multiple forms of knowledge into an artistic project to be presented and discussed in class.

ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.	In assignment 1, students will learn professional critiquing of scientific data and interpretations by advisors and peers. In class discussions and critiques for the creative assignment #4 – "Making it Visible", students will: • reflect on various critical responses from peer reviews of their own projects, and vice versa. ○ make comparisons between their own creative works and those of their peers.

	• assess their conceptualization, visualization, and narrativization in the context of the lived environment. • build on their prior experience and reflect on new/additional ideas and perspectives.

Goals and ELOs specific to the GE theme: Lived Environments

3. Successful students will explore a range of perspectives on the interactions and impacts between humans and one or more types of environment (e.g., agricultural, built, cultural, economic, intellectual, natural) in which humans live.
4. Successful students will analyze a variety of perceptions, representations and/or discourses about environments and humans within them.

ELOs related to Goals 3	Course activities and assignments to meet these ELOs

ELO 3.1 Engage with the complexity and uncertainty of human environment interactions.	Students will reflect on challenges we face together with plants in an environment that is changing; particularly with regards to human-caused climate change and the related extinction crisis. Students explore how humans engage with plants in agricultural, cultural, and natural environments, through:
	• field trips
	  ○ to the greenhouse and to the Olentangy Wetlands.
	  ○ opportunities to compare cultural, natural, constructed, and agricultural environments.
	• the science experiment
	  ○ exploring the effects of the often unreflected human dependency on and interaction with other organisms, e.g. the use of manufactured nitrogen fertilizer in relationship to the naturally-occurring, symbiotic nitrogen fixing bacteria in agriculture.
	• Reading, “The Great Nutrient Collapse”
	  ○ the effects of excess carbon dioxide on the health of plants.
	  ○ the emerging research surrounding their nutrition profile.

ELO 3.2 Describe examples of human interaction with and impact on environmental change and transformation over time and across space.	Students will evaluate and analyze: • the human impact and consequences of environmental changes on plants and humans. • human-plant interactions with a particular focus on challenging a human-centric viewpoint. One of the course texts, “Corn Tastes Better on the Honor System”:

	• engages students in a comparison of Indigenous domestication of corn versus the genetic modification of corn in an industrial agricultural context. • provides an awareness of how humans have transformed plants across evolutionary time through traditional selective breeding and through biotechnological practices. In the video assignment, "Anthropocene: The Human Epoch: How Humans Have Impacted the Planet'', students will: • review a documentary that focuses on human-caused ecological destruction and extinction across the globe. • discuss the role of visual culture in revealing the often-hidden sites of extraction. • gain awareness of how human-centric viewpoints can endanger both planetary and human health.

ELOs related to Goals 4	**Course activities and assignments to meet these ELOs**

ELO 4.1 Analyze how humans' interactions with their environments shape or have shaped attitudes, beliefs, values and behaviors.	Through the course lectures, reading, and discussions, students will evaluate:
	• human-centric attitudes
	  ○ how to understand and value plants beyond anthropocentrism
	• western cultural beliefs that consider plants as products and lands as places producing commodities
	• the desire for excess industrial commodities and analyzing the impact on ecosystems.
	
	In the final art project, "Speculative Fiction for Plants and Humans", students will be asked:
	• to invent alternative lived environments that
	  ○ minimize human impact.
	  ○ facilitate new affiliations.
	  ○ include cohabitations and coexistences.
	• to imagine an improved relationship for all in the lived environment.
	• to materialize these ideas in collaborative art projects.

ELO 4.2 Describe how humans perceive and represent the environments with which they interact.	Through lectures and experiments students will gain greater scientific understanding of the specific topic and thus be able to recognize and reflect on common misconceptions or mis-interpretations. Through slide lectures and discussions about contemporary ecological artworks students will:

	• gain an understanding of past and current visual art representations. • create and share their own visual representations. In reading assignments – 'Brilliant Green' students will • gain an understanding plant intelligence and capability to communicate with other organisms. • learn that plants have much to teach us about their approach to sustainability and adaptation to changing environments.
ELO 4.3 Analyze and critique conventions, theories, and ideologies that influence discourses around environments.	Through the course lectures, readings, discussions, and assignments, students will be asked to evaluate various ideologies related to human relationships with plants. In the final Assignment #5 – "Speculative Fiction for Plants and Humans", students will: • consider and critique the treatment of plants in Western ideologies, indigenous approaches, and in posthumanism. • speculate on alternative relationships between plants, humans, and the lived environment. • develop new/alternative/revisionist concepts in collaborative teams. • materialize their ideas in a collaborative artwork. • participate in critiques, exhibit their work, and reflect on the outcome.

Additional Course Learning Outcomes

At the successful completion of the course the student will be able to:

- develop capacities for observations, interpretation, evaluation, and analysis of the relationships between plants and humans in the lived environments through integration of scientific and artistic disciplines.
- understand how plants respond to their environments at the cellular level.
- synthesize and connect multiple approaches to understanding our shared environments.
- develop critical, logical, creative thinking to evaluate the changing climate and its impact on plants and humans.
- cultivate an appreciation of plants and recognize our utter dependence upon them.
- demonstrate an ability to participate in critiques and discussions regarding their own projects in relationship to related artists in the field of the lived environment.
- demonstrate the lab practices alongside logical thinking, observation, and data analysis and interpretation.
- gain a basic understanding of art making and techniques in visual literacy.
- transform scientific knowledge into aesthetic visual representations and narratives.
- materialize their artistic and scientific concepts with their own creative projects to speculate upon alternative lived environments.
- professionally exhibit their creative works in the Art & Tech Student Exhibition.

- promote public awareness of the valuable relationship between plants, humans, and the lived environment through their creative projects.

Communication

The best way to contact us outside of class time is through email or the Carmen Inbox. We expect that you should email us only from your OSU email or the Carmen Inbox. Email can also be used to schedule individual Zoom meetings to talk. You can generally expect a reply to emails within 24 hours on weekdays. We expect that you are checking your Buckeyemail email and your Carmen Inbox regularly. It is recommended that you use Buckeyemail for communication regarding grades or other private matters, as the Carmen Inbox is not as secure of a platform.

Carmen (carmen.osu.edu) is used for general communication through announcements. Carmen is where the most up-to-date schedule, assignment information, sharing ideas and work, collaborative engagement and assignment development, grades and feedback, readings, due dates for assignments, reference documents and general course content components are posted. Grades will also be posted to Carmen.

Course Web Platforms and Technology

Carmen: carmen.osu.edu (http://carmen.osu.edu/)
Our course page on Carmen will contain all course documents. Students will upload assignments to specified Carmen drop boxes.

Microsoft One Drive: office365.osu.edu (http://office365.osu.edu/)
One Drive can be used as a cloud-based backup for your work. Uploading important files in case of a hard drive failure is a way to prevent lost work. One Drive will be used in this class as a way of sharing large files that do not easily upload to Carmen.

Software: Adobe Suite - Photoshop, After Effects, Premiere Pro, and Media Encoder.
Adobe Creative Cloud access is free to all Ohio State students, faculty and staff. This suite of desktop and mobile apps gives you the tools to create professional videos, photos, websites and more.
Office of Technology and Digital Innovation - Adobe Creative Cloud (https://it.osu.edu/adobe)
Find out how to opt in and start downloading Creative Cloud apps.
Sign into Creative Cloud (link is external) to find your apps.

Other: a mobile device (smartphone or tablet)

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- Self-Service and Chat support: ocio.osu.edu/help
- Phone: 614-688-4357(HELP)F
- Email: servicedesk@osu.edu
- TDD: 614-688-8743

Requirements and Evaluation

Your performance will be evaluated on the quality of your work, your understanding of the basic skills and concepts covered, your resourcefulness, initiative, active participation in all class activities and overall rigor as a student.

Grading and Class work / Assignments

- Assignment #1 – Group scientific presentation of science lab results **10 %**
- Assignment #2 - 'Plant Noticing: Ways of Knowing, Ways of Showing' **10%**
- Assignment #3 - Research Notebook: **10 %**
- Assignment #4 - 'Making it Visible': **20 %**
- Final Project #5 - 'Speculative Fiction for Plants and Humans' **35 %**
- Participation – discussions, critiques, peer reviews, graded throughout the course: **15%**

Assignment #1 - A group scientific lab experience with lab protocols, analysis of data, and visual documents of experiments, such as microscopy and using imaging software for measuring Stomata. Each group presents their scientific results in an oral and visual report. Must include 2 to 3 slides and microscopic photography.

Assignment #2 - 'Plant Noticing: Ways of Knowing, Ways of Showing, and Ways of Understanding'
- This assignment accompanies "a plant noticing walk" on campus. Students use multiple methods of getting to know their chosen plant. In class, students will identify their plants and learn how to conduct a scientific literature search about them. Students develop a creative project to share their knowledge of their plant in a presentation and discussion.

Assignment #3 - Research Notebook
Students will make sketches, take notes, collect data, and record their own reflection and observations - both scientific and artistic - during all aspects of the class. Notebook pages are submitted to Carmen at intervals throughout the semester.

Assignment #4 - 'Making it Visible' - Art assignment for digital image manipulation
Students will create photography or digital images that make an aspect of plant cells/cellular systems "visible" through their manipulation of microscopic images, drawing, painting, and moving images.

Final Project #5 - 'Speculative Fiction for Plants and Humans' - Group art project
Small groups of students will create visualizations and narratives about the course theme. They may use various art forms, such as: graphic novels, digital images, moving image / video art, sculpture or installation. The projects will be exhibited at the Art & Technology Student Exhibition at the end of the semester. Each student will additionally write a short reflection paper about their experience and the connections between their artwork and course topic.

All assignments should be submitted on the scheduled due date before class starts.

Assignments turned in late will be reduced in mark, one letter per class period. If there are extenuating circumstances that will cause a project to be late, please communicate with us ahead of time and we will

work on a case-by-case basis to make adjustments to this late policy. Late and unfinished work may not be a part of the critique. If your project will be turned in late, it is still important to participate in the class critique and discussion. Some projects may be redone at the discretion of the instructor.

Grading Scale

A (93–100): Work, initiative, and participation of exceptional quality

A- (90–92.9): Work, initiative and participation of very high quality

B+ (87–89.9): Work, initiative and participation of high quality which reflects higher than average abilities

B (83–86.9): Very good work, initiative and participation that satisfies the goals of the course

B- (80–82.9): Slightly above average work, initiative and participation that satisfies the goals of the course

C+ (77–79.9): Average work, initiative and participation which reflects an understanding of course material

C (73–76.9): Adequate work; student has a less than average level of initiative and participation

C- (70–72.9): Passing but below good academic standing; student has a less than average level of work, initiative and participation

D+ (67–69.9): Below average work, initiative and participation

D (60–66.9): Well below average work, initiative and participation

E (59.9–0): Failure; no credit. Unsuccessful completion of work. Limited or no participation. Objectives of the assignment are not met or are met in a significantly limited way.

Attendance Policy:

Attendance is required for all class meetings. Attendance will be recorded every class period.
The Departments of Art and Molecular Genetics acknowledges that illness, family obligations, and other conflicts with your classes do occur from time to time and up to 3 absences are allowed for any reason during the semester without penalty. If you miss a class, for whatever reason, it is your responsibility to get ALL the information you missed from the instructor, or your classmates as soon as possible, and continue to complete all exercises, homework and projects on time.

- Upon a 3rd absence: you are required to schedule a meeting with your instructor to discuss strategies for avoiding additional absences.
- Absences beyond the 3rd: your final grade is reduced by a full letter for each additional.
- Upon 6 absences: sixth (6) time will be required to withdraw from the course.

If the absence maximum is reached after the withdrawal period, the student will receive a failing (E) grade in the course.

If you arrive late or leave early or you may be marked absent. Three late entries /early departures = one absence. Tardiness, missing class, and poor preparation can, therefore, impact your project/course grades in a detrimental manner.

It is Ohio State's policy to reasonably accommodate the sincerely held religious beliefs and practices of all students. The policy permits a student to be absent for up to three days each academic semester for reasons of faith or religious or spiritual belief.

Students planning to use religious beliefs or practices accommodations for course requirements must inform the instructor in writing no later than 14 days after the semester begins. The instructor is then responsible for scheduling an alternative time and date for the course requirement, which may be before or after the original time and date of the course requirement. These alternative accommodations will remain confidential. It is the student's responsibility to ensure that all course assignments are completed.

Students with concerns or complaints under the policy are strongly encouraged, but not required, to first discuss those concerns with their instructor and/or the chair of the department. Students may also report their concerns or file a complaint with the Office of Institutional Equity via the online reporting form, email at equity@osu.edu, or phone at 614-247-5838.

You are expected to come to class on time, ready to work and with all necessary supplies and materials. Flexibility and communication will be essential this semester. In the event of serious illness or other events that prevent you from completing work or meeting synchronously, please communicate with us as soon as possible and we can work together to create a new schedule to get you back on track.

Texts / Readings / Screenings:
Course required readings will be available online, in our Carmen resources, or in the library. Check the schedule for details.

- Kimmerer, Robin Wall. "Corn Tastes Better on the Honor System." Emergence Magazine. https://emergencemagazine.org/feature/corn-tastes-better/.
- Bridle, James. *Ways of Being: Animals, Plants, Machines : The Search for a Planetary Intelligence*, 2022. https://www.overdrive.com/search?q=7B402471-8C32-4054-AEFA-AF85D34BB419. (Chapter 2: Wood Wide Web).
- Reese, Hope. "How a Bit of Awe Can Improve Your Health." *The New York Times*, January 3, 2023, sec. Well. https://www.nytimes.com/2023/01/03/well/live/awe-wonder-dacher-keltner.html.
- Evich, Helena Bottemiller. "The Great Nutrient Collapse." The Agenda, September 13, 2017. http://politi.co/2zACS5k.
- Ro, Christine. "Why 'plant Blindness' Matters — and What You Can Do about It." Accessed May 8, 2023. https://www.bbc.com/future/article/20190425-plant-blindness-what-we-lose-with-nature-deficit-disorder.
- *BBC News*. "Plant Extinction 'Bad News for All Species.'" June 11, 2019, sec. Science & Environment. https://www.bbc.com/news/science-environment-48584515.
- Mancuso, Stefano, and Alessandra Viola. *Brilliant green: the surprising history and science of plant intelligence*. Washington: Island Press, 2015. https://islandpress.org/books/brilliant-green. (Chapter 3: The Senses of Plants).

- Mancuso, Stefano. “Stefano Mancuso: The Roots of Plant Intelligence | TED Talk.” https://www.ted.com/talks/stefano_mancuso_the_roots_of_plant_intelligence
- Baichwal, Jennifer, Nick De Pencier, Edward Burtynsky, Roland Schlimme, Rose Bolton, Norah Lorway, Alicia Vikander, et al., dirs. 2018. *Anthropocene : The Human Epoch*. Kino Lorber. https://www.kanopy.com/node/6016075.
- Buffie, Erna. 2013. *What Plants Talk About*. Directed by Merit Jensen-Carr, Shawn Pierce, Nora Young, David McGunigal, Barry Lank, Ian Kerr, Merit Motion Pictures, et al. PBS Distribution Distributor.

Additional inspirations / bibliography for this class:

- Plant Physiology 4th edition (2009) W.G. Hopkins and N.P.A. Huner Publisher: John Wiley & Sons, Inc. Hoboken, New Jersey, USA.
- Supplemental material: Plant Physiology 5th edition (2010) L. Taiz and E. Zeiger Publisher: Sinauer Associates, Inc. Sunderland, MA, USA.
- Demos, T.J., Against the Anthropocene: Visual Culture and Environment Today. Berlin: Sternberg press, 2017. Video lecture about the book (https://vimeo.com/251618816).
- Toland, Alexandra, Jay S Noller, and Gerd Wessolek, eds. Field to Palette: Dialogues on Soil and Art in the Anthropocene, 2019.
- Tsing, A. L., Swanson, H., Gan, E., & Bubandt, N., Arts of Living on a Damaged Planet. Minneapolis: University of Minnesota Press, 2017.
- Kimmerer, Robin Wall, Braiding Sweetgrass, Canada: Milkweed Editions, 2013.
- Wulf, Andrea, The Invention of Nature: Alexander von Humboldt's new world. New York: Vintage Books, 2016.
- Haraway, Donna J., Staying with the Trouble: Making kin in the Chthulucene. Durham: Duke University Press, 2016.
- Brown, Andrew. Art and Ecology Now. London: Thames & Hudson, 2014.
- Gast, Ellen Ter., and Ine Gevers., Yes Naturally: how art saves the world. Amsterdam: Niet Normaal Foundation, 2013.
- Weintraub, Linda. What's Next: Eco Materialism & Contemporary Art. (http://lindaweintraub.com/whats-next-excerpts- from-the-introduction/) Bristol: Intellect Ltd. 2019.
- Myers, William, Bio Design: Nature, Science, Creativity, Thames & Hudson Ltd, London. 2012
- Gessert, George, Green Light: Toward an Art of Evolution (http://mitpress.mit.edu/catalog/item/default.asp?ttype=2& tid=12059), MIT Press, 2010.
- Wilson, Stephen, Art+Science Now (http://userwww.sfsu.edu/~infoarts/links/wilson.thames.html), Thames & Hudson, 2010.
- Pollan, Michael, Botany of Desire: A Plant's Eye View of the World (http://www.randomhouse.com/catalog /display.pperl/9781588360083.html). New York: Random House, 2001.
- Hobhouse, Henry, Seeds of Change: Six Plant that Transformed Mankind. Berkeley, CA: Counterpoint, 2006.
- Anderson, Edgar, Plants, Man and Life, Dover, 2005 (1971 originally)

Academic integrity policy

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/.

If we suspect that a student has committed academic misconduct in this course, we are obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact us.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- *Ten Suggestions for Preserving Academic Integrity (*go.osu.edu/ten-suggestions*)*

Reusing past work (not acceptable)

In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic explored in previous courses, please discuss the situation with your instructor at the start of the assignment/project.

Student Services and Advising

University Student Services can be accessed through BuckeyeLink. More information is available here: https://contactbuckeyelink.osu.edu/

FOR UNDERGRAD COURSES: http://advising.osu.edu

Copyright for instructional materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Your mental health

As a student you may experience a range of issues that can cause barriers to learn, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand. You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 1-800-

273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

Accessibility accommodations for students with disabilities

Requesting accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let us now immediately so that we can privately discuss options. To establish reasonable accommodations, we may request that you register with Student Life Disability Services. After registration, make arrangements with us as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of Carmen Canvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- Canvas accessibility (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- Carmen Zoom accessibility (go.osu.edu/zoom-accessibility)
- Collaborative course tools

General Class and Studio Policies

- **Discussion and communication guidelines**

  The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

  - **Writing style**: While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
  - **Tone and civility**: Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
  - **Citing your sources**: When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.
  - **Backing up your work**: Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

- Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender identity and expression, and nationalities. Class rosters are provided to the instructor and may include the student's legal name unless changed via the University Name Change policy. We will gladly honor

your request to address you by another name or gender pronoun. Please advise us of this early in the semester so that we may make appropriate changes to our records.

- Tolerance. Required and elective art courses contain content that can include some language, imagery, or dialogue that may be challenging or offend some students. While no student is required to participate in a presentation or discussion of art or design that offends them, it is important to remain open-minded and participate in a cooperative and respectful manner. Art can often challenge our ideas and experiences, and can lead us into some lively discussion, concepts and imagery. Differences (in ideas, perspectives, experiences, etc.) can be positive, productive and educational, challenging and provocative, so please, engage in the exchange of ideas respectfully. Please see us with your concerns as soon as possible.

- Please contact us in advance (during the first week of class or as soon as circumstances develop during the term) if you have circumstances that may affect your performance and ability to fulfill your responsibilities in this course.

- **Statement on Title IX**

  Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at http://titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu

- **Commitment to a diverse and inclusive learning environment**

  The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

- **Land Acknowledgement**

  We would like to acknowledge the land that The Ohio State University occupies is the ancestral and contemporary territory of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and Cherokee peoples. Specifically, the university resides on land ceded in the 1795 Treaty of Greeneville and the forced removal of tribes through the Indian Removal Act of 1830. I/We want to honor the resiliency of these tribal nations and recognize the historical contexts that have and continue to affect the Indigenous peoples of this land.

  More information on OSU's land acknowledgement can be found here:

  https://mcc.osu.edu/about-us/land-acknowledgement

Course Calendar (Subject to change to support course learning objectives)

WEEK 1

Overview of the course, syllabus, Carmen, course materials and requirements

Why study plants lecture. Stephano Mancuso: The Roots of Plant Intelligence (https://www.youtube.com/watch?v=AIfwFLDXFyQ&ab_channel=TED) .

Introduce artistic strategies, Art & Science intro, research notebook, and plants and communication.

Greenhouse tour: Use 3 different methods of knowing to explore one plant at the greenhouse. Identify symbiotic relationships this plant has with other organisms. Record in research notebook.

Homework:

1. Get your notebook. Write and draw a list of methods that you use to get to know things.
2. Format your research, drawings, observations, images about your selected plant into PDF for presentation in class. Upload it to the Carmen folder: “Getting to know a plant”.
3. Read or listen to:
   - Robin Wall Kimmerer's, Corn Tastes Better on the Honor System
   - Plant Blindness
   - Write responses to questions to prepare for discussion.

WEEK 2

Microscope introduction

Lecture – “Plants are not alone”

Students present their research and images from “Getting to know a plant”.
Discuss readings. Discuss ways of knowing through different disciplines.

Homework:

- Plant Extinction, bad news for all species
- Watch film: “Anthropocene: The Human Epoch: How Humans Have Impacted the Planet” Available via Kanopy: https://www.kanopy.com/en/osu/video/6016074
- Write responses to questions to prepare for discussion.
- Begin plant noticing diary

WEEK 3

Discuss reading and film.

We will go on a plant noticing walk.

Plant seeds for science experiments in greenhouse.

'Amplified Symbionts' art workshop:

- Art/Science symbiosis – examples and models
- Draw a map that creatively represents a symbiotic relationship.
- Use David Byrne's Arboretum drawings as inspiration http://davidbyrne.com/explore/tree-drawings-arboretum
- Discussion of student art ideas and symbiosis drawings.

Homework:

- Continue plant noticing diary
- Examine the Anthropocene era website
- Write responses to questions to prepare for discussion
- Bring 3 objects from home that you have a relationship with.

WEEK 4

Art exercises in object relations and taxonomies. Diagramming and planning an art and science project.

Students present Assignment #2 "plant noticing" in a 6-minute, artistic form that shares scientific knowledge about the plant/s they researched.

Introduce "Making it Visible" art assignment.

Homework:

- Watch What Plants Talk About
- Write responses to questions to prepare for discussion
- In Carmen: turn in research notebook pages documenting "Object Relations and Taxonomies"
- Bring a plant leaf for next class
- Work on "Making it Visible" art assignment

WEEK 5

Lecture on plant stomata.

Learn to make stomata prints with the leaf you brought from class. Microscopy and measuring stomata with software 'Image J'.

Discuss "What Plants Talk About" video. Discuss the challenges of balancing art, science and technology.

Group Discussion on "making it visible" art assignment concepts.

Homework:

- Read "The Rapid Decline Of The Natural World Is A Crisis Even Bigger Than Climate Change"
- Write responses to questions to prepare for discussion
- Continue to use 'Image J' to generate data on stomata
- In Carmen: turn in research notebook pages documenting progress on "Making it Visible"
- Work on "Making it Visible" art assignment

WEEK 6

Present stomata data.

Discuss ideas for group science experiments.

Workshop on microscopic photography with smartphone cameras and apps

Discuss reading.

Run group science experiments

Present art assignment progress and work in class on completion.

Homework:

- Gather materials for your group science experiments
- In Carmen: turn in research notebook pages documenting microscopic photography experiments
- Work with group to prepare scientific lab results as an oral and visual report
- Work on "Making it Visible" art assignment

WEEK 7

Students present Assignment #1 – Group scientific presentation of science lab results

"Making it visible" art critiques and discussions

Homework:

- Read *The Great Nutrient Collapse*
- Write responses to questions to prepare for discussion

WEEK 8

Visiting Scientist presents Confocal Microscopy.

Discuss reading “The Great Nutrient Collapse”.

Workshop applications of digital manipulation of microscopic imagery with Photoshop

Homework:

- In Carmen: turn in research notebook pages documenting microscopic image manipulations
- Write a reflection about the visiting scientist lecture

WEEK 9

Brainstorming session: discuss ideas for final group art project/s.

Digital manipulation of microscopic imagery with Photoshop continue

Video recording microscopy with smartphone cameras and apps.

Form groups around specific ideas to make initial sketches for final art projects.

Homework:

- In Carmen: turn in research notebook pages documenting final project ideas
- Continue online brainstorming in Miro Board or OneDrive
- Read chapter 2, Wood Wide Web, in *Ways of Being: Animals, Plants, Machines : The Search for a Planetary Intelligence*, by James Bridle.
- Work with group on initial sketches for art project

WEEK 10

Spring Break

WEEK 11

Discuss reading.

Report and show art project progress. Make decisions on techniques, focus, space, and materiality for the exhibition plan.

Basic techniques for creating and editing time-based Images and Moving Images continue

Homework:

- Continue online ideation/sketches in Miro and OneDrive
- Peer review: comment on 2 other student’s contributions online.

WEEK 12

Basic techniques for creating and editing time-based Images and Moving Images continue

Work in class on the final art project

Homework:

- Work on final art project, post updates in Miro and OneDrive
- Peer review: comment on 2 other student's contributions online.

WEEK 13

Mid-project evaluations and critiques with visiting guest artist

Work in class on the final art project

Homework:

- Work on final art project, post updates in Miro and OneDrive
- Peer review: comment on 2 other student's contributions online.

WEEK 14

Work in class on the final art project

Homework:

- Work on final art project, post updates in Miro and OneDrive
- Peer review: comment on 2 other student's contributions online.

WEEK 15

Finalize and polish artworks
Final art projects critiques and discussions

Homework:

- Prepare for exhibition setup, including tools, materials, and schedule.

WEEK 16

Art & Tech show setup.
Art & Tech Student show public opening

FINALS WEEK

Turn in the course research notebooks, with reflections. The last day for uploading any missing files to Carmen and adding comments on One Drive.

Briefly describe how this course connects to or exemplifies the concept of this Theme (Lived Environments)

In a sentence or two, explain how this class "fits' within the focal Theme. This will help reviewers understand the intended frame of reference for the course-specific activities described below.

This course is an introduction to plant cells, molecules, and art making disciplines combined with critical and creative practices in a biology lab and an art studio. Students will investigate relationships between plants, humans, and our lived environment and they will speculate on alternative collaborative futures in artistic projects.

Goal 1: Successful students will analyze an important topic or idea at a more advanced and in-depth level than the foundations. In this context, "advanced" refers to courses that are e.g., synthetic, rely on research or cutting-edge findings, or deeply engage with the subject matter, among other possibilities.

ELO 1.1 Engage in critical and logical thinking
- Course activities and assignments to meet these ELOs

The course assignments and activities comprise scientific experiments and artistic practices that enable students to engage in critical and logical thinking about the relationship between plants and humans in their lived environments.

In the lab experiments for the Assignment #1 and the Assignment #3, students cultivate their own plants in the greenhouse to observe symbiotic relationships between plant roots and bacterium (Rhizobium) for their mutual benefits of exchanging nitrogen and carbohydrates. Students will examine how fertilizer affects the nitrogen fixing symbiosis through the lab practices alongside logical thinking, close observation, and data analysis. In an additional experiment, students investigate how temperature affects the rate of photosynthesis, measuring stomatal apertures under a microscope. These scientific examinations will allow students to critically understand how plants and their microbial partners react to a changing environment, such as climate change, including plants in agricultural ecosystems caused by human intervention.

Students also critically investigate environmental impact on plants and humans, and logically recognize interdependence between them throughout the course activities, such as the class discussions, following the course lectures, reading texts, watching and reviewing videos, participating in critiques and peer reviews regarding their scientific experiments and their own art projects and related artists' professional practice.

ELO 1.2 Engage in an advanced, in-depth, scholarly exploration of the topic or ideas within this theme
- Course activities and assignments to meet these ELOs

In the science lab and art studio, students will learn principles of operating laboratory equipment and tools, designing an experiment, analyzing and interpreting data, and acquiring art making techniques. This practical learning experience allow students to engage in creative scholarly exploration in their artistic assignments and further cultivate a better understanding of the lived environment in an in-depth approach.

In Assignment #3, students will develop their visual thinking skills and visual techniques. They will make plant-observation diaries and document their own reflections in developing critical observations from the cultivation of plant experiments. Making sketches and recording data in the research notebook helps students develop skills for explaining their scientific findings and their experience into visual representations in their own creative ways.

In Assignment #4 - "Making it Visible", students will explore image analysis with microscopic imagery, which then can be manipulated in an artistic form such as drawing, digital imaging, sculpture, installation, videomaking, or performance. Students make plant cells visible through their artistic perspectives as long as it is creatively engaged in the course theme. This exploration allows them to visualize the cellular/molecular and reflect on their own relationships to the world at this scale.

In Assignment #5 – "Final Art Project", students advance their creative scholarly explorations through a process of collaboration and realization of a professional artwork presented in the Art & Technology Student Exhibition at the end of semester.

Goal 2: Successful students will integrate approaches to the theme by making connections to out-of-class experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in future.

ELO 2.1 Identify, describe, and synthesize approaches or experiences.
- Course activities and assignments to meet these ELOs

Activities such as science experiments, art projects, field trips, visiting artists and scientists, and aesthetic exploration in both science labs and art studios, offer students disciplinary and interdisciplinary approaches to examining our lived environments.

For instance, in Assignment #2 - "Plant Noticing: Ways of Knowing, Ways of Showing, and Ways of Understanding", students practice multiple modes of learning about a plant – observations, literature research, recordings, sensorial, and textual – making connections between different academic disciplines. They identify the plant, seek scientific knowledge about it, and synthesize these forms of knowledge into artistic projects to be described in a class presentation.

ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.
- Course activities and assignments to meet these ELOs

Students demonstrate a sense of self as a learner as they reflect on their creative assignments (discussed in ELO 1.2) and participate in critique discussions.

In class discussions and critiques for the creative assignment #4, students will reflect on various critical responses from peer reviews of their own projects, and vice versa. Comparisons between their own creative works and those of their peers encourage students to assess their conceptualization, visualization, and narrativization in the context of the lived environment. This learning and responding allows students to build on their prior experience and to reflect on new/additional ideas and perspectives. This is applied to the final art project, which is collaborative and requires more advanced engagement with the course topics. Students' creative works with the exhibition platform at the end of semester provide educational outreach to the larger student community, promote the public awareness

of valuable relationships between plants, humans, and the lived environment, and seek constructive feedback from out-of-class, our eco-friendly art and science communities.

GOAL 3: Successful students will explore a range of perspectives on the interactions and impacts between humans and one or more types of environment (e.g. agricultural, built, cultural, economic, intellectual, natural) in which humans live.

ELO 3.1 Engage with the complexity and uncertainty of human environment interactions.
- Course activities and assignments to meet these ELOs

Students explore how humans engage with plants in agricultural, cultural, and natural environments, through field trips, readings, lectures, and assignments. Field trips to the greenhouse and to the Olentangy Wetlands provide opportunities to compare cultural, natural, constructed, and agricultural environments. In the science experiment, students will explore the effects of manufactured nitrogen used in industrial agriculture in relationship to the naturally-occurring symbiotic nitrogen fixing bacteria. Readings such as, “The Great Nutrient Collapse” provide opportunities for discussion and debate on the effects of excess carbon dioxide on the health of plants and the emerging research surrounding their nutrition profile. Students will reflect on challenges we face together with plants in an environment that is changing; particularly with regards to human-caused climate change and the related extinction crisis.

ELO 3.2 Describe examples of human interaction with and impact on environmental change and transformation over time and across space.
- Course activities and assignments to meet these ELOs

Students will evaluate and analyze the human impact and consequences of environmental changes on plants and humans. The course offers lectures, reading assignments, videos, and class discussions regarding human-plant interactions with a particular focus on challenging a human-centric viewpoint. For instance, one of the texts, “Corn Tastes Better on the Honor System”, engages students in a comparison of Indigenous domestication of corn versus the genetic modification of corn in an industrial agricultural context. This topic provides an awareness of how humans have transformed plants across evolutionary time through traditional selective breeding and through biotechnological practices.

In one of the videos assignments, “Anthropocene: The Human Epoch: How Humans Have Impacted the Planet'', students are asked to review and discuss a documentary that focuses on human-caused ecological destruction and extinction across the globe. Students will discuss the role of visual culture in revealing the often-hidden sites of extraction. This class activity increases awareness in the ways that human-centric mindsets endanger both planetary and human health.

GOAL 4: Successful students will analyze a variety of perceptions, representations and/or discourses about environments and humans within them.

ELO 4.1 Analyze how humans’ interactions with their environments shape or have shaped attitudes, beliefs, values and behaviors.
- Course activities and assignments to meet these ELOs

Students will evaluate human-centric attitudes and western cultural beliefs that make us think of plants as products and lands as places producing commodities. The desire for excess industrial

commodities further degrades ecosystems and accelerates human impact on plants and our environments. Through the course lectures, reading, and discussions, students will learn about how to understand and value plants beyond the anthropocentric mindset.

In the final art project, *"Speculative Fiction for Plants and Humans"* students will be asked to invent alternative lived environments, where we could minimize human impact and facilitate new affiliations, cohabitations, and coexistences between humans and plants in an effort to imagine an improved relationship for all in the lived environment. Students will materialize those concerns in their final, collaborative art projects and describe them in the final paper about their artwork.

ELO 4.2 Describe how humans perceive and represent the environments with which they interact.
- Course activities and assignments to meet these ELOs

Viewing and discussing contemporary ecological artworks, along with the creation of their own art assignments encourages students to consider their perceptions and share these through visual representations. Students will discuss alternative ways of perceiving and understanding plants and the lived environment through reading assignments such as, 'Brilliant Green'. In it, scientist Stefano Mancuso presents an understanding of "plant intelligence" and capabilities of plant communications with other organisms, which are more sophisticated than our general perception about them. Students will learn that plants have much to teach us about their approach to sustainability and adaptation to changing environments.

ELO 4.3 Analyze and critique conventions, theories, and ideologies that influence discourses around environments.
- Course activities and assignments to meet these ELOs

Through the course lectures, readings, discussions, and assignments, students will be asked to evaluate various ideologies related to human relationships with plants. In the final Assignment #5 – "Speculative Fiction for Plants and Humans", students will:

- consider and critique the treatment of plants in Western ideologies, indigenous approaches, and in posthumanism.
- speculate on alternative relationships between plants, humans, and the lived environment.
- develop new/alternative/revisionist concepts in collaborative teams.
- materialize their ideas in a collaborative artwork.
- participate in critiques, exhibit their work, and reflect on the outcome.

Molecular Genetics Curricular map and goals

Course Number	*Course Title*	*Credit Hours*	*Role in Major/MS degree*	*UG Program Learning Goals*	*MS Program Learning Goals*
Biochem 4511	Introduction to Biological Chemistry	4	core (BS)	1*, 2*, 3*, 4*, 5*	NA
MOLGEN 2220H	Intro to Molecular Life Sciences: Research Opportunities and Career Options	1	Elective (BS)	1, 2	NA
MOLGEN/PHILOS 2690	Genes and Society	3	Elective (BS)	6*, 7*	NA
MOLGEN/ART 3011	Art and Science: Learning with Plants	4	Elective (BS)	6*, 7*	NA
MOLGEN 3300	General Plant Biology	3	Elective (BS)	1*, 2*	NA
MOLGEN 3436	Introductory Plant Physiology	3	Elective (BS)	1*, 2*	NA
MOLGEN 4503	Molecular Genetics Writing Project	1	Elective (BS)	6**, 7**, 8**	NA
MOLGEN 4581S	BioEYES: Hands-on STEM learning with zebrafish in Columbus Public Elementary Schools	1	Elective (BS)	6**, 7**	NA
MOLGEN 4591S	DNA Fingerprinting Workshops in Columbus Public Schools	1	Elective (BS)	6**, 7**	NA
MOLGEN 4606	Molecular Genetics	4	core (BS)	1*, 2*, 3*, 4*, 5*	NA
MOLGEN 4703	Human Genetics	3	Elective (BS)	2**, 3**, 4**, 8*	NA
MOLGEN 4998	Undergraduate Research in Molecular Genetics	1 to 3	Elective (BS)	3**, 4**, 5**, 6**, 7**, 8**	NA
MOLGEN 4998H	Undergraduate Research in Molecular Genetics	1 to 3	Elective (BS)	3**, 4**, 5**, 6**, 7**, 8**	NA
MOLGEN 4999	Thesis Research in Molecular Genetics	1 to 3	Elective (BS)	3**, 4**, 5**, 6**, 7**, 8**	NA
MOLGEN 4999H	Thesis Research in Molecular Genetics	1 to 3	Elective (BS)	3**, 4**, 5**, 6**, 7**, 8**	NA
MOLGEN 5193	Individual Studies	1 to 3	Elective(BS), Elective MS	6**, 7**, 8**	2-A, 3-A

			Plan A, core MS Plan B		
MOLGEN 5194	Group Studies	1 to 3	elective BS and MS	2**, 8**	2-A
MOLGEN 5300	Cancer Genetics	3	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5601	Eukaryotic Molecular Genetics Lab	3 or 4	core (BS) elective (MS)	2*, 3*, 4*, 5*, 6*, 7*	1-I, 3-A
MOLGEN 5602	Eukaryotic Cell and Developmental Laboratory	3 or 4	core (BS) elective (MS)	2*, 3*, 4*, 5*, 6*, 7*	1-I, 3-A
MOLGEN 5607	Cell Biology	3	core (BS) elective (MS)	1*, 2*, 3*, 4*, 5*	1-B
MOLGEN 5607E	Cell Biology	4	core (BS) elective (MS)	1*, 2*, 3*, 4*, 5*, 6*	NA
MOLGEN 5608	Genes and Development	3	core (BS) elective (MS)	1*, 2*, 3*, 4*, 5*	1-B
MOLGEN 5608E	Genes and Development	4	core (BS) elective (MS)	1*, 2*, 3*, 4*, 5*, 6*	1-B
MOLGEN 5623	Genetics and Genomics	2	elective BS and MS	2**, 3**, 4**, 8**	1-I, 3-A
MOLGEN 5630	Plant Physiology	3	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5632	Insect Molecular Genetics	2	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5643	Plant Anatomy	3	elective BS and MS	2**, 3**, 4**, 6**, 7*, 8**	1-I
MOLGEN 5645	Quantitative, Population, and Evolutionary Genetics	2	core (BS) elective (MS)	1*, 2*, 3*, 4*, 5*	1-B
MOLGEN 5650	Analysis and Interpretation of Biological Data	3	elective BS and MS	3**, 5**	1-I
MOLGEN 5695	Frontiers in in Life Sciences Research: Genomics, Proteomics and Bioethics	1	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5700	Systems of Genetic Analysis	3	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5701	DNA Transactions	4	elective BS	2**, 3**,	1-I

	and Gene Regulation		and MS	4**, 8**	
MOLGEN 5705	Advances in Cell Biology	2	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5715	Developmental Genetics	2	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5733	Advanced Human Genetics	2	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5735	Plant Biochemistry	3	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5795	Special Topics in Molecular Genetics	1 to 3	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5796	Current Topics in Signal Transduction	1 to 2	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 5797	Study at a Foreign Institution	1 to 3	elective BS and MS	6*, 7*, 8*	1-B
MOLGEN 5798	Study Tour: Domestic	1 to 3	elective BS and MS	6*, 7*, 8*	1-B
MOLGEN 5800	Organelle Biology	2	elective BS and MS	2**, 3**, 4**, 8**	1-I
MOLGEN 7600	First-Year Student Orientation	1	required (MS)	NA	1-B
MOLGEN 7741	Molecular Virology and Pathologenesis of Viruses	5	elective (MS)	NA	1-A
MOLGEN 7999	Thesis Research	1-12	required (planA) elective (planB)	NA	2A, 3A
MOLGEN 7807	Gene Expression: Post-Transcriptional Control	3	elective (MS)	NA	1-A 3-A

Undergraduate Major Learning Goals
(no asterisk = beginner's level; * = intermediate level; ** = advanced level)

1. Undergraduate Molecular Genetics majors acquire a basic mastery of fundamental concepts of biology, chemistry, mathematics, physics, and the scientific method.
2. Undergraduate Molecular Genetics majors acquire a basic mastery of fundamental areas of molecular genetics, including transmission genetics, the central dogma of molecular biology, regulation of gene expression, quantitative and population genetics, genomics, recombinant DNA and biotechnology, and cell and developmental biology.
3. Undergraduate Molecular Genetics majors develop analytical and problem solving skills in areas of genetics and molecular biology.
4. Undergraduate Molecular Genetics majors acquire a basic mastery of experimental techniques and approaches used in genetics and molecular biology.
5. Undergraduate Molecular Genetics majors acquire a basic mastery of data analysis and statistical approaches used in genetics and molecular biology.
6. Undergraduate Molecular Genetics majors effectively communicate their understanding of genetics

and molecular biology both orally and in writing.
7. Undergraduate majors participate in academic research and/or outreach activities that are consistent with their interests and postgraduate plans.
8. Undergraduate majors acquire expertise relevant to their chosen area of specialization.

MS Learning goals
(B- beginning, I = Intermediate, A= Advanced)

1. Demonstrate a broad base of knowledge in several areas, including genetics, cell biology, and developmental biology. Goal is partially achieved by requiring one course in each pillar above.
2. Demonstrate a deep understanding of an area of special interest.
3. Effectively communicate research findings via oral and written presentations to specialized scientific and general audiences.