BIOL-144: PLANT BIOLOGY

Also listed as: BIOL-144H

Effective Term
Fall 2026

BOT Approval Date
06/12/2025

Discipline
BIOL - Biology
Course Number
144

Course Title
Plant Biology

Short Title
Plant Biology

Credit Status (CB 04)
D - Credit - Degree applicable

Units

Lecture Units
3.00

Lab Units
1.00

Total Units
4.00

Hours

Lecture Contact Hours
48-54
Out of Class Hours Lecture
96-108

Lab Contact Hours
48-54
Out of Class Hours Lab
0.00

Total Contact Hours
96 - 108

Total Out of Class Hours
96 - 108

Total Student Learning Hours
192 - 216

Is this an existing Extensive Lab?
Yes

Distance Education
Yes

Distance Education

Distance Education Type
Both Fully Online and Hybrid Online

Does the DE also apply to the Honors section?
No

Fully Online Delivery Requirements:
a. Students must be notified via the college schedule of classes and the syllabus for the class if proctored tests are required for this course
b. Any planned face-to-face meetings, such as an orientation or study session, must be optional
c. The MSJC curriculum committee requires the use of accessible, asynchronous discussion as a component of every fully online course

Are you using publisher content?
No

Regular Substantive Interaction
Instructor-to-student, student-to-student, and student-to-content contact shall be distributed in a manner that will ensure regular substantive interaction (RSI) is maintained not only weekly but also for the duration of the course. Instructor interactions should be equivalent in time, quality and consistency to the engagement students would receive in a face-to-face course—for example, through announcements, discussion participation, personalized feedback, video messages, or other instructional communications. Instructors are expected to be responsive to student inquiries within a 24-72 hour time frame excluding holidays. RSI will be maintained through a variety of methods: • Orientation - Students must be oriented to the online and face-to-face portions at the start of the course. • Announcements - Announcements using the course management system must be posted at least weekly to keep students current on course events, due dates, materials, etc. • Discussion Forums - Content-related discussion forums within the designated CMS will include appropriate instructor participation and will be initiated and maintained, with timely feedback provided. Instructors are required to monitor the discussions and related activities to provide guidance and direction. Open-ended discussion boards may be used to further learning and interaction. • MSJC Communication – Instructor will use MSJC-administered communication tools (such as email or the designated CMS communication tools) to regularly communicate with and provide ease of access to students. • Timely Feedback - Timely feedback on student work will be provided by the instructor, which may include comments and/or rubrics, within the Grades area of the designated CMS. • Scheduled Meetings – Hybrid and synchronous courses will meet at regularly scheduled times. ADA Compliance - All course interactions and content must be designed with accessibility in mind and meet ADA requirements.

Honors / Non-honors
BIOL-144H
C-ID (Admin Only)

CB 00

CCC000598587

Course Title

Honors Plant Biology

Approved Cal-GETC Area

AREA-5B

Approved Second Cal-GETC Area

AREA-5C

Approved Third Cal-GETC Area

Catalog Description

This course is a survey of the biology of plants. It explores the structure, function, evolution, reproduction, genetics, and ecology of photosynthetic organisms as well as their importance to people. The lab component provides experience with plant anatomy, morphology, growth, metabolism, reproduction and propagation. This course is not intended for biology majors.

Codes

TOP Code (CB 03)

0402.00 - Botany, General

CIP Code

26.0301 - Botany/Plant Biology.

Repeatability Code

No

Grading Option

Letter grade OR P/NP

Minimum Qualifications

Minimum Qualifications	And/Or
Biological Sciences (Masters Required)	Or
Ecology (Masters Required)	End

GE Information

Check GE Types Requested

AA/AS A - Natural and Physical Sciences

Cal-GETC Areas

Approved Cal-GETC Area

AREA-5B

Approved Second Cal-GETC Area

AREA-5C

Learning Objectives

Learning Objectives

Learning Objective
1. Illustrate and identify plant organs and tissues and examine how structure correlates with function.
2. Diagram the processes of photosynthesis, respiration, and transpiration in plants.
3. Categorize the elements that are important for plant nutrition and health.
4. Differentiate between the effects of the plant hormones and describe trophic responses.
5. Practice various plant propagation techniques.
6. Compare and contrast mitosis and meiosis.
7. Review the history of traditional genetics, demonstrate Mendel's laws, and describe the uses of modern genetics in agricultural practices.
8. Examine the contributions of Darwin and other scientists to theories of evolution and the tenets of natural selection.
9. Describe the Binomial System of Nomenclature, analyze the 3-Domain and 5-Kingdom classification systems, and discuss phylogenetic relationships.
10. Evaluate the uses of plants by diverse cultures throughout history, including the appropriation of traditional ecological knowledge, and the disparities in valuation afforded by western science to knowledge held by various cultures, ethnicities and genders.

11. Analyze environmental issues including conservation and pollution and relate ecological principles to the issues in question.
12. Design and execute an experiment using the scientific method and summarize findings in a report written in scientific format.

Honors Objectives

- Demonstrate research and experimental design skills by reading and assessing peer-reviewed sources and designing a feasible investigation related to plant form, function, ecology, or evolution.
- Recognize the implications, applicability, strengths, and shortcomings of conducting scientific research.
- Apply critical thinking skills to produce rigorous analyses of contemporary research in the botanical sciences.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome
1. The student will demonstrate the ability to utilize the scientific method and evaluate data.
2. The student will organize their time and exhibit persistence in comprehending complex biological concepts.
3. The student will critically examine diversity and opportunities in science, fostering an inclusive mindset towards various identities and experiences.

Content

Course Lecture Content

1. The Science of Plants
    a. Plant Domestication and Global Agriculture
        i. implications for human settlement and cultural development
    b. Characteristics of Life
    c. Classification of Living Organisms
    d. Scientific Process
2. Water
3. Organic Molecules
4. Cells and Tissues
    a. Cell Theory
    b. Prokaryotic and Eukaryotic Cells
5. Plant Cell Structures and Functions
    a. Tissue Systems
6. Roots
    a. Mycorrhizae
    b. Economic and cultural uses
7. Stems
    a. Primary and secondary growth
    b. Economic and cultural uses
8. Leaves
    a. Leaf Complexity
    b. Economic and cultural uses
9. Flowers and Sexual Reproduction
    a. Fruit Development and Structure
    b. Propagation and Germination
    c. Aesthetics
    d. Demographics of Food Security
10. Asexual Reproduction and Plant Propagation
    a. Horticulture

11. Photosynthesis
12. Respiration
    a. The carbon cycle and global climate change
13. Plant Hormones
    a. Environmental Stimuli
    b. Tropisms
    c. Agricultural production and global food security
14. Plant Nutrition
    a. Soils
15. Cell Cycle
    a. Mitosis and Meiosis
16. Patterns of Inheritance
    a. Mendel's Principles of Inheritance
    b. Plant Breeding
17. DNA Structure and Organization
18. Biotechnology and Genetically Modified Plants
19. Evolution
    a. Natural Selection
    b. Artificial Selection and the Role of Human Cultures
20. Cyanobacteria and Algae
21. Evolution of Land Plants (Embryophytes)
22. Bryophytes
23. Lycophytes and Ferns
24. Gymnosperms
    a. Timber harvesting and forest management
25. Angiosperms
    a. Monocots and Dicots
26. Fungi
27. Ecosystems and Biomes
28. Plant Communities and Populations
    a. Ecosystem Dynamics and Human Activity
    b. Biogeochemical Cycles
        i. Anthropogenic Climate Change
    c. Ecological Succession
        i. Wildfire
        ii. Human impacts on the environment
        iii. Land Stewardship and the Land Ethic
29. Food, Commercial Products, and Pharmaceuticals
    a. Plants and Human Society
    b. Traditional Ecological Knowledge and Cultural Identiity
    c. Bioprospecting and Environmental Racism
    d. Material Culture and Aesthetics
    e. Subsistence Agriculture
    f. Psychotropic plants and the spiritual realm
    g. Conservation

Course Lab Content

1. Survey of plant uses and products
2. Scientific method
3. Microscopy
4. Cell division
5. Plant tissues and vascular function
6. Stomatal regulation and evapotranspiration
7. Photosynthesis and light absorption
8. Respiration and fermentation
9. Mineral nutrition and soil health
10. Mendelian genetics: monohybrid and dyhibrid crosses
11. Construction and use of dichotomous keys
12. Population growth and environmental quality
13. Plant propagation
14. Flower morphology
15. Ethnobotany
16. Citizen science and biodiversity
17. Biogeochemical cycles and global climate change

Honors Content

- The honors component of the course will cover the same content as the standard BIOL 144 course. Additionally, honors students will explore course-related topics in greater depth.
- Honors assignments will require students to generate original data or utilize open-source data sets to investigate a topic relevant to plant biology at a level that goes beyond the standard library research paper. This data analysis component may be integrated into a volunteer or service experience.
- Students will work under the guidance of their instructor to determine the best analytical approach to understanding the chosen topic. The guidance related to data analysis may be catered to the focus and unique parameters of a service learning or volunteer opportunity Representative topics may include, but are not limited to, germination, population dynamics, phenology, data-mining citizen science projects (such as iNaturalist), food deserts, and ethnobotany. Pertinent examples include exploring flowering-time onset of local white sage populations over a multi-year time frame and conducting germination studies for seeds collected from local fire-adapted conifers. Service learning projects may include, but are not limited to, biological monitoring projects or revegetation efforts at local conservation areas, taxonomic undertakings at local herbaria, or basic laboratory research in regional research facilities.
- Successful research assignments will depend on students' use, understanding, and application of the scientific method and critical thinking skills.

Methods of Instruction

Method

Lab Activities

Integration

Hands-on laboratory exercises will emphasize the principles taught in the lecture. Students will engage in experimentation, microscopy, observation of morphological characteristics, data collection, and analysis.

DE Adaptations for MOI

Students are required to complete the same laboratory objectives as the face-to-face version of the course. Laboratory activities may be facilitated using a variety of hands-on activities as well as virtual laboratories. Hands-on activities will rely on materials and supplies that are readily available in most households or that can be inexpensively purchased in local stores. Laboratory activities will have either narrative instructions, video demonstrations, or multi-media components, all of which will be accessible. These will be followed by reports or assignments that will be submitted to the instructor via the CMS. Students may be required to collaborate on data-gathering endeavors by participating in threaded discussions or utilizing other virtual collaboration tools. Students are evaluated based on accuracy, participation, and understanding of the lab methods and concepts presented.

Method

Lecture

Integration

Lectures will be presented using a variety of multi-media approaches to demonstrate biological concepts. Content will highlight concerns relevant to the broad spectrum of diverse lived experiences represented by the student population by including case studies and examples that highlight the intersection between biodiversity and human culture.

DE Adaptations for MOI

Lectures will be delivered in an online environment using the Course Management System. Lectures may be PowerPoint presentations, written narratives, or accessible video lectures posted for the students to access

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Method

Observation and Demonstration

Integration

Demonstrations of lab and research techniques typically employed in botanical research will be provided by the instructor.

DE Adaptations for MOI

Demonstrations will be facilitated using a wide variety of accessible multi-media approaches, including short video clips, animations, and graphics.

Method

Discussion

Integration

Large and small group discussions on a variety of issues as they relate to the study of plants and their role in ecosystems and human society. For example, students may explore the role of traditional cultures in biodiversity conservation and artificial selection as a means of connecting course content to their own cultural identities.

DE Adaptations for MOI

Student discussion will be achieved via asynchronous communication using the online discussion forum feature of the course management system.

Additional Methods of Instruction for Honors

Students will meet with their instructor regularly throughout the semester (a minimum of 3 times, possibly more) to evaluate progress on the honors project and to discuss relevant issues. Students will be mentored on gathering, manipulating, and interpreting data.

Individual or small-group workshops or focus sessions will explore research techniques and demonstrate the skills necessary to evaluate reputable sources of data and information.

Students will be provided additional readings and resources relevant to their research topic and will be expected to consider their significance and integrate the content into their overall understanding of the issue they are investigating.

Methods of Evaluation

Method

Exams/Tests

Integration

Examinations will be used to assess the student's understanding of the course content. Examinations may be multiple-choice, written, or oral. A variety of assessment strategies will be integrated into the course to accommodate diverse learning styles and means of demonstrating fluency with the material.

DE Adaptations for MOE

Examinations will be given through the online course management system, and may consist of multiple choice, true/false, matching, or written essay questions. Feedback will be provided based on correctness of responses in a timely manner (within two weeks) to allow students to develop proficiency as they proceed through the course.

Method

Class Work

Integration

Class work will take the form of lab activities based on the application of the scientific method, observation of relevant phenomena, collection of data, analysis, and the formulation of conclusions.

DE Adaptations for MOE

Lab activities will be completed for lab work facilitated in the online environment. Students will be graded based upon the proper implementation of lab procedures, accuracy of observations, calculations and measurements and the validity of their conclusions. Lab writeups will be submitted by uploading them directly to the course management system or by answering a series of questions set up as an assignment or quiz in the CMS. Timely feedback will be provided by the instructor within two weeks of submission.

Method

Group Projects

Integration

Group projects will engage students in critical thinking and analysis-based activities. Students will be encouraged to highlight their unique perspectives and diverse experiences. Topics will explore issues that challenge the group to address social justice issues related to food, nutrition and access to biological resources. Evaluation will be based on participation, demonstrated comprehension of the material, and understanding of the issues and arguments being discussed.

DE Adaptations for MOE

Evaluation will be based upon participation, demonstrated comprehension of the material, and understanding of the issues and arguments being discussed. Evidence will be provided by the student interactions within the discussion forum. Feedback will be provided in a timely fashion and should be available for students before the next iteration of the assignment, so that they may act on suggestions and improve performance. A clear rubric will be presented to guide students and establish expectations for participation.

Method

Research Projects

Integration

Students will engage in a research project that will involve the use of published scientific literature. Students will be graded based on their ability to assess the scientific validity of their sources, professional presentation of their work, and their ability to reflect on the impact of what they have learned on diverse peoples and regions of the world.

DE Adaptations for MOE

Completed research projects will be submitted for evaluation through the assignments feature of the course management system, where instructors will provide timely feedback. Rubrics will be employed to ensure that students are aware of expectations and receive valuable feedback.

Evaluation of Honors assignments

Students in the honors section of BIOL 144 will complete all of the requirements for the regular BIOL 144 course and will be graded according to the standards set for the regular course. To receive honors credit, students must successfully complete the honors assignment(s) in addition to the standard course work.

Written research projects will be assessed based on the appropriate application of the scientific method, a valid interpretation of the data collected or used, the relevance of the conclusions drawn from the research, the number and quality of citations, scientific accuracy of the content, originality of work and proper formatting (such as APA).

The portfolio assignment will be evaluated based on the thorough documentation of the research process, including annotations and critical analyses of resources evaluated for inclusion as citations in the final paper.

Assignments

Assignment Type

Reading

In-class and/or outside of class

In-class

Formative or Summative

Formative

Assignment

Read the lab procedure document, 'Pigments in Photosynthesis,' provided in the CMS, along with the journal article entitled, "Light Absorption by Plants and Its Implications for Photosynthesis." (OSBORNE, B. A., & RAVEN, J. A. (1986). LIGHT ABSORPTION BY PLANTS AND ITS IMPLICATIONS FOR PHOTOSYNTHESIS. Biological Reviews, 61(1), 1-60. https://doi.org/10.1111/j.1469-185X.1986.tb00425.x)

Using a spectrophotometer and a sample of a plant pigment involved in the photosynthetic process, generate a data set of absorption in 10-nanometer intervals along the visible spectrum of light. Read and interpret this data set by first creating a graph with wavelength on the x-axis and absorption on the y-axis. Next, ascertain which colors of the visible spectrum are optimal for absorption by this pigment. Which colors are poorly utilized? By combining graphed data with other groups in the class who assessed different pigments, write a summary statement about how pigments interact to enhance light absorption. Compare the class results with the findings presented in the 'Light Absorption' article.

How assignment will be adapted in online format

Students will be provided with a virtual walkthrough of the lab procedures necessary to generate light absorption data in the CMS. A sample of raw data will be provided to them for analysis. They will prepare their written response and submit it using the assignment feature of the CMS. Grading and feedback will be provided in a timely manner using the appropriate tools within the CMS.

Assignment Type

Writing

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

Familiarize yourself with a single plant native to your local environment and prepare a brief written report. To do this, you may use a variety of resources to identify a local species or you may opt to explore a map of local biodiversity. The iNaturalist app and website are very useful for both of these approaches. Once you have identified the plant, please explore the relevant literature about the plant to prepare a short report addressing the following: What is its geographical range and ecological requirements? What is its taxonomic family? Does it have any documented uses? What drew you to this particular plant?

How assignment will be adapted in online format

Students will be provided with links to relevant plant databases for exploring local biodiversity. They will have access to the internet as well as the MSJC library website for research. Their papers will be submitted through the Assignment feature of the CMS. Grades and constructive feedback will be provided to students in a timely manner by utilizing the appropriate features within the CMS.

Assignment Type

Writing

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

Based on the information presented throughout this course related to the global shift from traditional to conventional agricultural practices, please write a 750-1000 word response to the following prompt: what role does the conservation of landrace varieties developed by traditional cultures play in maintaining global food security?

How assignment will be adapted in online format

Students will be provided with all foundational materials through readings and virtual lectures in the CMS. This writing assignment will be presented using the assignment feature of the CMS, which is also where students will submit their work. Timely and constructive feedback will be provided using the feedback feature in the assignment.

Honors Assignments

Assignment

Students will complete all regular course requirements for BIOL 144 and be graded according to the standards used for the rest of the class. In addition, students will be expected to complete one of Options A or B, in addition to Option C.

Required or Optional

Required

Assignment

Option A: In consultation with the instructor, honors students will choose a topic relevant to the content of the course and conduct an independent research project. The core requirement is that students must manipulate and interpret data in a way that allows them to address a particular question and derive novel conclusions. Students may elect to gather data using a variety of lab or field methods, or they may opt to use open-source data sets such as those provided by iNaturalist.

Sample topics may include an analysis of phenological changes in butterfly host species over time, a germination study of Tecate Cypress seeds under differing temperature regimes, or a spatial analysis of food deserts relative to demographic indices.

The results of the research will be presented in a research paper of 8-10 pages in length, with a minimum of five peer-reviewed references, cited in APA format.

Required or Optional

Required

Honors Core Values

Academic Rigor and Research
Engagement
Positive Transgressive Behavior (as evidenced by creativity, innovation, risk taking, challenging norms and standard narratives)

Justify how the assignment reflects the Academic Rigor and Research Core Value

Students will develop a research project based on their understanding of the core concepts presented in the class and will be driven by curiosity to engage in scientific inquiry. They will use data, either generated as a part of their project or borrowed from an open source, to address a question or problem.

Justify how the assignment reflects the Engagement Core Value

Students will move beyond reporting on what they have learned about a topic and engage directly with the scientific process. This is easier than ever to accomplish with the advent of open-source data collection applications (such as iNaturalist) and the free sharing of datasets on the internet (example: Keeling Curve data set, shared by NOAA). Engagement in the act of conducting science will empower students to see themselves as scientists and to address problems in a proactive way.

Justify how the assignment reflects the Positive Transgressive Behavior Core Value

Students will engage directly with the scientific process, thereby challenging the narrative that science is the realm of trained professionals in sterile environments. They will be encouraged to move beyond this stereotype and see themselves as empowered innovators who utilize their curiosity and innovative thinking to address real-world concerns.

Assignment

Option B: The student will engage in a service learning project. The student, with the guidance and approval of the instructor, will identify a local organization where the student can volunteer in some capacity. Examples might include a conservation organization (such as The Nature Conservancy of the US Forest Service), an advocacy group (such as the Sierra Club or California Native Plant Society), or a research entity (such as the UC Riverside Herbarium). The student will be expected to volunteer a minimum of 20 hours with this organization during the semester.

The service learning experience will be integrated into a research project involving the manipulation and presentation of data. The data component can be catered to the student's interests. While it may involve an issue related directly to the work experience (for example, an analysis of visitation pressure during peak flower season at the Santa Rosa Plateau), it can also focus on practical elements of the experience (such as job outlook data related to forest management). For example, a student may provide a description and reflection on the experience of volunteering to conduct riparian surveys for a conservation agency. The data analysis requirement could be met in many ways, as determined by the students in consultation with the instructor. Examples include presenting and analyzing data collected as part of the project, analyzing data gleaned from other sources on riparian ecosystems in general, or exploring relevant employment data related to opportunities available for working in the field professionally. The student and instructor can determine the data approach that is the best fit for the student's interests. The analysis need not be complicated but should incorporate the identification of relevant data sources, the demonstration of some level of manipulation and interpretation of the data, and the presentation and discussion of the data.

The student will prepare a 4-7 page paper exploring the service learning experience along with the integration of data analysis. The paper should incorporate a minimum of 3 peer-reviewed sources.

As an appreciative gesture, the student may opt to present their findings to the facilitating organization.

Required or Optional

Required

Honors Core Values

Academic Rigor and Research
Engagement
Positive Transgressive Behavior (as evidenced by creativity, innovation, risk taking, challenging norms and standard narratives)

Justify how the assignment reflects the Academic Rigor and Research Core Value

A component of this option involves both library research and data analysis. Students will demonstrate academic rigor in the synthesis and presentation of findings in a final summative essay.

Justify how the assignment reflects the Engagement Core Value

The volunteer component engages students directly in their community and immerses them in their field of interest. Persistence and commitment to the project are imperative to meeting the required number of hours.

Justify how the assignment reflects the Positive Transgressive Behavior Core Value

Students will move beyond the campus environment to engage in a volunteer experience. This requires initiative and commitment. It additionally challenges the norms of learning activities and empowers students to see themselves as a part of a professional community in which they can play an active role and make a positive contribution.

Assignment

Option C: Students will keep a comprehensive journal, portfolio, or ePortfolio documenting their progress through Option A or B. Students will document the refinement of the topic they wish to pursue. They will keep track of relevant citations and data sources, including annotations for quick reference. All citations included in the final project and discussed in the portfolio will be summarily analyzed to assess the validity of the analytical approaches and the veracity of the conclusions gleaned from the research. Any service hours or data collection activities will be included along with notes from meetings with the instructor. The journal/portfolio will be required to be updated regularly and made available for consultation with the instructor so that streamlined and personal

guidance can be provided for the development of the research or service learning project. The instructor may provide writing prompts for reflection on the stages of the research process as a means of further developing the student's analytical mindset.

Required or Optional

Required

Honors Core Values

Academic Rigor and Research
Engagement

Justify how the assignment reflects the Academic Rigor and Research Core Value

Rigorous note-taking and documentation are important to conducting research. This component supports students in the development of a successful Honors project and underscores the importance of attention to detail in academic endeavors.

Justify how the assignment reflects the Engagement Core Value

Students will be engaged throughout the course of the semester in the ongoing development of the research/service learning project. The journal will provide a record of progress and instill a sense of accountability, ultimately leading to a refined product.

Course Materials

Textbooks

Parker, R. (2021). Just the Facts: Introduction to Plant Science. Kendall-Hunt. ISBN: 9781792459313
Bidlack, J., S. Jansky, K.R. Stern (2020). Stern's Introductory Plant Biology, 15th ed. McGraw-Hill. ISBN: 9781264157365
Matthias, C. W. (2023). Understanding Botany. Independently Published. ISBN: 979-8851313035

Class Size Information

Class Size

32

Class Size Category

G - Large lab 32

Diversity and Inclusion

Course Design and Materials: Course will incorporate diverse perspectives, authors, and examples that reflect a variety of cultures, identities, and lived experiences. Instructional materials will be reviewed regularly to ensure representation, inclusivity, and alignment with equity-minded practices across disciplines.

Inclusive Learning Environment: Instructors will establish classroom norms and policies that promote respect, civil discourse, and belonging in both online and face-to-face classes. Clear expectations for communication and engagement will support a learning space where all students feel valued and heard.

Accessible Instruction: Course content will be delivered using accessible design. Materials will follow accessibility guidelines within the CMS, including captioned media, readable document formats, and multiple means of engagement to support diverse learning.

Equitable Teaching Practices: Instructors will use transparent and grading criteria, varied assessment methods, and timely feedback to promote fairness and student success. Opportunities for revision, reflection, and multiple demonstrations of learning may be incorporated when appropriate to the discipline.

Culturally Responsive Pedagogies: Instructional strategies will encourage critical thinking about diverse perspectives and systems of power relevant to the course content. Faculty will foster opportunities for students to connect course material to real-world contexts.

Ongoing Reflection and Improvement: Faculty will engage in continuous professional development related to IDEAA principles and reflect on course practices using metacognition to identify opportunities for increased equity, inclusion, and accessibility.

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

This course explores the form, function, and diversity of plant life. Students frame these concepts against the backdrop of the complex interrelationships between people and the botanical world, including material culture, sustenance, aesthetics, and spirituality. Students will be invited to explore how different races, ethnicities and genders are defined and impacted by the foundational organisms in their immediate environment. Students are expected to integrate the material into an exploration of their own lived experiences and share their diverse perspectives in an environment governed by norms of inclusivity.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

Instruction is focused on eliminating structural barriers to success by incorporating open educational resources and presenting a diverse array of media to connect with a spectrum of learning styles. In addition, students are expected to interact with one another in discussions focused on contemporary issues and to share their perspectives and personal experiences while adhering to norms of inclusivity. Students are encouraged to challenge normative expectations of what it means to engage with science and are provided with the tools to be active in the scientific endeavor regardless of their chosen major or career path.

Interactions

Explain how the course will incorporate student-to-student interaction.

Students will have frequent opportunities to interact with one another in online or in-person discussions focusing on issues relating to the intersection between core concepts presented in the course and their own lived experiences. Students will explore their personal and cultural relationship with the botanical world in group settings. The will collaborate on lab experiments by sharing results in think-pair-share forums and will engage with one another to demonstrate understanding of biological concepts using the jigsaw method of instruction. These interactions will augment the other forms of content delivery employed in this course by exposing students to diverse perspectives held by members of their own communities. Students will be encouraged to develop and abide by norms of tolerance and inclusivity. An example of student-to-student interaction is a discussion forum focused on students' lived experiences and interactions with traditional plant uses in their own cultures. Students will offer appreciative evaluations of each others' work. They will be invited to compare bio-cultural experiences in various contexts against a backdrop of the foundational knowledge in ethnobotanical principles presented in the course.

Explain how the course will incorporate instructor-to-student interaction.

Instructors will participate in and guide group discussions. In the distance education modality, these interactions may be either asynchronous, taking place in the discussion forum or via email communication, or synchronous, via video conferencing. For challenging assignments and projects, instructors will model metacognitive approaches, engaging with students to guide them through complex critical thinking processes. This may include demonstrations of map reading techniques, data interpretation approaches, or interactions with complex primary literature sources. The instructor will guide students through dissections, microscopy activities and genetics problems by demonstrating techniques, holding space for the students to execute the procedure, assessing outcomes and providing constructive criticism. Feedback will be provided either verbally, in writing, or through the course management system. Instructors will be available to answer questions and interact with students directly.

Explain how the course will incorporate student-to-content interaction.

Students will be provided with a variety of accessible forms of media for content delivery. These may include written narratives, journal articles, open-source textbook materials, videos, or verbal lectures. A diverse array of approaches will be employed to accommodate a spectrum of learning styles. For the online modality, these materials will be posted in an accessible format in the course management system, with the lecture component being recorded and captioned. Students will work towards concept proficiency through formative assessments, engage in deeper more reflective work through critical thinking assignments, and will assess their assimilation of the content through summative assessments. Students will engage with content in active ways, bringing their schema to bear with reading assignments, mining data for meaning, and providing feedback to enhance relevance and reliability. A pertinent example of student-to-content interaction is the reading of a journal article about photosynthesis and light absorption, followed by a laboratory investigation in which students will apply the principles they have learned, collaborate with one another, combine data for evaluation, and finally, compare their results with the expected outcomes gleaned from the initial reading. Students will be introduced to new concepts, such as plant tropisms, in a scaffolded way. Content will be chunked with multiple checkpoints for understanding. Students will then connect the content to their lived experience (in the case of tropisms, considering how plants move and respond to environmental cues). Hands-on or simulated application of knowledge will then follow. Finally, students will reflect on the content in a metacognitive sense and prepare for a summative assessment.

Explain how the course will incorporate student-to-self interaction (metacognitive).

Students will engage in critical thinking activities that require them to explore the ways in which their understanding of core botanical concepts directly impacts their lives. They will be encouraged to critically assess their ethical stance on complex issues (such as biocultural identity, conservation, and bioengineering) that affect diverse stakeholders in varying ways. Students will have the opportunity to reflect on any discordance between their subjective worldview and their understanding of objective science. Students will consider their own relationship to the botanical world and, through a variety of analysis projects, explore differences in the ways people around the world interact with their immediate environment. Through reflection, students will be immersed in the global context of the topics presented in the course.

Key: 479