

PLANT SCIENCE (PLANTSCI)

PLANTSCI 110 – INTRODUCTION TO PLANT SCIENCE AND TECHNOLOGY

4 credits.

Introduces the basic principles of plant science and technology as they apply to cultivated plants. Topics include the historical and economic importance of plants for food, feed, and fiber; origin, classification, and geographic distribution; plant breeding; growth, development, and physiology; agroecosystems and practices; field and greenhouse production; integrated pest management; and marketing practices. Discuss and apply associated technologies (e.g. gene editing, remote sensing, unmanned aerial vehicles).

Requisites: None

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Define and describe plant anatomy and morphology from subcellular through whole plant organization
Audience: Undergraduate

2. Define and describe the basic principles of plant growth and development including photosynthesis, respiration, transpiration, plant growth regulators, reproduction and genetics
Audience: Undergraduate

3. Articulate how the environment and management practices affect plant growth and development
Audience: Undergraduate

4. Illustrate how cutting-edge technologies are being used to address modern agricultural challenges
Audience: Undergraduate

5. Locate and use reputable resources to communicate scientific knowledge about plants in written and oral formats
Audience: Undergraduate

6. Identify areas of interest and potential opportunities for career development in plant science and technology
Audience: Undergraduate

PLANTSCI 121 – COLLOQUIUM IN PLANT SCIENCE AND TECHNOLOGY

1 credit.

Overview of regional, national and international areas of importance to various plant science industries. Discuss current plant science related topics of special interest.

Requisites: None

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Describe what education and training is needed for various careers in horticulture and plant sciences.

Audience: Undergraduate

2. Discuss current plant science topics and be able to find scientific, unbiased sources of information.

Audience: Undergraduate

3. Identify opportunities for career development in the plant sciences and horticulture.

Audience: Undergraduate

4. Discuss the numerous ways that plant science and horticulture can help to reduce climate change effects for a sustainable future.

Audience: Undergraduate

PLANTSCI 227 – PROPAGATION OF HORTICULTURAL PLANTS

3 credits.

Methods of propagation of herbaceous and woody plants, fundamental anatomical and physiological principles underlying sexual and asexual propagation of plants.

Requisites: Sophomore standing and (BOTANY 100, BOTANY/BIOLOGY 130, or ZOOLOGY/BIOLOGY/BOTANY 152)

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Explain the science behind the major types of asexual and sexual propagation methods

Audience: Undergraduate

2. Perform the major types of asexual and sexual propagation methods
Audience: Undergraduate

3. Describe the role of research in plant propagation
Audience: Undergraduate

4. Identify appropriate plant propagation reference materials available for developing propagation protocols
Audience: Undergraduate

5. Provide expertise in plant propagation for possible future employment in commercial operations
Audience: Undergraduate

PLANTSCI 230 – WINES AND VINES OF THE WORLD

2 credits.

An introduction to grape production and wine culture. Learn the science of growing grapes, wine-making, and wine appreciation. Topics include cultural history and geography of the world's grape-producing regions, principles of plant anatomy and physiology, biochemistry of wine production, wine producing regions of the world and wine styles, and sensory evaluation of wines. Includes a wine tasting discussion to explore the sensory attributes of the wines and production practices specific to the wine production regions to be covered. Students must be 21 years of age by the start of class to enroll.

Requisites: Consent of instructor

Course Designation: Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Describe the basic chemistry and biology concepts pertaining to viticulture and winemaking

Audience: Undergraduate

2. Explain general concepts of sustainable grape production and the winemaking process

Audience: Undergraduate

3. Discuss the history and social dimensions of wines from around the world and their relation to culture

Audience: Undergraduate

4. Implement tasting strategies to characterize wine from different regions of the world

Audience: Undergraduate

5. Analyze the causes of and solutions for the sustainability challenges of worldwide grape production

Audience: Undergraduate

6. Analyze sustainability issues and/or practices in viticulture using a systems-based approach

Audience: Undergraduate

PLANTSCI 234 – HERBACEOUS ORNAMENTAL PLANT IDENTIFICATION, CULTURE, AND USE

4 credits.

Field identification, landscape characteristics, uses, environmental requirements, and adaptability of herbaceous ornamental plants. Topics include annual flowers, herbaceous perennials and ornamental grasses, groundcovers, bulbs and containerized outdoor tropical plants.

Requisites: Sophomore standing and (BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 152, or BOTANY 100)

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Use basic taxonomic tools needed for plant identification, including classification, vegetative and reproductive morphology, and nomenclature of cultivated plants

Audience: Undergraduate

2. Recognize many herbaceous plants, both native and exotic, by family, species (genus and specific epithet), variety, cultivar, and sometimes trademark

Audience: Undergraduate

3. Discuss herbaceous plant identification, distribution, ornamental characteristics as well as undesirable features, culture, adaptability, and uses

Audience: Undergraduate

4. Select herbaceous plants for specific purposes and site conditions

Audience: Undergraduate

5. Identify appropriate reference material and guides for identifying herbaceous plants

Audience: Undergraduate

PLANTSCI 240 – THE SCIENCE OF CANNABIS

1 credit.

An overview of the history, legality, regulation, anatomy and botany, agronomic and horticultural practices, and end-use potential of industrial hemp. Focus on sustainable agricultural production and processing of industrial hemp for food, fiber, and cannabinoids. Gain real world insight into this rapidly expanding area. Hands-on experience growing, propagating and pollinating hemp.

Requisites: None**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No**Last Taught:** Spring 2025**Learning Outcomes:** 1. Define the past and present status of legality of hemp in Wisconsin, the United States, and in the world.

Audience: Undergraduate

2. Acquire a basic comprehension of hemp anatomy, physiology and genetics.

Audience: Undergraduate

3. Describe best practices for growing, harvesting, and processing industrial hemp for grain, fiber, and cannabinoid production.

Audience: Undergraduate

4. Discuss the pros, cons, and viability of at least 10 hemp-derived products in the U.S.

Audience: Undergraduate

5. Explain the social, economic, and environmental dimensions of the sustainability challenges of cannabis production

Audience: Undergraduate

6. Apply sustainability principles and frameworks to addressing the challenge of producing cannabis derived products

Audience: Undergraduate

PLANTSCI/PL PATH 261 – SUSTAINABLE TURFGRASS USE AND MANAGEMENT

2 credits.

Sustainable use and management of turfgrass landscapes in urban and suburban environments, including home lawns, golf courses, and sports fields. Focus is on creating sustainable and attractive turfgrass landscapes through proper species selection, use of slow-release or organic fertilizer practices, and minimizing the use of pesticides and supplemental irrigation.

Requisites: None**Repeatable for Credit:** No**Last Taught:** Fall 2025**Learning Outcomes:** 1. Describe how turf is used in urban and suburban communities

Audience: Undergraduate

2. Identify the positive environmental impacts of using turfgrass

Audience: Undergraduate

3. Identify the negative environmental impacts of turfgrass management

Audience: Undergraduate

4. Identify the 3 major pest groups in turfgrass and describe sustainable management strategies for each

Audience: Undergraduate

PLANTSCI/PL PATH 262 – TURFGRASS MANAGEMENT LABORATORY

1 credit.

Hands-on turf establishment, cool- and warm-season grass, seed and weed identification, chemical application, and turf cultivation techniques and equipment use, plus field trips to major league sport facilities and golf courses.

Requisites: PL PATH/PLANTSCI 261 or concurrent enrollment**Repeatable for Credit:** No**Last Taught:** Fall 2024**Learning Outcomes:** 1. Identify the species of turfgrass commonly used in Wisconsin and the conditions they are most suited to.

Audience: Undergraduate

2. Describe management strategies that can be implemented to increase the sustainability of turfgrass management.

Audience: Undergraduate

3. List the most common pests observed on Wisconsin turfgrass and describe strategies for their sustainable management.

Audience: Undergraduate

4. Calculate the amount of seed needed to properly establish a turfgrass site, the amount of fertilizer needed to adequately fertilize turfgrass, and the concentration of pesticides needed to suppress common turfgrass pests.

Audience: Undergraduate

PLANTSCI/LAND ARC 263 – WOODY LANDSCAPE PLANT IDENTIFICATION, CULTURE, AND USE

4 credits.

Field identification, landscape characteristics, uses, environmental requirements, and adaptability of woody ornamental plants; their autumn and winter characteristics. Topics include trees, shrubs, evergreens, vines and woody groundcovers.

Requisites: Sophomore standing and (BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 152, or BOTANY 100)

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2023

Learning Outcomes: 1. Use basic taxonomic tools needed for plant identification, including classification, vegetative and reproductive morphology, and nomenclature of cultivated plants

Audience: Undergraduate

2. Recognize many woody ornamental trees, shrubs, groundcovers, and vines, both native and exotic, by family, species (genus and specific epithet), variety, cultivar, and sometimes trademark

Audience: Undergraduate

3. Discuss woody landscape plant identification, distribution, ornamental characteristics as well as undesirable features, culture, adaptability, and uses

Audience: Undergraduate

4. Select woody landscape plants for specific purposes and site conditions

Audience: Undergraduate

5. Identify appropriate reference material and guides for identifying woody landscape plants

Audience: Undergraduate

PLANTSCI 289 – HONORS INDEPENDENT STUDY

1-2 credits.

Research work under direct guidance of a Plant and Agroecosystem Sciences faculty or instructional academic staff member. Students are responsible for arranging the work and credits with the supervising instructor. Intended for students in the CALS Honors Program.

Requisites: Consent of instructor

Course Designation: Honors - Honors Only Courses (H)

Repeatable for Credit: Yes, unlimited number of completions

Learning Outcomes: 1. Develop critical, analytical and independent thinking skills through a scientific research project.

Audience: Undergraduate

2. Apply the scientific method and engage in constructive problem solving in a scientific research project.

Audience: Undergraduate

3. Demonstrate application of research skills and methodologies through a research project.

Audience: Undergraduate

4. Effectively communicate scientific findings in an oral and/or written format.

Audience: Undergraduate

PLANTSCI 299 – INDEPENDENT STUDY

1-3 credits.

Research work under direct guidance of a Plant and Agroecosystem Sciences faculty or instructional academic staff member. Students are responsible for arranging the work and credits with the supervising instructor.

Requisites: Consent of instructor

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2026

Learning Outcomes: 1. Develop critical, analytical and independent thinking skills through a scientific research project.

Audience: Undergraduate

2. Apply the scientific method and engage in constructive problem solving in a scientific research project.

Audience: Undergraduate

3. Demonstrate application of research skills and methodologies through a research project.

Audience: Undergraduate

4. Effectively communicate scientific findings in an oral and/or written format.

Audience: Undergraduate

PLANTSCI 300 – CROPPING SYSTEMS

3 credits.

Agronomic cropping systems of the Midwest: environmental impacts, productivity, and profitability. Cropping system diversification and sustainable agriculture. An agroecological approach, the application of ecological concepts and principles for the improvement of cropping systems is emphasized. Specific topics include agricultural intensification, agroecosystem structure and function, aspects of technology adoption, soil erosion and conservation, tillage systems, weed ecology and management, nutrient dynamics and management, water quality, crop rotation, and cropping system diversification.

Requisites: AGRONOMY 100, HORT 120, PLANTSCI 110, ENVIR ST/ AGROECOL/C&E SOC/ENTOM 103, or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Describe the dynamic history and unique characteristics of agriculture

Audience: Both Grad & Undergrad

2. Identify factors that drive change and those that constrain change in cropping systems

Audience: Both Grad & Undergrad

3. Use an agroecological approach to better understand and improve cropping systems

Audience: Both Grad & Undergrad

4. Explain key components of cropping systems and their impact on agroecosystem services and sustainability

Audience: Both Grad & Undergrad

5. Evaluate new and emerging approaches to crop management in the context of sustainability and potential tradeoffs

Audience: Both Grad & Undergrad

6. Develop a comprehensive grant research proposal that effectively addresses a topic pertinent to sustainability of cropping systems

Audience: Graduate

PLANTSCI 302 – FORAGE MANAGEMENT AND UTILIZATION

3 credits.

Establishment, management, harvesting and utilization of forage crops for use as hay, pasture and silage. Emphasis on cool season perennial grasses and legumes.

Requisites: Junior standing and (DY SCI/AN SCI 101, ZOOLOGY/ BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 151, AGRONOMY 100, PLANTSCI 110, or BIOCORE 381) or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2023

Learning Outcomes: 1. Explain the importance of forages in Wisconsin, USA, and the world

Audience: Both Grad & Undergrad

2. Identify forage species commonly grown and know the environmental conditions to which each is best adapted

Audience: Both Grad & Undergrad

3. Identify an alfalfa variety or corn silage hybrid best suited for a specific environment

Audience: Both Grad & Undergrad

4. Describe how legumes and grasses grow, and regrow, after harvest or grazing

Audience: Both Grad & Undergrad

5. Recommend practices to optimize establishment, growth, persistence, and nutritive value of forages

Audience: Both Grad & Undergrad

6. Evaluate how the environment impacts forage persistence, production, and quality

Audience: Both Grad & Undergrad

7. Develop optimal harvest strategies based on farming operation goals

Audience: Both Grad & Undergrad

8. Explain the principles of preserving forage crops (hay or silage) and direct grazing

Audience: Both Grad & Undergrad

9. Recognize major pests (diseases, insects, and weeds) that affect alfalfa production and best management practices for control

Audience: Both Grad & Undergrad

10. Communicate effectively ideas in written reports and oral presentations

Audience: Both Grad & Undergrad

11. Understand and summarize current topics in forages research

Audience: Graduate

PLANTSCI 310 – PLANT SCIENCE AND TECHNOLOGY IN CROPPING SYSTEMS

4 credits.

Explores the application of plant science and current technologies in both field and controlled environments to enhance crop production. Analyzes the impacts of these technologies on agroecosystem structure and function, examining the trade-offs that affect productivity, profitability, environmental sustainability, and social outcomes.

Requisites: BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 152, BIOCORE 381, PLANTSCI 110, HORT 120, AGRONOMY 100, or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Learning Outcomes: 1. Critically assess state-of-the-art technologies in plant science, productivity, and utilization

Audience: Undergraduate

2. Evaluate technology impacts on agroecosystem structure and function specifically productivity, profitability, environmental, and social outcomes

Audience: Undergraduate

3. Articulate trade-offs associated with technology adoption, technology avoidance, and system choices

Audience: Undergraduate

4. Effectively apply and communicate knowledge about plant science and use of technologies in crop production

Audience: Undergraduate

5. Evaluate the potential applications of state-of-the-art plant science technologies in their current or proposed research, considering the practical implications, benefits, and challenges of integrating these technologies into their work

Audience: Graduate

PLANTSCI 320 – ENVIRONMENT OF CULTIVATED PLANTS

3 credits.

An exploration of major environmental factors that regulate plant growth and development - temperature, water availability, light, and carbon dioxide. Patterns are studied temporally at the daily, seasonal (yearly), and long-term (climate) time scales, geographically at the local and global scales, and contextually in natural, agricultural, and controlled environment conditions. Includes effects of environmental conditions on plant growth and development, including adaptive mechanisms to stress conditions at the physiological level.

Requisites: BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 152, AGRONOMY 100, HORT 120, PLANTSCI 110, or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Explain effects of major environmental factors on plant growth and development

Audience: Both Grad & Undergrad

2. Examine plant responses to identify effects of different weather or climate components

Audience: Both Grad & Undergrad

3. Reflect on how changes in climate will affect plants at their current distribution

Audience: Both Grad & Undergrad

4. Explain how development stages in plants are effective integrators of climate data

Audience: Both Grad & Undergrad

5. Evaluate the role of environmental variables in plant growth and development in general and specific primary literature

Audience: Graduate

PLANTSCI 333 – SURVEY OF CONTROLLED ENVIRONMENT FOOD PRODUCTION

2 credits.

Survey of the basic principles and concepts of the biology of plants and their application to cultivation of food crops in controlled environments.

Integrates topics including: organic systems, sustainability, urban agriculture, and socioecological factors.

Requisites: None

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Explain and apply concepts from biological and physical sciences to growing plants in controlled environments with an emphasis on application in organic systems.

Audience: Undergraduate

2. Investigate the effects of controlled environments on plant growth and evaluate the results.

Audience: Undergraduate

3. Select crops and cultivars appropriate for growing in controlled environments, indoors and outdoors.

Audience: Undergraduate

4. Discuss the scientific principles behind food safety, sanitation, organic practices, and good agricultural practices in controlled environments.

Audience: Undergraduate

5. Apply sustainability principles and/or frameworks to addressing the challenge of food production in controlled environments, specifically their application in urban food systems.

Audience: Undergraduate

6. Describe the social, economic, and environmental dimensions of controlled environment agriculture and identify potential tradeoffs and interrelationships among these dimensions at a level appropriate to the course.

Audience: Undergraduate

PLANTSCI 334 – GREENHOUSE CULTIVATION

2 credits.

Principles of selection, production, handling, use of fruits, vegetables, flowers, and foliage plants grown indoors.

Requisites: BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 152, AGRONOMY 100, PLANTSCI 110, or HORT 120

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Identify key aspects of the greenhouse industry and the methods and principals of growth in controlled environments

Audience: Undergraduate

2. Develop critical thinking skills and apply scientific concepts related to growing plants in controlled environments

Audience: Undergraduate

PLANTSCI 335 – GREENHOUSE CULTIVATION LAB

1 credit.

Provides a hands-on experience in and understanding of greenhouse cultivation.

Requisites: PLANTSCI 334 or concurrent registration

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Demonstrate the skills, techniques, and practices used in greenhouse cultivation.

Audience: Undergraduate

PLANTSCI 338 – PLANT BREEDING AND BIOTECHNOLOGY

3 credits.

Principles of crop plant improvement are discussed in the context of genetics, plant biology, plant breeding, plant biotechnology, and world food, feed, and raw material needs.

Requisites: BIOLOGY/BOTANY 130, GENETICS 466, 467, BIOCORE 381, or (ZOOLOGY/BIOLOGY/BOTANY 151 and 152 or concurrent enrollment in ZOOLOGY/BIOLOGY/BOTANY 152)

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Explain the basic principles of plant breeding

Audience: Both Grad & Undergrad

2. Describe and analyze different plant breeding systems and methods

Audience: Both Grad & Undergrad

3. Identify, formulate, and solve breeding problems using appropriate information and approaches

Audience: Both Grad & Undergrad

4. Discuss the professional and ethical responsibility of plant breeding activities

Audience: Both Grad & Undergrad

5. Synthesize knowledge to propose improvements to breeding systems and write clear and concise technical reports and research articles

Audience: Both Grad & Undergrad

6. Discuss the significance of current research in the field of plant breeding

Audience: Both Grad & Undergrad

7. Critically assess and compare various breeding strategies

Audience: Both Grad & Undergrad

8. Evaluate advanced breeding strategies and technologies as presented in scientific literature (e.g. use of genomic tools in breeding, CRISPR, speed breeding strategies, and use of AI in breeding among others)

Audience: Graduate

PLANTSCI 340 – PLANT GENOME ENGINEERING AND EDITING

3 credits.

Presents an overview of the techniques, biology and underlying theory of plant tissue culture, genetic engineering and genome editing. Overviews of research and commercial applications, and issues/challenges in the area of plant biotechnology are also covered.

Requisites: (BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 152, ZOOLOGY/BIOLOGY 102, or BIOCORE 381) and (CHEM 104, 109, or 116), or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Recall and summarize the general principles, practices and application of plant cell and tissue culture, and genetic engineering and gene editing in science, agriculture and industry.

Audience: Both Grad & Undergrad

2. Apply experimental design and analysis of plant biotechnology experiments.

Audience: Both Grad & Undergrad

3. Illustrate representative plant cell culture and bioengineering techniques.

Audience: Both Grad & Undergrad

4. Recall biosafety and regulatory requirements for conducting research involving cell culture, microbes and recombinant DNA.

Audience: Both Grad & Undergrad

5. Understand issues and challenges encountered in the areas of in vitro culture and plant biotechnology

Audience: Both Grad & Undergrad

6. Demonstrate understanding, application and synthesis of concepts learned in the course through completion of a review paper on approved topics relating to plant biotechnology

Audience: Graduate

PLANTSCI 350 – PLANTS AND HUMAN WELLBEING

2 credits.

Plants provide not only the foundation of food, clothing, and shelter essential for human existence, but also some of the key raw materials for transcendence and abstraction through music, art, and spirituality. Since antiquity, we have co-evolved with plants and their derivative products, with each exerting a domesticating force on the other. It is, for example, impossible to think of our modern life without its plant-based accompaniments in the form of cotton, sugar, bread, coffee, and wood. Yet they are so ubiquitous we may forget they all derive from plants discovered, domesticated, bred, and farmed for millennia in a never-ending pursuit to improve our wellbeing. Major points of intersection between plants and human wellbeing will be explored from a horticultural point of view by highlighting a plant or group of plants that represent a primary commodity or resource through which humans have pursued their own aims and explore effects and impacts on human society.

Requisites: None**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No**Last Taught:** Fall 2025

Learning Outcomes: 1. Acquire, integrate and apply knowledge of how plants and plant materials impact human wellbeing through readings, discussions, lectures, and examination of plant materials and their products

Audience: Undergraduate

2. Develop the ability to discuss scientific topics in small groups and answer questions about how these topics intersect with human wellbeing and public policy.

Audience: Undergraduate

3. Explain the social, economic, and environmental dimensions of the sustainability challenge associated with the production of plant-based materials for needs and wants associated with human wellbeing.

Audience: Undergraduate

4. Understand how the biological aspects of plants and plant materials dictate how these crops will be used by different cultures for specific aspects of wellbeing

Audience: Undergraduate

5. Analyze the causes of and solutions for the sustainability challenge of production of plant materials for the needs and wants of human wellbeing

Audience: Undergraduate

6. Understand how plants and plant materials are intertwined with both wellbeing and un-wellbeing in modern human societies, and explore this interaction through discussions, reflections, and lecture material.

Audience: Undergraduate

PLANTSCI 351 – A DEEPER LOOK AT PLANTS AND HUMAN WELLBEING

1 credit.

Plants are essential for human wellbeing, yet they are often manipulated in ways that contribute significantly to human and environmental detriment. Provides an opportunity to consider the scientific, social, economic, and public policy implications of plants or groups of plants and dive deeply into those subjects for a variety of crops that are essential for human societies.

Requisites: Concurrent enrollment in PLANTSCI 350**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No**Last Taught:** Fall 2025

Learning Outcomes: 1. Acquire, integrate and apply knowledge of how plants and plant materials impact human wellbeing through readings, discussions, lectures, and examination of plant materials and their products.

Audience: Undergraduate

2. Develop the ability to discuss scientific topics in small groups and answer questions about how these topics intersect with human wellbeing and public policy.

Audience: Undergraduate

3. Explain the social, economic, and environmental dimensions of the sustainability challenge associated with the production of plant-based materials for needs and wants associated with human wellbeing.

Audience: Undergraduate

4. Understand how the biological aspects of plants and plant materials dictate how these crops will be used by different cultures for specific aspects of wellbeing

Audience: Undergraduate

5. Analyze the causes of and solutions for the sustainability challenge of production of plant materials for the needs and wants of human wellbeing

Audience: Undergraduate

6. Understand how plants and plant materials are intertwined with both wellbeing and un-wellbeing in modern human societies, and explore this interaction through discussions, reflections, and lecture material.

Audience: Undergraduate

PLANTSCI 360 – GENETICALLY MODIFIED CROPS: SCIENCE, REGULATION & CONTROVERSY

2 credits.

Explores how and why genetically modified (GM) crops are created and their regulation at the federal and state level. Learn about the impacts of GM crops and critically evaluate arguments both for and against their use. Introduction to the complex economic, cultural, and political issues surrounding GM crops.

Requisites: ZOOLOGY/BIOLOGY 101, BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 151, BIOCORE 381, GENETICS 466, or GENETICS 467

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Explain how genetically modified crops are made and compare genetic engineering with other plant breeding methods.

Audience: Undergraduate

2. Describe the US coordinated framework for the regulation of biotechnology and labeling laws.

Audience: Undergraduate

3. Discuss the potential risks and benefits of genetically modified crops for agriculture, the environment, and human health.

Audience: Undergraduate

4. Analyze different perspectives on controversial topics related to genetically modified organisms.

Audience: Undergraduate

PLANTSCI/A A E/PL PATH 367 – INTRODUCTION TO ORGANIC AGRICULTURE: PRODUCTION, MARKETS, AND POLICY

3 credits.

Provides an in-depth understanding of the history of organic agriculture, its production, processing, marketing, and social dimensions, and its impact on environmental, community, and human health.

Requisites: ENVIR ST/AGROECOL/C&E SOC/ENTOM 103, AGRONOMY 100, HORT 120, PLANTSCI 110, BOTANY/PL PATH 123, SOC/C&E SOC 222, or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Describe the history of current organic systems and how it influences the way that organic farms and industries work.

Audience: Both Grad & Undergrad

2. Explore the biological, ecological, and agricultural underpinnings of organic production systems.

Audience: Both Grad & Undergrad

3. Examine how organic systems, social initiatives, and regulations are developed and how they shape business activities, community development efforts, and human and environmental health outcomes.

Audience: Both Grad & Undergrad

4. Evaluate the benefits and limitations of organic systems, social initiatives, and regulations from environmental, social, economic, and racial justice perspectives.

Audience: Both Grad & Undergrad

5. Analyze sustainability issues and/or practices using a systems-based approach.

Audience: Both Grad & Undergrad

6. Describe the social, economic, and environmental dimensions of organic farming and identify potential tradeoffs and interrelationships among these dimensions at a level appropriate to the course.

Audience: Both Grad & Undergrad

7. Develop the capacity to evaluate sustainability and resilience outcomes of organic and other agricultural production and processing systems using interdisciplinary methods.

Audience: Graduate

PLANTSCI 370 – WORLD VEGETABLE CROPS

3 credits.

An overview of the importance of fresh and processed vegetables worldwide. Vegetable origin, history, classification, culture, marketing, physiology, genetics, handling, quality, significance in world cultures and diets.

Requisites: HORT 120, AGRONOMY 100, PLANTSCI 110, BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 151, or BIOCORE 381

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Integrate and apply knowledge of vegetable plants to worldwide consumption and production of vegetable crops
Audience: Undergraduate

2. Discuss the diversity of vegetable plants consumed around the world with particular attention to how vegetable plant families are used in different world regions
Audience: Undergraduate

3. Explain how the biological aspects of vegetable plants, including their physiology and genetics, dictate how these crops will be produced in different world regions
Audience: Undergraduate

4. Describe the nutritional profile, culinary characteristics, and important metabolites that are found in vegetable plants for defensive and attractant purposes
Audience: Undergraduate

PLANTSCI 372 – SEMINAR IN ORGANIC AGRICULTURE

1 credit.

Faculty, regional professionals, local organic farmers, and students present and discuss topics relevant to history, marketing, economics, production, and social context of organic and sustainable agriculture.

Requisites: None

Course Designation: Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Discuss the work activities, career attributes, challenges, and preparation for employment described by practitioners in organic agricultural systems.
Audience: Undergraduate

2. Identify personal interests and potential career paths within organic agriculture based on knowledge of the skills required and day-to-day work described by current practitioners.
Audience: Undergraduate

3. Demonstrate verbal and written workplace communication skills through resume-building, interviews, presentations, and networking.
Audience: Undergraduate

4. Describe the formal and informal professional development used by organic system practitioners.
Audience: Undergraduate

5. Design, plan, and implement an event to deepen the knowledge of a select audience around one or more areas of organic agricultural systems.
Audience: Undergraduate

PLANTSCI 375 – SPECIAL TOPICS

1-4 credits.

Special topics on issues relevant to plant sciences.

Requisites: None

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Summer 2025

Learning Outcomes: 1. Explain concepts relating to a special topic outlined in the title
Audience: Undergraduate

PLANTSCI 376 – TROPICAL HORTICULTURAL SYSTEMS

2 credits.

Highlights the connections between tropical plants and society. Topics include multidisciplinary reflections on the biology of tropical plants, as well as an overview of different production systems and some of the social and environmental problems associated with the utilization of tropical plants in the context of local and global markets. Provides the opportunity to demonstrate comparative skills with respect to local and international challenges posed by the topics we address in class. Illustrates connections between horticulture and conservation, food security, nutrition, and global health.

Requisites: Junior standing**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No**Last Taught:** Fall 2025**Learning Outcomes:** 1. Demonstrate interdisciplinary skills, intercultural knowledge, and global competencies through the understanding of the relationships between tropical plants and different cultures.

Audience: Undergraduate

2. Recognize social, economic, and environmental issues related to sustainable food production in tropical ecosystems and find suitable methods to address them

Audience: Undergraduate

3. Discuss the unique challenges to food security and sustainability in tropical ecosystems under the pressure of climate change

Audience: Undergraduate

4. Develop a critical perspective and creative thinking regarding the production and consumption of tropical horticultural products, and how they relate to nutrition, food security, health and wellbeing, sustainable cropping practices and community development

Audience: Undergraduate

5. Recognize the importance of green spaces, conservation of biodiversity, traditional knowledge, intellectual property rights, and equitable sharing of benefits derived from the use of tropical plants

Audience: Undergraduate

6. Apply written and public speaking skills through critical explorations of tropical food systems

Audience: Undergraduate

PLANTSCI 378 – TROPICAL HORTICULTURAL SYSTEMS INTERNATIONAL FIELD STUDY

2 credits.

Visit diverse agricultural systems, such as small farms, large-scale operations, market growers, industrial export businesses, agronomic centers, botanical gardens, herbaria, germplasm banks, and nature preserves in a tropical country in Central America. Provides an opportunity to develop a holistic appreciation of horticulture by highlighting the interactions between plants and society. Reflect on the role of plants in our daily lives and the effects that our daily choices have on the environment, human health, conflicts, poverty, and development. Discuss some of the social, scientific and environmental challenges that conventional, sustainable and organic horticulture practices face in the production, marketing, and use of tropical crops. Enrollment in a UW-Madison resident study abroad program; requires completion of PLANTSCI 376.

Requisites: None**Course Designation:** Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No**Learning Outcomes:** 1. Identify social, economic, and environmental issues related to tropical horticulture and find suitable methods to address them.

Audience: Undergraduate

2. Analyze diverse methods of tropical plant production and their correlation with nutrition, health, sustainable agricultural practices, and community development.

Audience: Undergraduate

3. Develop a critical perspective and creative thinking regarding the production and consumption of horticultural products, and how this can impact the livelihoods of small and large-scale producers and consumers in different parts of the world, particularly in tropical regions.

Audience: Undergraduate

4. Cultivate interdisciplinary skills, cultural awareness, and global competencies through the understanding of the ecological and socio-economic impacts of tropical crops in both Costa Rica and in the US.

Audience: Undergraduate

PLANTSCI 380 – INDIGENOUS FOODWAYS: FOOD AND SEED SOVEREIGNTY

2 credits.

Indigenous foods of North America are a vital component of modern agricultural and food systems. Indigenous foods and foodways will be examined from interdisciplinary historical, legal, biological, and social perspectives. Historic indigenous foodways of the present-day upper Midwestern United States and the impact on food and seed sovereignty of settler colonialism and subsequent agricultural practices and policies will be explored. Current efforts to re-claim agricultural traditions and foodways to improve public health, economic opportunity, and food and seed sovereignty will be covered, including the right to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, to define one's own food and agriculture systems, and to control the mechanisms and policies that govern food distribution. Hands-on activities are featured; previous examples include cooking with indigenous foods, ice fishing, and tapping maple trees for syrup.

Requisites: Sophomore standing**Course Designation:** Breadth - Social Science

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No**Last Taught:** Spring 2026**Learning Outcomes:** 1. Demonstrate an understanding of the history, culture, and perspectives of Native American Nations in the Upper Midwest in relation to food and seed sovereignty

Audience: Both Grad & Undergrad

2. Explain the legal frameworks facing indigenous communities and how they interact with federal and state policies to influence food sovereignty
Audience: Both Grad & Undergrad

3. Research, analyze, discuss and present on the history and use of a particular plant or animal; demonstrate knowledge of scientific concepts surrounding this plant or animal
Audience: Both Grad & Undergrad

4. Identify and analyze approaches that might be used to improve food and seed sovereignty
Audience: Both Grad & Undergrad

5. Describe the social, economic, and environmental dimensions of growing and producing indigenous crops and identify potential tradeoffs and interrelationships among these dimensions at a level appropriate to the course
Audience: Both Grad & Undergrad

6. Analyze the causes of and solutions for the sustainability challenge of improving food sovereignty in tribal communities in the US
Audience: Both Grad & Undergrad

7. Develop a capstone project based on course materials
Audience: Graduate

PLANTSCI 399 – COORDINATIVE INTERNSHIP/COOPERATIVE EDUCATION

1-8 credits.

Internship under guidance of a faculty or instructional academic staff member in Plant and Agroecosystem Sciences and internship site supervisor. Students are responsible for arranging the work and credits with the faculty or instructional academic staff member and the internship site supervisor.

Requisites: Consent of instructor**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Workplace - Workplace Experience Course

Repeatable for Credit: Yes, unlimited number of completions**Last Taught:** Fall 2025**Learning Outcomes:** 1. Apply concepts learned in coursework to authentic professional situations
Audience: Undergraduate

2. Demonstrate professional skills appropriate for the industry
Audience: Undergraduate

3. Identify and reflect on how concepts learned in coursework apply to specific work settings and situations
Audience: Undergraduate

PLANTSCI 400 – STUDY ABROAD IN PLANT SCIENCES

1-6 credits.

Provides an area equivalency for courses taken on Madison Study Abroad Programs that do not equate to existing UW courses. Current enrollment in a UW-Madison study abroad program.

Requisites: None**Repeatable for Credit:** Yes, unlimited number of completions**Learning Outcomes:** 1. Demonstrate understanding of concepts described in course syllabus
Audience: Undergraduate

PLANTSCI 501 – PRINCIPLES OF PLANT BREEDING

3 credits.

Principles involved in breeding and maintaining economic crops; factors affecting the choice of breeding methods; alternative approaches through hybridization and selection.

Requisites: (GENETICS 466, 467, PLANTSCI 338, or HORT 338 prior to Fall 2025) and (BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 151, or BIOCORE 381), or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Identify key biological and quantitative principles behind the science of plant breeding.

Audience: Both Grad & Undergrad

2. Recognize how genetic variation is generated and how other sources of variation can affect phenotypes.

Audience: Both Grad & Undergrad

3. Describe how crops were domesticated, and how germplasm can be deployed by plant breeders to improve crops.

Audience: Both Grad & Undergrad

4. Apply scientific theories, concepts, reasoning, and quantitative and qualitative approaches to understand and solve problems in plant breeding and plant genetics.

Audience: Both Grad & Undergrad

5. Use terminology accurately and effectively in describing plant breeding phenomena and processes.

Audience: Both Grad & Undergrad

6. Evaluate and discuss relevant scientific concepts.

Audience: Both Grad & Undergrad

7. Relate scientific information found in primary scientific literature to key issues and concepts in plant breeding.

Audience: Graduate

PLANTSCI 502 – TECHNIQUES OF PLANT BREEDING

1 credit.

Introduction to a wide array of laboratory and field techniques used in breeding and maintaining economically important crops.

Requisites: (GENETICS 466, 467, PLANTSCI 338, or HORT 338 prior to Fall 2025) and (BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 151, or BIOCORE 381), or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2019

Learning Outcomes: 1. Define different approaches, techniques, and ideas in plant breeding from a practical and theoretical point of view by interacting with plant breeders who breed a wide range of crops.

Audience: Both Grad & Undergrad

2. Identify why certain techniques are used in certain situations, and what options might exist for plant breeders to pursue particular breeding objectives.

Audience: Both Grad & Undergrad

3. Describe why a particular crop is bred in a certain way, and be able to articulate why the crop's biology or key traits are best served by these approaches.

Audience: Both Grad & Undergrad

4. Explain how improved germplasm and cultivars are developed and released by plant breeders.

Audience: Both Grad & Undergrad

5. Use terminology accurately and effectively in describing plant breeding problems and solutions.

Audience: Both Grad & Undergrad

6. Read, evaluate, and discuss scientific concepts.

Audience: Both Grad & Undergrad

7. Relate scientific information found in primary scientific literature to key issues and concepts in plant breeding.

Audience: Graduate

PLANTSCI 510 – SENIOR CAPSTONE EXPERIENCE

2 credits.

Apply classroom learning to problems of societal relevance. Integrate diverse bodies of knowledge to identify and evaluate contemporary issues relevant to plant scientists.

Requisites: PLANTSCI 110, 310, and senior standing

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Integrate existing knowledge of plant science and technology with current research to evaluate key contemporary issues in the field of plant and agroecosystem sciences.

Audience: Undergraduate

2. Synthesize plant science information, predictions, insights, and hypotheses into effective forms of written and oral communication.

Audience: Undergraduate

3. Evaluate plant sciences information from a broad range of sources.

Audience: Undergraduate

4. Discuss societal, economic, ethical, scientific, and social issues relevant to plant scientists

Audience: Undergraduate

PLANTSCI/ATM OCN 532 – ENVIRONMENTAL BIOPHYSICS

3 credits.

Plant-environment interactions with particular reference to energy exchanges and water relations. Models are used to provide a quantitative synthesis of information from plant physiology, soil physics, and micrometeorology with some consideration of plant-pest interactions.

Requisites: (BIOLOGY/BOTANY 130, ZOOLOGY/BIOLOGY/BOTANY 152, or BIOCORE 381) and (MATH 211, 217, or 221) and (PHYSICS 103, 201, 207, or 247), or graduate/professional standing

Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Apply numerical models that describe radiation fluxes in natural environments and account for latitude and longitude, time of day and year, sun angle, direct and diffuse solar radiation, and radiative properties of natural surfaces

Audience: Both Grad & Undergrad

2. Apply numerical models that describe how soil and air temperatures vary across a continuum of temporal scales (from hourly to annual) and are impacted by varied physical environments

Audience: Both Grad & Undergrad

3. Calculate growing degree-days using different numerical models and demonstrate knowledge about phenological development of plants and insects

Audience: Both Grad & Undergrad

4. Apply numerical models that represent wind speed within and above vegetative canopies and account for atmospheric turbulence

Audience: Both Grad & Undergrad

5. Calculate heat and mass (water, carbon dioxide) transport between organisms, soils, plant canopies, and the atmosphere using numerical models that represent conductance, diffusion, convective transport of heat, infiltration of water and drainage in soil, evaporation, and transpiration

Audience: Both Grad & Undergrad

6. Apply numerical modeling to calculate transmission and interception of direct, diffuse, and scattered solar radiation in plant canopies

Audience: Both Grad & Undergrad

7. Demonstrate knowledge about different numerical approaches to calculate evapotranspiration and photosynthesis of plants from the leaf to canopy level

Audience: Both Grad & Undergrad

8. Demonstrate basic knowledge about environmental biophysics through application of numerical equations and/or a model to a scientific question developed in close collaboration with the course instructor

Audience: Undergraduate

9. Demonstrate advanced knowledge about environmental biophysics through the independent development of a research project that produces new information

Audience: Graduate

PLANTSCI 550 – MOLECULAR APPROACHES FOR CROP IMPROVEMENT

3 credits.

Survey and exploration of the molecular methods used by plant scientists to develop improved crop plants. Topics include CRISPR, T-DNA transformation, RNAi, gene editing systems, and molecular techniques for crop improvement.

Requisites: (BIOCHEM 501 or 507) and (GENETICS 466 or 467); or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Critically read scientific journal articles.

Audience: Both Grad & Undergrad

2. Evaluate and discuss scientific results as reported in journal articles.

Audience: Both Grad & Undergrad

3. Describe how discoveries in basic science lead to practical developments that drive crop improvement.

Audience: Both Grad & Undergrad

4. Describe the following molecular methods: Genome Sequencing, plant transformation, Gene Silencing, CRISPR-Cas9 genome editing, base-editors, and other genome manipulation methods based on CRISPR-Cas9.

Audience: Both Grad & Undergrad

5. Utilize the following bioinformatics tools: BLAST searching, EFP Browser, and gRNA design tools transformation, Gene Silencing, and CRISPR-based gene editing.

Audience: Both Grad & Undergrad

6. Demonstrate communication skills to multiple audiences.

Audience: Both Grad & Undergrad

7. Develop critical thinking skills to design experiments and peer review of scientific papers.

Audience: Graduate

PLANTSCI/GENETICS 615 – GENETIC MAPPING

3 credits.

Computing-intensive preparation for genetic mapping research, including linkage analysis and QTL mapping in designed crosses; linkage disequilibrium and association analysis (GWAS).

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Compare the principles and applicability of linkage vs association mapping

Audience: Graduate

2. Describe how population and model parameters affect statistical power

Audience: Graduate

3. Construct genetic linkage maps and discover QTL in designed crosses

Audience: Graduate

4. Conduct genome-wide association analyses and interpret the results

Audience: Graduate

PLANTSCI 681 – SENIOR HONORS THESIS

2-4 credits.

Individual study and research for students completing theses under direct guidance of a Plant and Agroecosystem Sciences faculty or instructional academic staff member. Students are responsible for arranging the work and credits with the supervising instructor. Intended for students in the CALS Honors Program.

Requisites: Consent of instructor

Course Designation: Honors - Honors Only Courses (H)

Repeatable for Credit: No

Last Taught: Fall 2018

Learning Outcomes: 1. Investigate a topic in conjunction with other investigators to develop a deep understanding of a research problem.

Audience: Undergraduate

2. Identify a research problem and develop a set of testable hypotheses.

Audience: Undergraduate

3. Carry out analysis of data related to the testable hypotheses.

Audience: Undergraduate

4. Communicate the results of investigations via written and/or oral means to an appropriate audience.

Audience: Undergraduate

5. Write an honors thesis that contains an abstract, background, a demonstration of research skills, analysis of the research question, and a summary of the impact of the work.

Audience: Undergraduate

PLANTSCI 682 – SENIOR HONORS THESIS

2-4 credits.

Individual study and research for students completing theses under direct guidance of a Plant and Agroecosystem Sciences faculty or instructional academic staff member. Students are responsible for arranging the work and credits with the supervising instructor. Intended for students in the CALS Honors Program. Continuation of PLANTSCI 681

Requisites: Consent of instructor**Course Designation:** Honors - Honors Only Courses (H)**Repeatable for Credit:** No**Last Taught:** Spring 2009

Learning Outcomes: 1. Investigate a topic in conjunction with other investigators to develop a deep understanding of a research problem.
Audience: Undergraduate

2. Identify a research problem and develop a set of testable hypotheses.
Audience: Undergraduate

3. Carry out analysis of data related to the testable hypotheses.
Audience: Undergraduate

4. Communicate the results of investigations via written and/or oral means to an appropriate audience.
Audience: Undergraduate

5. Write an honors thesis that contains an abstract, background, a demonstration of research skills, analysis of the research question, and a summary of the impact of the work.
Audience: Undergraduate

PLANTSCI 699 – SPECIAL PROBLEMS

1-4 credits.

Independent research guided by a Plant and Agroecosystem Sciences faculty or instructional academic staff member. Students are responsible for arranging the work and credits with the supervising instructor.

Requisites: Consent of instructor**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: Yes, unlimited number of completions**Last Taught:** Spring 2026

Learning Outcomes: 1. Articulate a clear research question or problem and formulate a hypothesis.
Audience: Undergraduate

2. Identify appropriate research methodologies and collect sound scientific data.
Audience: Undergraduate

3. Apply critical thinking skills to interpret laboratory data and apply problem solving skills to constructively address research setbacks.
Audience: Undergraduate

4. Practice research ethics and responsible conduct in research.
Audience: Undergraduate

5. Communicate scientific ideas and results verbally and in written form effectively.
Audience: Undergraduate

PLANTSCI 720 – PHYSIOLOGY OF PLANT PRODUCTION

3 credits.

Examines the role of physiological processes in agricultural plant production, including the effects of primary productivity, water relations, mineral nutrition, and temperature responses. Plasticity and adaptation (through breeding) to different agricultural environments are studied.

Requisites: Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No

Learning Outcomes: 1. Describe the role of plant physiology and how its adaptation and plasticity are important for plant production
Audience: Graduate

2. Evaluate primary literature on the use of physiological concepts in issues related to agricultural production
Audience: Graduate

3. Design experiments that test hypotheses related to the physiology of agricultural plants
Audience: Graduate

4. Analyze the potential impacts of climatic changes on production systems based on limitations of plant physiology
Audience: Graduate

PLANTSCI 771 – EXPERIMENTAL DESIGN AND ANALYSIS

2 credits.

Review of methods for controlling error in research experiments; review and in-depth development of factorial treatment designs; theory, analysis, and examples of advanced experimental designs for plant and animal research.

Requisites: F&W ECOL/STAT 572 or concurrent enrollment or AN SCI 865 or concurrent enrollment

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2024

Learning Outcomes: 1. Describe the importance of experimental design in research.

Audience: Graduate

2. Plan and execute a proper basic experimental design, critically evaluate personal limitations, and actively seek assistance when necessary.

Audience: Graduate

3. Use proper experimental design and analysis tools for most agricultural situations.

Audience: Graduate

4. Explain experimental design in the context of agricultural experimentation.

Audience: Graduate

PLANTSCI 772 – APPLICATIONS IN ANOVA AND MIXED MODELS

2 credits.

Development of models, programs, inferences, and interpretations of analysis of variance in biological research; mixed models and their development; choosing the correct inference range; variance and covariance analyses; repeated measures; dealing with missing data.

Requisites: (F&W ECOL/STAT 572 or concurrent enrollment or AN SCI 865 or concurrent enrollment) and (PLANTSCI 771 or concurrent enrollment)

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2024

Learning Outcomes: 1. Describe the importance of experimental design in research.

Audience: Graduate

2. Plan and execute a proper advanced experimental design.

Audience: Graduate

3. Use proper experimental design and analysis tools for most advanced agricultural experiments.

Audience: Graduate

4. Explain the theory and concepts of mixed models as well as applications of mixed models in biological research settings.

Audience: Graduate

PLANTSCI 799 – PRACTICUM IN PLANT SCIENCES TEACHING

1-3 credits.

Instructional orientation to teaching at the higher education level in the agricultural and life sciences, direct teaching experience under faculty supervision, experience in testing and evaluation of students, and the analysis of teaching performance.

Requisites: Consent of instructor

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Articulate learning goals for the practicum in cooperation with supervising instructor

Audience: Graduate

2. Prepare and/or implement lesson plans for a class period, week, or module of the class

Audience: Graduate

3. Deliver course content and/or facilitate discussion

Audience: Graduate

4. Identify pedagogical strengths and opportunities for growth based on classroom assessment and/or feedback

Audience: Graduate

PLANTSCI 811 – BIOMETRICAL PROCEDURES IN PLANT BREEDING

3 credits.

Understanding and application of quantitative genetic theory and other molecular and analytical tools as it relates to plant breeding.

Requisites: Graduate/professional standing and F&W ECOL/STAT 572 or AN SCI 865

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Describe quantitative genetics principles, including heritability, repeatability, and resemblance between relatives, and the application of these concepts to assess genetic variation and trait inheritance in plant populations.

Audience: Graduate

2. Analyze phenotypic datasets and interpreting results, particularly in relation to variance partitioning and resource allocation in plant breeding.

Audience: Graduate

3. Identify the impact of genotype-by-environment ($G \times E$) interactions and environmental stability on breeding outcomes, and the application of this knowledge to optimize breeding strategies.

Audience: Graduate

4. Analyze and interpret genotype-phenotype association tools to identify the genetic basis of traits and refine breeding approaches across plant populations.

Audience: Graduate

5. Communicate complex biometrical and genetic concepts, through effective scientific writing and presentations, clearly conveying research findings and upholding principles of scientific integrity.

Audience: Graduate

PLANTSCI 812 – SELECTION THEORY FOR QUANTITATIVE TRAITS IN PLANTS

2 credits.

Discuss advanced topics in selection theory and the utilization of molecular markers in selection.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Apply the breeder's equation to design and evaluate selection schemes

Audience: Graduate

2. Explain Best Linear Unbiased Prediction (BLUP) and its application to selection

Audience: Graduate

3. Analyze multi-environment trial data to make genomic predictions

Audience: Graduate

4. Identify resource allocation tradeoffs and strategies for long-term genetic gain

Audience: Graduate

PLANTSCI 875 – SPECIAL TOPICS

1-4 credits.

Special topics on issues relevant to plant sciences.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2025

Learning Outcomes: 1. Explain concepts relating to a special topic outlined in the title

Audience: Graduate

PLANTSCI 920 – SEMINAR IN PLANT SCIENCE AND TECHNOLOGY

1 credit.

Presentations in plant science and technology to prepare for professional conferences, outreach meetings and clientele interactions.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Fall 2025

Learning Outcomes: 1. Communicate effectively through oral presentations, discussion and writing

Audience: Graduate

2. Translate scientific information into outreach materials for agricultural stakeholder audiences

Audience: Graduate

3. Evaluate the effectiveness of oral and written scientific communication

Audience: Graduate

PLANTSCI 957 – SEMINAR IN PLANT BREEDING AND PLANT GENETICS

1 credit.

Current research in plant breeding and plant genetics. Explore cutting-edge research methods and findings. Develop and refine scientific presentation skills.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2026

Learning Outcomes: 1. Present current research in plant breeding and genetics clearly and effectively, including appropriate visuals and following the structure of a scientific seminar

Audience: Graduate

2. Deliver constructive feedback on peers' research and presentations, fostering a collaborative and supportive academic environment

Audience: Graduate

3. Discuss current research in plant breeding and genetics, identifying strengths, weaknesses, and areas for further research

Audience: Graduate

PLANTSCI 990 – RESEARCH

1-12 credits.

Independent research and writing for graduate students under the supervision of a faculty member.

Requisites: Consent of instructor

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2026

Learning Outcomes: 1. Demonstrate graduate-level research skills and techniques

Audience: Graduate

2. Address research challenges using a broad range of theories, research methods, and approaches to scientific inquiry

Audience: Graduate

3. Formulate and design new approaches that extend plant science and technology research beyond its current boundaries

Audience: Graduate