

Information in Browse Course Catalog is subject to change. Information is term specific. Please refer to the appropriate term when searching for course content. Key to Course Descriptions may be found at: http://rcs.registrar.arizona.edu/course_descriptions_key.

PLS 120: Basic Computer Skills for Office Applications (3 units)

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$32

Course Components:	Laboratory Lecture	May Be Offered Required
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Equivalent to: ABE 220, ABT 220, AGTM 120, AGTM 220, ENGR 220, FCR 120, FCR 220, FCSC 120, NFS 220, N_SC 120, N_SC 220, PLS 120

Also offered as: AGTM 120, BE 120, FCSC 120, NSC 120

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Online Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

Home department: Biosystems Engineering

-SA represents a Student Abroad & Student Exchange offering

-**CC** represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 170C1: Plants and Our World (3 units)

Description: Biological Sciences - Plants and Our World will cover the principles of plant growth, development, and reproduction from the cellular to the whole organism levels, explore how plants are affected by their environment, and their ecology and evolution. The emphasis of the course is on what makes plants uniquely interesting and different from other organisms, and their importance to life and society.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Discussion	May Be Offered
	Lecture	Required

Course typically offered:

Main Campus: Fall, Spring

Enrollment requirement: Enrollment not allowed if you have previously taken NATS 104 "Plants and Our World" (Topic 7).

General Education: NATS 104

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 170C2: Introductory Biotechnology (3 units)

Description: Biological Sciences - Is it possible to make 10,000 or even 100,000 clones of the perfect soldier (a Navy Seal) and use these clones to fight our wars (Clone Wars)? While this is illegal in a large number of countries, the answer is yes. Would this be ethical? With more information, you can make an informed decision. What if the millions of deaths that occur every year due to malaria could be prevented by introducing transgenic mosquitos that would breed with the wild populations to disrupt the life cycle of the causative agent? Would this be ethical? Several human organs can now be artificially produced in the laboratory and transplanted to individuals where a replacement is required. It will very soon be possible to transplant ¿designer¿ organs from pigs to humans. Is either of these technologies preferable to you when you are in need of an organ? Today in professional sports, players are often tested for performance enhancing drugs. In the future, will there be a test for performance enhancing transplanted or artificial organs/limbs? Biotechnology is the field of applied biology that involves the use of living organisms or their products to modify human health and the environment. This definition encompasses a wide range of technologies for modifying organisms. Local and national newspapers, magazines, and news shows are sprinkled with advances in biotechnology every week. It can be daunting to understand the importance of the stories and how the content will affect your life. You will be presented with many examples of biotechnological advances and given the background to understand them so that you can make informed decisions. Subjects covered include approaches to: making a better beer, remediating contaminated soils, feeding a growing population, developing biofuels, remediating global warming, producing transgenic animals including fish, development of superbugs, producing pharmaceuticals in the milk of various animals or in plants, providing advanced health care for an aging population, and developing cures for the many human ailments. Finally, as 10% of the world¿s cropland is planted in Genetically Modified (GM) crops, much higher in the U.S., the positives and negatives of these technologies will be discussed.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall

General Education: NATS 104

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: This course will help you develop a deeper understanding of what will be required to feed, fuel and house 10 billion people by mid-century. We will discuss modern agriculture, biotechnology and breeding developments, population growth, distribution of the human population, peak oil, water dynamics, costs to produce foods, climate change in relation to feeding a growing population and opportunities for food security for the future. You will come to understand the major role that biology plays in our lives and our environment.

Main Campus: Spring

Main Campus: Fall

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 195B: The Science Underpinning GMOs and Organics (1 unit)

Description: This course is designed to help you develop a deeper understanding of conventionally- and organically-grown foods and how GMOs fit in. There is a common misperception that nearly every fruit and vegetable is a GMO. There is also the perception that organics are grown without the use of pesticides and that they are always safe. I will explain how GMOs, organic- and conventionally-grown foods are made, what has been done to show that they are safe and what the future looks like for GMOs and organic foods. We will explore who benefits from the increased use of GMOs and organics and who suffers.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Course typically offered:

Main Campus: Fall

Honors Course: Honors Contract

Honors Course: Honors Contract

PLS 217: Introduction to Hydroponics (3 units)

Description: Introduction to hydroponics and hydroponic systems for various crops: an historical perspective and current trends; basic plant physiology and anatomy; general cultural practices; plant protection (insects and diseases); traditional and organic hydroponic production systems; pollination, fertilization and bee management; plant nutrition and disorders; irrigation systems and nutrients; transplant production; greenhouse site selection, structures and control systems; fruit harvest; food handling and safety; marketing and economics of a hydroponic business.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: BE 217

Course typically offered:

Main Campus: Fall

Home department: Biosystems Engineering

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 217L: Lab: Introduction to Hydroponics (1 unit)

Description: This is a hands-on course, teaching hydroponic tomato production from seedling through harvest using commercial style high-wire production techniques. Students apply what they have learned in BE 217R Lecture to real plants in a greenhouse setting. Course covers plant cultivation techniques such as clipping, stem pruning, leaning and lowering, cluster pruning and clipping, leaf maintenance, and harvesting techniques. Course also includes gaining skills in plant spacing, making nutrient tanks, monitoring plant health, pollination, and irrigation and climate control factors important for a successful crop. Observations of other hydroponic production systems in use at the UA-CEAC facility are also included.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components: Laboratory Required

Also offered as: BE 217L

Course typically offered:

Main Campus: Fall

Home department: Biosystems Engineering

Enrollment requirement: BE 217 is a Pre-requisite or Co-requisite.

PLS 235: Introduction to Urban Horticulture (3 units)

Description: This course aims to introduce students to science-based principles and practices that pertain to the cultivation and management of ornamental and edible plants in urban landscapes and gardens.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$43

Course Components: Lecture Required

PLS 240: Plant Biology (4 units)

Description: This course deals with plant form and function from an evolutionary point of view and is intended for majors in all fields of biology. Emphasis is placed on understanding basic processes of metabolism, evolution, reproduction, growth, development, and physiology of nonvascular and vascular plants. These processes are considered within the context of the environments plants inhabit and human activities that affect or depend upon plants.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$18

Course Components: Laboratory May Be Offered
Lecture Required

Course typically offered:

Main Campus: Fall

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 245: Plants, Genes and Agriculture (3 units)

Description: In this course, students will learn about the origins of agriculture and crops, be introduced to the scientific concepts of plant biology and genomics, and understand how this knowledge has created modern industrial agriculture and engineered crops. The materials presented will provide a plant science background and perspective to understand today's news and controversies about the food and products we consume based on a foundation of crop biology, genetics, and biotechnology.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Spring

PLS 270: Golf and Sports Turf Management (3 units)

Description: [Taught alternate years beginning 2000] Course will address specialized cultural management practices and relevant construction principles for golf course and sports turf fields. Students will develop organizational strategies used for maintenance of the above areas.

Grading basis: Student Option ABCDE/PF

Career: Undergraduate

Course Components: Laboratory May Be Offered

Lecture	Required
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Repeatable: Course can be repeated a maximum of 2 times.

PLS 299: Independent Study (1 - 3 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 299H: Honors Independent Study (1 - 3 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

PLS 300: Applied Weed Science (3 units)

Description: This course will cover applied aspects of weed management in the low deserts of Arizona. The focus will be on chemical and non-chemical techniques used in the production of field and vegetable crops. Weed identification and classification will be covered. Non-chemical weed management will include cultural, mechanical and biological control methods. Chemical control will include herbicide mode of action, adjuvants, resistance and soil persistence. Field projects will be conducted.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Laboratory May Be Offered
 Lecture Required

Course typically offered:

Main Campus: Spring (even years only)

Distance Campus: Spring (even years only)

Recommendations and additional information: PLS 130 or PLS 240 are recommended but not required.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 303: Arboriculture (2 units)

Description: Humans cultivate trees for many purposes including beauty, shade, wildlife habitat, and food. This course introduces students to the field of arboriculture, which is the study, cultivation, and management of trees and other perennial woody plants. Specifically, this course covers the selection, establishment, and management of landscape trees, which are important considerations in fields such as urban forestry and residential and commercial landscaping. Students will learn tree care concepts based on tree biology and environmental science and acquire relevant knowledge to be able to apply arboriculture principles to urban forestry, landscape planning, design and installation, and landscape management programs.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
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Course typically offered:

Main Campus: Spring

Recommendations and additional information: PLS 240 and ECOL 182R.

Field trip: none

PLS 306: Crop Science and Production (3 units)

Description: An examination of the fundamental aspects of plant science as applied to crop production. Laboratory exercises will be field-oriented and will involve several field trips.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
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Course typically offered:

Main Campus: Fall (even years only)

Distance Campus: Fall (even years only)

Recommendations and additional information: PLS 130 or PLS 240, SWES 200.

Field trip: Field trips

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: The course introduces students to the science of plant diversity through exploration of the origins and development of modern crop plants. Fundamental concepts of plant biology, morphology, evolution, and domestication are covered; recent research on common food plants are reviewed; and many food samples are directly investigated in class. The course includes hands-on experiences, active learning, and independent or collaborative projects.

Main Campus: Spring (even years only)

Distance Campus: Spring

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: Plant propagation integrates art with science by applying principles of plant biology and cultural practices to create and multiply plants using seeds, cuttings, grafting, budding and tissue culture systems. While sexual seed propagation and all asexual techniques can be carried out in field or controlled environments, plant tissue culture requires specialized substrate, facilities and equipment to ensure sterile conditions. This course provides a comprehensive presentation of principles, techniques and systems used in plant propagation and culture. Students will learn both the techniques and biological concepts as they apply to sexual and asexual reproduction. Students will also study cultural practices and environmental controls important to plant production in field and container systems, as well as the special environmental controls needed for sterile culture techniques.

Career: Undergraduate

Course Components:	Lecture	Required
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Course typically offered:

Main Campus: Fall (odd years only)

Description: This course will be offered every other year in the fall semester. The course will provide a general introduction to the field of Virology, inclusive of bacterial, animal, and plant viruses. Topics will include the history of virology, taxonomy and classification of viruses, introduction to virus structure and assembly, types of virus genomes and functions representative of the different types of virus groups, introduction general laboratory, virus-host interactions, virus-vector biology, and diagnostic methods ecology, and evolutionary aspects.

Career: Undergraduate

Course Components:	Lecture	Required
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Course typically offered:

Main Campus: Spring (even years only)

Recommendations and additional information: MCB 181R, ECOL 182R, CHEM 151, CHEM 152; MIC 205A and 205L or PLP 305.

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 340: Introduction to Biotechnology (3 units)

Description: Survey of both the basic concepts and techniques used in the analysis and improvement of biological organisms by genetic engineering and cell culture as well as examples of biotechnology improvements that have been made in various organisms. The course covers topics ranging from bioremediation to Cancer Stem Cells.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: MCB 340, MIC 340

Also offered as: MCB 340, MIC 340

Course typically offered:

Main Campus: Fall

Recommendations and additional information: PLS 240 or MCB 181R or MIC 205 or an introductory course in biology.

PLS 340L: Biotechnology Laboratory (2 units)

Description: Do you want to try laboratory research? This course aims to give students solid, foundational experience with a basic set of laboratory techniques and equipment that are used in various areas of biotechnology. The techniques covered may include DNA preparation, PCR, cloning genes into plasmids, transformation of organisms, DNA sequence analysis, protein gel electrophoresis, enzyme assays, and plant tissue culture. Most sessions in the well-equipped laboratory include a brief introduction to the day's procedures followed by hands-on activities. In the beginning of the semester, students are guided closely through the procedures, but over the course of the semester students increasingly work more independently.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$60

Course Components: Laboratory Required

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Students should have completed the inorganic chemistry series (CHEM 151/152), MCB181, and MIC 205 (Microbiology) or PLS/MCB/MIC 340 (Biotechnology) or equivalent courses.

PLS 355: Turfgrass Management (3 units)

Description: Species adaptability, growth and development, establishment and cultural practices affecting use.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Recommendations and additional information: PLS 130 or PLS 240 or MCB 181R.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 358: Plant Molecular Biology (3 units)

Description: A consideration of the molecular-genetic and cellular biology of growth and development in plants and their response to biotic and abiotic stresses, with a primary focus on processes unique to plants. Experimental approaches will be emphasized.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Discussion	May Be Offered
	Lecture	Required

Course typically offered:

Main Campus: Fall

Recommendations and additional information: MCB 181R or equivalent.

PLS 359: Plant Cell Structure and Function (3 units)

Description: Whether you will work with plants as a physiologist, pathologist, ecologist, agronomist, horticulturist, or molecular biologist, you will need to know how a plant is constructed, how it grows, and how it functions. Depending on the need and your interests, you may work at the subcellular, cellular, tissue, organ, or whole plant level. As a result, it is important to have a comprehensive understanding of plant cell structure and function. In this course, we will start with the molecular and subcellular organization of a single plant cell. Subsequently, we will investigate tissue levels of organization and function. Emphasis will be placed on not only teaching the structural aspects but also discussing the functions of a plant cell, tissue, and organ. Organ and whole plant growth and physiology will be covered in PLS 360 (Plant Growth and Physiology), a course that will be offered in the spring semester.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
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Course typically offered:

Main Campus: Fall

Distance Campus: Fall

Recommendations and additional information: MCB 181, MCB 182, CHEM 151, CHEM 152, CHEM 241A, CHEM 243A. Recommend PLS 240, PLS 312 or equivalent.

Honors Course: Honors Contract

Honors Course: Honors Contract

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 360: Plant Growth and Physiology (3 units)

Description: Survey of the fundamental concepts of plant physiology and how those concepts are supported by evidence from physiological, biochemical, biophysical, molecular and genomic experiments. The emphasis is on "whole plant" physiology and how plants work in the real world.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: MCB 360

Also offered as: MCB 360

Course typically offered:

Main Campus: Spring

Distance Campus: Spring

Recommendations and additional information: PLS 130 or PLS 240; MCB 181R and MCB 181L; CHEM 103A and CHEM 103B. CHEM 241A and CHEM 241B recommended.

PLS 361: Principles of Plant Physiology Laboratory (1 unit)

Description: Laboratory exercises in plant physiology.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Laboratory Required

Repeatable: Course can be repeated a maximum of 2 times.

Equivalent to: MCB 361

Also offered as: MCB 361

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Prerequisite or concurrent registration, PLS 360.

PLS 392: Directed Research (1 - 6 units)

Description: Individual or small group research under the guidance of faculty.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 6 units.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

Student Engagement Activity: Engagement Activity TBD

Student Engagement Competency: Engagement Competency TBD

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 393: Internship (1 - 6 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

Student Engagement Activity: Engagement Activity TBD

Student Engagement Competency: Engagement Competency TBD

PLS 397A: Yuma Production Systems (3 units)

Description: Overview of agricultural productions systems in Yuma, concentrating on vegetable production systems.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Discussion May Be Offered
Workshop Required

Repeatable: Course can be repeated a maximum of 2 times.

Course typically offered: Distance Campus: Fall (odd years only)

PLS 397B: Advanced Greenhouse Crop Production (3 units)

Description: This is a hands-on emphasis course for students interested in careers in the greenhouse industry. It includes plant cropping techniques, operation/maintenance/troubleshooting of the environmental & nutrient delivery systems and tracking the effects of the environment on plant growth, fruit yield & quality with an emphasis on pre and post-harvest handling. Alternative crops & cropping systems, alternative energies, overall costs and business plans will also be discussed.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components: Workshop Required

Course typically offered:

Main Campus: Spring

Recommendations and additional information: PLS 217. Consent of the instructor.

Enrollment requirement: PLS 217.

Honors Course: Honors Contract

Honors Course: Honors Contract

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 399: Independent Study (1 - 3 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Student Engagement Activity: Engagement Activity TBD

Student Engagement Competency: Engagement Competency TBD

PLS 399H: Honors Independent Study (1 - 3 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

Student Engagement Activity: Engagement Activity TBD

Student Engagement Competency: Engagement Competency TBD

PLS 400: Noxious, Invasive Plants of Arizona (3 units)

Description: An overview of the impacts and management strategies and tactics for noxious, invasive plants in (or near) Arizona.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: RNR 400

Course typically offered:

Main Campus: Summer (odd years only)

Home department: Renewable Natural Resources

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 403: Citrus Production (3 units)

Description: Cultural practices used in citrus production and the physiological basis for those practices. Taught in Yuma, AZ.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:

Course typically offered: Distance Campus: Spring (even years only)

Recommendations and additional information: Basic biology knowledge, consent of instructor.

PLS 405: Weed Science (3 units)

Description: Principles of controlling agronomic and horticultural weeds. Emphasis on weed biology and crop-weed competition in relation to chemical, mechanical, cultural and biological control strategies.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Co-convened with: PLS 505

Recommendations and additional information: PLS 130 or PLS 240, SWES 200; Concurrent registration, PLS 360.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 410: Microbial Biogeochemistry and Global Change (3 units)

Description: Microbes are the drivers of planetary biogeochemistry. They produce half the oxygen on the planet, and fix half the carbon. They introduce bioavailable forms of nitrogen into the biosphere. If human life ceased to exist, the central biogeochemical cycles would continue turning. However, while the planet's biogeochemistry can persist readily in the absence of human life, that does not mean that humankind's presence lacks impact. The Anthropocene (era of human impact) has seen significant changes to planetary stocks and fluxes of C, N, S, etc. Many of these changes involve or impact microbes, and have significant impacts on biogeochemical cycles. To understand microbial biogeochemistry in today's world, one must include the context of global change. And, conversely, one cannot understand the trajectory of global change without understanding microbial feedbacks via biogeochemical cycles. In this interdisciplinary undergraduate and graduate class we will cover major microbial biogeochemical cycles, and how these cycles are impacted by, and feedback to, global change. To understand the research in this area, we will discuss current methods in both microbial ecology and biogeochemistry, ranging from molecular meta-omics to the use of isotopes as biogeochemical tracers, with a particular emphasis on the challenges and opportunities of integrating these two disciplines. Lectures will be mixed with journal club-style readings and discussions, so active participation is essential. This course is designed for graduate students from diverse backgrounds and advanced undergraduates.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: ECOL 410, ENVS 410, GEOS 410

Co-convened with: PLS 510

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Background in biology or biogeochemistry, and openness to interdisciplinary learning.

Home department: Soil, Water, & Environmental Sciences

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 415: Plant Breeding and Genetics (3 units)

Description: This course follows basic genetics in presenting more specialized topics and concepts in plant genetics, providing an introduction to plant breeding, and a foundation for future coursework in advanced plant breeding and quantitative genetics. As the deployment of genetically modified crops has waned due to the expense of research and development, regulatory costs of gaining approval, and the risk of negative public opinion, seed companies are now investing heavily in genomics-assisted breeding of new cultivars. To address these changes, development and understanding of the core principles that have been used for the past century must be combined with current technology to address the challenges facing sustainable production of food, feed, and fiber. In addition, this course will also provide insight into cultivar development as an interesting topic for all students of plant science.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Spring

Recommendations and additional information: PLS 312 AND MATH 263

PLS 424L: Plant Biotechnology (2 units)

Description: This laboratory course is designed for science undergraduates as well as graduate students who are interested in strengthening their hands-on experience with the techniques involved in developing superior food, feed and fiber crops.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Laboratory Required

Also offered as: ENVS 424L, MCB 424L

Co-convened with: PLS 524L

Course typically offered:

Main Campus: Spring

Recommendations and additional information: PLS 340, 360

PLS 424R: Plant Biotechnology (3 units)

Description: This course is designed for science undergraduates as well as graduate students who are interested in strengthening their knowledge of the techniques involved in developing superior food, feed and fiber crops.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: ENVS 424R, MCB 424R

Course typically offered:

Main Campus: Spring

Recommendations and additional information: PLS 340, 360

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 428L: Microbial Genetics Laboratory (2 units)

Description: Laboratory associated with lecture course on Prokaryotic gene structure and function; methods of gene transfer and mapping, DNA structure, replication, transcription, and translation. Hands-on computer analysis of DNA sequences and gene cloning strategies. Principles of regulation of gene expression. Biology of plasmids and bacteriophages.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$70

Course Components: Laboratory Required

Equivalent to: ECOL 428L, MCB 428L, MIC 428L, MICR 428L, PLS 428L, SWES 428L, VSC 428L

Also offered as: ACBS 428L, ECOL 428L, ENVS 428L, MIC 428L, PLP 428L

Co-convened with: PLS 528L

Course typically offered:

Main Campus: Spring

Recommendations and additional information: ECOL 320, PLS 312 and PLP 428R.

Home department: Plant Pathology

Writing Emphasis: Writing Emphasis Course

PLS 428R: Microbial Genetics (3 units)

Description: Prokaryotic gene structure and function; methods of gene transfer and mapping, DNA structure, replication, transcription, and translation. Hands-on computer analysis of DNA sequences and gene cloning strategies. Principles of regulation of gene expression. Biology of plasmids and bacteriophages.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: ECOL 428, ECOL 428R, GENE 428R, MCB 428, MIC 428, MIC 428R, MICR 428, MICR 428R, PLP 428, PLS 428R, SW 428, SWES 428, SWES 428R, VSC 428, VSC 428R

Also offered as: ACBS 428R, ECOL 428R, ENVS 428R, MIC 428R, PLP 428R

Co-convened with: PLS 528R

Course typically offered:

Main Campus: Spring

Distance Campus: Spring

Home department: Plant Pathology

Writing Emphasis: Writing Emphasis Course

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 429: Applied Cyberinfrastructure Concepts (3 units)

Description: Students will learn from experts from projects that have developed widely adopted foundational Cyberinfrastructure resources, followed by hands-on laboratory exercises focused around those resources. Students will use these resources and gain practical experience from laboratory exercises for a final project using a data set and meeting requirements provided by domain scientists. Students will be provided access to computer resources at: UA campus clusters, iPlant Collaborative and at NSF XSEDE. Students will also learn to write a proposal for obtaining future allocation to large scale national resources through XSEDE.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: BE 429, ISTA 429

Co-convened with:

Course typically offered:

Main Campus: Fall

Recommendations and additional information: Programming experience at the level of CSC 120 is recommended but not required.

Home department: School of Information

PLS 434: Industrial Biotechnology (3 units)

Description: Biotechnology can make industrial processes more efficient and sustainable, by creating products that replace harsh treatments and conditions. It can also be used to make food, food ingredients, feed additives, fossil-fuel alternatives, pharmaceuticals and more in large scale. In this course, we will look at the use of biotechnology products in various industries and how biotechnology products are made at the industrial scale through the stages of Discovery, Development, and Manufacturing, and involving genetic engineering, fermentation, recovery, and formulation of the products.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall

Recommendations and additional information: MCB/MIC/PLS 340 and MIC 285R and/or MIC 328R are recommended pre- or co-requisites.

Field trip: none

Enrollment requirement: MCB 181R and CHEM 151 or CHEM 141 are required prerequisites.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 436: Agro-ecology (3 units)

Description: Agro-ecology is the application of ecological principles to the production of food and fiber. The underlying goals are to assess and promote the long-term sustainability of agricultural production systems. Through this course we will study how agro-ecosystems vary across time and space and will examine the trade-offs associated with different cropping systems and management practices. We will begin with a brief history of major trends in agriculture, then examine the ecological interactions involved in crop production, observe how these interactions shape agricultural practices and conclude with a discussion of domestic and international government policies that influence agricultural sustainability.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: ENTO 436, ENVS 436, RNR 436

Co-convened with: PLS 536

Course typically offered:

Main Campus: Spring

Recommendations and additional information: ECOL 302.

Home department: Entomology

PLS 440: Mechanisms in Plant Development (3 units)

Description: Focuses on the molecular genetic mechanisms of plant development using primarily the current model systems.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: ECOL 440, MCB 440

Also offered as: ECOL 440, MCB 440

Co-convened with: PLS 540

Course typically offered:

Main Campus: Fall

Recommendations and additional information: ECOL 320 may be used instead of PLS 312.

Honors Course: Honors Contract

Honors Course: Honors Contract

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 448A: Plant Biochemistry and Metabolic Engineering (3 units)

Description: Covering topics in plant metabolic engineering; photosynthesis; carbohydrate, nitrogen and lipid metabolism; specialized metabolism. This course covers biochemical processes specific to plants and allows students to gain an understanding and appreciation of how (bio)chemical components are synthesized and utilized by plants during growth and development and in their interactions with their environment, as well as how these processes can be manipulated. A background in plant biology, general biochemistry or chemistry is expected. Note that concurrent registration in any of these courses will NOT meet this requirement. Students must have completed both semesters of O-chem and a biochemistry course that covers general metabolism prior to taking this course.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: BIOC 448A, CHEM 448A, ECOL 448A, MCB 448A

Also offered as: BIOC 448A, CHEM 448A, ECOL 448A, MCB 448A

Co-convened with: PLS 548A

Course typically offered:

Main Campus: Fall

Recommendations and additional information: CHEM 241A/B or CHEM 242A/B; BIOC 462A/B or BIOC 460 or consent of instructor.

PLS 449A: Plant Genetics and Genomics (3 units)

Description: A 3 unit lecture/discussion course that provides an advanced treatment of the current knowledge and experimental approaches used in genetic and genomic analysis, with emphasis on plants. Basic understanding of Mendelian genetics, gene and genome structure and function is required.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: ECOL 449A, GENE 449A, MCB 449A

Also offered as: ECOL 449A, GENE 449A, MCB 449A

Co-convened with: PLS 549A

Recommendations and additional information: PLS 312.

PLS 455: Turfgrass Science: Environmental Stress (3 units)

Description: Environmental interactions of turfgrasses. Adaptability to and cultural amelioration of environmental stress. Pesticide/nutrient fate and management practices to protect the environment.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Recommendations and additional information: PLS 130 or PLS 240, PLS 355, PLS 360.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 456: Topics in Biotechnology (3 units)

Description: This course is designed to help you develop a deeper understanding of a variety of current topics in Biotechnology including GMOs, Stem Cells, Designer Babies, Synthetic Biology, Nanobiotechnology, Cancer Biology, Epigenetics, Vaccines, Antibiotics, Immunotherapy, Aging, Cloning and Gene Editing.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: MIC 456

Co-convened with: PLS 556

Recommendations and additional information: PLS 340 preferred not required.

PLS 467: Fresh Produce Safety (3 units)

Description: This course will focus on growing and handling practices that minimize the risk of microbial contamination of fresh grown produce.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
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PLS 475A: Applied Plant Physiology (3 units)

Description: Students will learn the major environmental factors affecting plant growth and development and will understand interactions between plants and their microenvironments, including light penetration and CO₂/H₂O diffusion. Students will learn energy and mass balance of leaves and canopy and correlate these phenomena with plant productivity and related plant physiological mechanisms. Lectures cover critical controlled environment issues and practices of plant production in greenhouse, plant production factory, tissue culture vessels and post-harvest storage, with an introduction to the current research status in these areas. This course will be offered in spring of even years.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
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Repeatable: Course can be repeated a maximum of 2 times.

Equivalent to: ABE 475A

Also offered as: BE 475A

Co-convened with: PLS 575A

Course typically offered:

Main Campus: Spring

Distance Campus: Spring

Recommendations and additional information: Introductory plant physiology course.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 479: Applied Instrumentation for Controlled Environment Agriculture (3 units)

Description: Students will learn principles, methods, and techniques related to the measurement and control of environmental factors affecting plant growth and plants' surrounding climate under controlled environments. Light intensity, light quality, temperature (air, plant), relative humidity, carbon dioxide, water, air current, and related factors are important variables in controlled environment plant production systems to measure and control since they affect and determine plant growth and development and processes such as heating, ventilating and air conditioning, fertigation etc. Therefore, students will learn application of sensors, instrumentation and designing of a simple system to measure and control environments for plant production systems.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components:	Laboratory Lecture	May Be Offered Required
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Equivalent to: PLS 479

Also offered as: BE 479

Co-convened with: PLS 579

Course typically offered:

Main Campus: Spring

Home department: Biosystems Engineering

Enrollment requirement: Adv. Stdg: Engineering, or (PLS major or minor. Junior or Senior status. MATH 113 and PHYS 102).

PLS 480: Medicinal Plants (3 units)

Description: Historical and cultural aspects of plants and medicine, therapeutic uses of plants, psychoactive and food plants, contribution of medicinal plants to modern medicine, future of medicinal plants.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
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Equivalent to: ARL 480

Also offered as: ARL 480

Co-convened with: PLS 580

Course typically offered:

Main Campus: Fall (even years only)

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 483: Controlled Environment Systems (3 units)

Description: An introduction to the technical aspects of greenhouse design, environmental control, hydroponic crop production, plant nutrient delivery systems, intensive field production systems, and post-harvest handling and storage of crops.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Laboratory	Required
	Lecture	Required

Equivalent to: PLS 483

Also offered as: BE 483

Co-convened with: ABE 583

Course typically offered:

Main Campus: Fall

Home department: Biosystems Engineering

Enrollment requirement: Adv. Standing Engineering, BE minors, or majors/minors in the following areas: PLS, SPS, EWRE, EHY, or ENVS (Microbiology, Sustainable Land & Water Management, Water Resource Management, or Biosphere Science specializations only).

PLS 491: Preceptorship (1 - 8 units)

Description: Specialized work on an individual basis, consisting of instruction and practice in actual service in a department, program, or discipline. Teaching formats may include seminars, in-depth studies, laboratory work and patient study.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components:	Independent Study	Required
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Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

PLS 491H: Honors Preceptorship (1 - 3 units)

Description: Specialized work on an individual basis, consisting of instruction and practice in actual service in a department, program, or discipline. Teaching formats may include seminars, in-depth studies, laboratory work and patient study.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Independent Study	Required
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Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 492: Directed Research (1 - 6 units)

Description: Individual or small group research under the guidance of faculty.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 6 units.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

Student Engagement Activity: Engagement Activity TBD

Student Engagement Competency: Engagement Competency TBD

PLS 493: Internship (1 - 6 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

Student Engagement Activity: Engagement Activity TBD

Student Engagement Competency: Engagement Competency TBD

PLS 496D: Redesigning Food Systems for Sustainability, Security and Health (3 units)

Description: Understanding how regional food systems function to serve or not serve local people, economies and ecosystems in the Sonoran Borderlands.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: ENVS 496D, RNR 496D

Home department: Soil, Water, & Environmental Sciences

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 497F: Community and School Garden Workshop (2 - 6 units)

Description: This workshop-based course is designed to enable UA undergraduate and graduate students to work in Tucson-area schools and community sites helping stakeholders to plant, harvest and prepare foods from their garden as well as use the garden as a learning space. As a member of a school or community garden team, students are likely to cover a wide range of activities from maintaining a compost pile to administering lesson plans for teaching in the garden to weeding, planting, and organizing work crews. In addition to attending one 3-hour weekend workshop, students are required to attend weekly class meetings on the UA campus. Most of the course, however, revolves around independent and sustained involvement with a Tucson school or community garden. No teaching or gardening experience is required.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Workshop Required

Repeatable: Course can be repeated for a maximum of 9 units.

Also offered as: AIS 497F, ENVS 497F, GEOG 497F, HPS 497F, LAS 497F, NSC 497F, STCH 497F, TLS 497F

Co-convened with: PLS 597F

Course typically offered:

Main Campus: Fall, Spring

Home department: School of Geography and Development

Student Engagement Activity: Community Partnership

Student Engagement Competency: Sustainability

PLS 498: Senior Capstone (1 - 3 units)

Description: A culminating experience for majors involving a substantive project that demonstrates a synthesis of learning accumulated in the major, including broadly comprehensive knowledge of the discipline and its methodologies. Senior standing required.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Spring

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 498H: Honors Thesis (3 units)

Description: An honors thesis is required of all the students graduating with honors. Students ordinarily sign up for this course as a two-semester sequence. The first semester the student performs research under the supervision of a faculty member; the second semester the student writes an honors thesis.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 9 units.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

Student Engagement Activity: Engagement Activity TBD

Student Engagement Competency: Engagement Competency TBD

Writing Emphasis: Writing Emphasis Course

PLS 499: Independent Study (1 - 5 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

Student Engagement Activity: Engagement Activity TBD

Student Engagement Competency: Engagement Competency TBD

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 499H: Honors Independent Study (3 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

Student Engagement Activity: Engagement Activity TBD

Student Engagement Competency: Engagement Competency TBD

PLS 500: Computer Concepts and Perl Programming (3 units)

Description: Basic Perl programming with applications to biology and fundamental computer concepts that are necessary to efficiently utilize computers in biological research. Graduate-level requirements include writing two functional specifications.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: BIOC 500, ECOL 500, GENE 500, PLS 500

Also offered as: GENE 500, MCB 500

Co-convened with:

Course typically offered:

Main Campus: Fall

Home department: Molecular & Cellular Biology

Interdisciplinary Interest Area: BIOC - Biochemistry

Interdisciplinary Interest Area: ECOL - Ecology & Evolution Bio

PLS 505: Weed Science (3 units)

Description: Principles of controlling agronomic and horticultural weeds. Emphasis on weed biology and crop-weed competition in relation to chemical, mechanical, cultural and biological control strategies. Graduate-level requirements include a literature review and research project.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Co-convened with: PLS 405

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 510: Microbial Biogeochemistry and Global Change (3 units)

Description: Microbes are the drivers of planetary biogeochemistry. They produce half the oxygen on the planet, and fix half the carbon. They introduce bioavailable forms of nitrogen into the biosphere. If human life ceased to exist, the central biogeochemical cycles would continue turning. However, while the planet's biogeochemistry can persist readily in the absence of human life, that does not mean that humankind's presence lacks impact. The Anthropocene (era of human impact) has seen significant changes to planetary stocks and fluxes of C, N, S, etc. Many of these changes involve or impact microbes, and have significant impacts on biogeochemical cycles. To understand microbial biogeochemistry in today's world, one must include the context of global change. And, conversely, one cannot understand the trajectory of global change without understanding microbial feedbacks via biogeochemical cycles. In this interdisciplinary undergraduate and graduate class we will cover major microbial biogeochemical cycles, and how these cycles are impacted by, and feedback to, global change. To understand the research in this area, we will discuss current methods in both microbial ecology and biogeochemistry, ranging from molecular meta-omics to the use of isotopes as biogeochemical tracers, with a particular emphasis on the challenges and opportunities of integrating these two disciplines. Lectures will be mixed with journal club-style readings and discussions, so active participation is essential. This course is designed for graduate students from diverse backgrounds and advanced undergraduates. Graduate-level requirements include (i) a twice-as-extensive background reading and synthesis component for their final presentation as the undergraduates, (ii) an active leadership role in group discussions.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Also offered as: ECOL 510, ENVS 510, GEOS 510

Co-convened with: PLS 410

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Background in biology or biogeochemistry, and openness to interdisciplinary learning.

Home department: Soil, Water, & Environmental Sciences

Interdisciplinary Interest Area: ECOL - Ecology & Evolution Bio

Interdisciplinary Interest Area: GEOS - Geosciences

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 524L: Plant Biotechnology (2 units)

Description: This course is designed for science undergraduates as well as graduate students who are interested in strengthening their hands-on experience with the techniques involved in developing superior food, feed and fiber crops.

Grading basis: Regular Grades

Career: Graduate

Course Components: Laboratory Required

Also offered as: ENVS 524L, MCB 524L

Co-convened with: PLS 424L

Course typically offered:

Main Campus: Spring

Recommendations and additional information: PLS 340, 360

PLS 524R: Plant Biotechnology (3 units)

Description: This course is designed for science undergraduates as well as graduate students who are interested in strengthening their knowledge of the techniques involved in developing superior food, feed and fiber crops.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Also offered as: ENVS 524R, MCB 524R

Course typically offered:

Main Campus: Spring

Recommendations and additional information: PLS 340, 360

PLS 528L: Microbial Genetics Laboratory (2 units)

Description: Laboratory associated with lecture course on Prokaryotic gene structure and function; methods of gene transfer and mapping, DNA structure, replication, transcription, and translation. Hands-on computer analysis of DNA sequences and gene cloning strategies. Graduate-level requirements include the DNA sequence of an entire operon from any one of a variety of bacteria and additionally analyze one product from the operon using several GCG protein analysis programs. Also extra exam questions.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$70

Course Components: Laboratory Required

Equivalent to: ECOL 528L, MCB 528L, MIC 528L, MICR 528L, PLS 528L, SWES 528L, VSC 528L

Also offered as: ACBS 528L, ECOL 528L, ENVS 528L, MCB 528L, MIC 528L, PLP 528L

Co-convened with: PLS 428L

Course typically offered:

Main Campus: Spring

Home department: Plant Pathology

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 528R: Microbial Genetics (3 units)

Description: Prokaryotic gene structure and function; methods of gene transfer and mapping, DNA structure, replication, transcription, and translation. Hands-on computer analysis of DNA sequences and gene cloning strategies. Principles of regulation of gene expression. Graduate-level requirements include a DNA sequence of an entire operon from any one of a variety of bacteria and additionally analyze one product from the operon using several GCG protein analysis programs plus an extensive exam.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: ECOL 528R, GENE 528, GENE 528R, MCB 528R, MIC 528R, MICR 528R, PLP 528, PLS 528R, SWES 528R, VSC 528R

Also offered as: ACBS 528R, ECOL 528R, ENVS 528R, MCB 528R, MIC 528R, PLP 528R

Co-convened with:

Course typically offered:

Main Campus: Spring

Distance Campus: Spring

Home department: Plant Pathology

PLS 529: Applied Cyberinfrastructure Concepts (3 units)

Description: Students will learn from experts from projects that have developed widely adopted foundational Cyberinfrastructure resources, followed by hands-on laboratory exercises focused around those resources. Students will use these resources and gain practical experience from laboratory exercises for a final project using a data set and meeting requirements provided by domain scientists. Students will be provided access to computer resources at: UA campus clusters, iPlant Collaborative and at NSF XSEDE. Students will also learn to write a proposal for obtaining future allocation to large scale national resources through XSEDE. Graduate-level requirements include reading a paper related to cyberinfrastructure, present it to the class, and lead a discussion on the paper.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Also offered as: BE 529, INFO 529

Co-convened with: PLS 429

Course typically offered:

Main Campus: Fall

Recommendations and additional information: Programming experience at the level of CSC 227 (Program Design and Development) is preferred. Consent of instructor required.

Home department: School of Information

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 536: Agro-ecology (3 units)

Description: Agro-ecology is the application of ecological principles to the production of food and fiber. The underlying goals are to assess and promote the long-term sustainability of agricultural production systems. Through this course we will study how agro-ecosystems vary across time and space and will examine the trade-offs associated with different cropping systems and management practices. We will begin with a brief history of major trends in agriculture, then examine the ecological interactions involved in crop production, observe how these interactions shape agricultural practices and conclude with a discussion of domestic and international government policies that influence agricultural sustainability. Graduate-level requirements include leading one class discussion and taking a more in-depth take-home midterm exam.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Also offered as: EIS 536, ENVS 536, RNR 536

Co-convened with: PLS 436

Course typically offered:

Main Campus: Spring

Home department: Committee on Entomology and Insect Science

PLS 539: Methods in Cell Biology and Genomics (3 units)

Description: In-depth, practical and theoretical analysis of novel, experimental methods that advance our understanding of modern biology.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Also offered as: GENE 539, MCB 539, PCOL 539, PSIO 539

Course typically offered:

Main Campus: Fall (even years only)

PLS 540: Mechanisms in Plant Development (3 units)

Description: Focuses on the molecular genetic mechanisms of plant development using primarily the current model systems. Graduate-level requirements include seven journal club discussions and presentations for graduate students and honors undergraduate students.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: ECOL 540, MCB 540

Also offered as: ECOL 540, MCB 540

Co-convened with: PLS 440

Course typically offered:

Main Campus: Fall

Recommendations and additional information: PLS 560 or equivalent course.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 548A: Plant Biochemistry and Metabolic Engineering (3 units)

Description: Covering topics in plant metabolic engineering; photosynthesis; carbohydrate, nitrogen and lipid metabolism; specialized metabolism. This course covers biochemical processes specific to plants and allows students to gain an understanding and appreciation of how (bio)chemical components are synthesized and utilized by plants during growth and development and in their interactions with their environment, as well as how these processes can be manipulated. A background in plant biology, general biochemistry or chemistry is expected. Note that concurrent registration in any of these courses will NOT meet this requirement. Students must have completed both semesters of O-chem and a biochemistry course that covers general metabolism prior to taking this course. Graduate-level requirements include 2 or 3 short individual oral presentations and a term paper.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: BIOC 548A, CHEM 548A, ECOL 548A, MCB 548A

Also offered as: BIOC 548A, CHEM 548A, ECOL 548A, MCB 548A

Co-convened with: PLS 448A

Course typically offered:

Main Campus: Fall

Recommendations and additional information: CHEM 241A/B OR CHEM 242A/B; BIOC 462A/B or BIOC 460 or consent of instructor.

PLS 549A: Plant Genetics and Genomics (3 units)

Description: A 3-unit lecture/discussion course that provides an advanced treatment of the current knowledge and experimental approaches used in genetic and genomic analysis, with emphasis on plants. Basic understanding of Mendelian genetics, gene and genome structure and function is required. Graduate-level requirements include leading 3 course discussions on review articles and problem sets and write a paper based on each of the three research discussions that they lead.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: ECOL 549A, GENE 549A, MCB 549A

Also offered as: ECOL 549A, GENE 549A, MCB 549A

Co-convened with: PLS 449A

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 556: Topics in Biotechnology (3 units)

Description: This course is designed to help you develop a deeper understanding of a variety of current topics in Biotechnology including GMOs, Stem Cells, Designer Babies, Synthetic Biology, Nanobiotechnology, Cancer Biology, Epigenetics, Vaccines, Antibiotics, Immunotherapy, Aging, Cloning and Gene Editing. Graduate-level requirements include leading discussions, organizing undergraduates, a paper on one of our subject areas and organizing tours of appropriate laboratories that do research on one of our subject areas.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Also offered as: MIC 556

Co-convened with: PLS 456

Course typically offered:

Main Campus: Spring

PLS 558: Plant Molecular Biology (3 units)

Description: A consideration of the molecular-genetic and cellular biology of growth and development in plants and their response to biotic and abiotic stresses, with a primary focus on processes unique to plants. Experimental approaches will be emphasized. Graduate level course grades will be based on three paper presentations in addition to undergraduate requirements.

Grading basis: Regular Grades

Career: Graduate

Course Components: Discussion May Be Offered
 Lecture Required

Co-convened with: PLS 458

Course typically offered:

Main Campus: Fall

Recommendations and additional information: MCB 304 or equivalent.

PLS 560: Advanced Plant Biology (4 units)

Description: Advanced, graduate-level treatment of current understanding of development, metabolism, response to environmental signals and stress, interactions with other organisms, and plant origins and crop domestication.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Also offered as: ECOL 560, MCB 560, PLP 560

Course typically offered:

Main Campus: Fall

Recommendations and additional information: MCB 181R, PLS 360, and BIOC 462A. Basic molecular biology, plant biology and biochemistry are necessary to succeed in this class. Equivalent courses will be acceptable to fulfill these requisites.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 572: Systematic Botany (4 units)

Description: Evolutionary relationships and characteristics of seed plants: systems of classification; acquisition of skills to identify members of almost 50 families, collection and identification of local flora. Graduate-level requirements include study of additional plant families and increased depth regarding class project.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Laboratory Lecture	May Be Offered Required
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Equivalent to: PLS 572

Also offered as: ECOL 572

Co-convened with: PLS 472

Course typically offered:

Main Campus: Spring (odd years only)

Home department: Ecology & Evolutionary Biology

PLS 573: Recombinant DNA Methods and Applications (4 units)

Description: This course offers an intensive lab experience to teach students the practical and theoretical aspects of modern molecular biology. In the first part of the course, recombinant DNA methods and bioinformatics are used to clone and identify an unknown gene. In the second part of the course DNA microarray technology is used to determine the effect of environmental stress on the global gene expression program in yeast, and to identify genes that control the stress response. Weekly lectures compliment the lab sessions, covering the theory and principles underlying the experiments performed during the course. Graduate level requirements will include additional assignments, such as presenting and discussing research papers applicable to the lab projects or recent advances in molecular biology techniques.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$150

Course Components:	Discussion Lecture	Required Required
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Equivalent to: BIOC 573, GENE 573, MIC 573, MICR 573, PLS 573

Also offered as: BIOC 573, GENE 573, MCB 573, MIC 573

Course typically offered:

Main Campus: Spring

Home department: Molecular & Cellular Biology

Enrollment requirement: (MCB 181R and 181L) or MCB 184.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: Students will learn the major environmental factors affecting plant growth and development and will understand interactions between plants and their microenvironments, including light penetration and CO₂/H₂O diffusion. Students will learn energy and mass balance of leaves and canopy and correlate these phenomena with plant productivity and related plant physiological mechanisms. Lectures cover critical controlled environment issues and practices of plant production in greenhouse, plant production factory, tissue culture vessels and post-harvest storage, with an introduction to the current research status in these areas. This course will be offered in spring of even years. Graduate-level requirements include a research paper on a specific topic within plant physiology under controlled environment. The paper should be a critical review of the current literature on the topic chosen.

Career: Graduate

Repeatable: Course can be repeated a maximum of 2 times.

Also offered as: BE 575A

Course typically offered:

Main Campus: Spring

Description: Students will learn principles, methods, and techniques related to the measurement and control of environmental factors affecting plant growth and plants' surrounding climate under controlled environments. Light intensity, light quality, temperature (air, plant), relative humidity, carbon dioxide, water, air current, and related factors are important variables in controlled environment plant production systems to measure and control since they affect and determine plant growth and development and processes such as heating, ventilating and air conditioning, fertigation etc. Therefore, students will learn application of sensors, instrumentation and designing of a simple system to measure and control environments for plant production systems. Graduate-level requirements include higher grading percentages for midterm, design project, and final exams.

Career: Graduate

Course Components:	Laboratory Lecture	May Be Offered Required
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Also offered as: BE 579

Course typically offered:

Main Campus: Spring

Home department: Biosystems Engineering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 580: Medicinal Plants (3 units)

Description: Historical and cultural aspects of plants and medicine, therapeutic uses of plants, psychoactive and food plants, contribution of medicinal plants to modern medicine, future of medicinal plants. Graduate-level requirements include review of at least two leading papers in the field.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: ARL 580

Also offered as: ARL 580

Co-convened with: PLS 480

Course typically offered:

Main Campus: Fall (even years only)

PLS 583: Controlled Environment Systems (3 units)

Description: An introduction to the technical aspects of greenhouse design, environmental control, hydroponic crop production, plant nutrient delivery systems, intensive field production systems, and post-harvest handling and storage of crops. Graduate-level requirements include submission of a comprehensive report related to a specific greenhouse design project.

Grading basis: Regular Grades

Career: Graduate

Course Components: Laboratory Required
Lecture Required

Equivalent to: PLS 583

Also offered as: BE 583

Co-convened with: PLS 483

Course typically offered:

Main Campus: Fall

Home department: Biosystems Engineering

PLS 593: Internship (1 - 6 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 595B: Current Topics in Plant Science - Advanced (1 - 3 units)

Description: The exchange of scholarly information and/or secondary research, usually in a small group setting. Instruction often includes lectures by several different persons. Research projects may or may not be required of course registrants.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Repeatable: Course can be repeated for a maximum of 15 units.

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: Graduate standing or consent of instructor.

PLS 596A: Department of Plant Sciences Seminar. (1 unit)

Description: Departmental seminar providing a forum for graduate students to present research objectives and progress. Student presentations will be evaluated by course instructors and selected faculty. Students will also have the opportunity to participate in the seminar evaluation process.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Seminar Required

Repeatable: Course can be repeated for a maximum of 12 units.

Equivalent to: PLS 596A

Also offered as: PLP 596A

Co-convened with: PLS 496A

Course typically offered:

Main Campus: Fall, Spring

Home department: Plant Pathology

PLS 596U: Molecular Phylogenetics (2 units)

Description: This course will cover (1) the theoretical and methodological aspects of inferring phylogeny from molecular data, and (2) the use of phylogenetic trees for investigating a wide variety of biological questions, with readings from the primary literature forming the basis of discussions.

Grading basis: Regular Grades

Career: Graduate

Course Components: Seminar Required

Equivalent to: EIS 596U, ENTO 596U, PLS 596U, RNR 596U

Also offered as: ECOL 596U, EIS 596U, RNR 596U

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Graduate standing or consent of instructor.

Home department: Ecology & Evolutionary Biology

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 597F: Community and School Garden Workshop (2 - 6 units)

Description: This workshop-based course is designed to enable UA undergraduate and graduate students to work in Tucson-area schools and community sites helping stakeholders to plant, harvest and prepare foods from their garden as well as use the garden as a learning space. As a member of a school or community garden team, students are likely to cover a wide range of activities from maintaining a compost pile to administering lesson plans for teaching in the garden to weeding, planting, and organizing work crews. In addition to attending one 3-hour weekend workshop, students are required to attend weekly class meetings on the UA campus. Most of the course, however, revolves around independent and sustained involvement with a Tucson school or community garden. No teaching or gardening experience is required.

Grading basis: Regular Grades

Career: Graduate

Course Components: Workshop Required

Repeatable: Course can be repeated for a maximum of 9 units.

Also offered as: AIS 597F, ENVS 597F, GEOG 597F, LAS 597F, NSC 597F, STCH 597F, TLS 597F

Co-convened with: PLS 497F

Course typically offered:

Main Campus: Fall, Spring

Home department: School of Geography and Development

PLS 599: Independent Study (1 - 5 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 607: Untold Stories: University Women in Agriculture (3 units)

Description: This course examines the status of women involved in higher education in a variety of agriculturally related fields. Through readings and interviews we survey the working conditions, personal challenges and lifestyles of professional women in non-traditional fields. Covering a wide variety of topics, this course surveys the contributions of women to the professional workplace and to the household. The role of the law in shaping conditions for women in the workplaces and levels of satisfaction in their chosen professions is also reviewed. In addition this course moves toward understanding how to work with women in the professional workplace and enhance their contributions and encourage their professional growth.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: CALS 607, FCSC 607, PLS 607

Also offered as: AED 607, CALS 607, FCSC 607

Home department: Agricultural Education

PLS 611: Comparative Virology (3 units)

Description: A comprehensive course covering broad-ranging aspects of modern virology with an emphasis on comparisons between representative virus groups, taking into account different host, tissue, cell, and vector tropisms, and modes of transmission. The team of instructors will highlight representative types of viruses across different life forms to encourage and illuminate inter-group comparisons in discussion sessions lead by the graduate students.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: MIC 611, PLS 611, VSC 611

Also offered as: ACBS 611, MIC 611, PLP 611

Recommendations and additional information: PLP 305, BIOC 460, VSC 433.

Home department: Plant Pathology

PLS 616: Arizona Cropping Systems (1 unit)

Description: Students will learn various crop production systems and understand challenges, production practices, technologies, pests and diseases in Arizona agriculture. Students will be able to associate impact of plant and microbial sciences in arid land agriculture. This course consists of 7 field trips scheduled on selected Fridays during fall semester. The last trip will be a Friday/Saturday trip to the Yuma area.

Grading basis: Regular Grades

Career: Graduate

Course Components: Laboratory Required

Also offered as: ENVS 616, PLP 616

Course typically offered:

Main Campus: Fall

Home department: Plant Pathology

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 695A: Journal Club (1 unit)

Description: Enrolled students take turns selecting and leading the discussion on articles from the primary literature. Enrollment is open to students with interests in any of the three focus areas of the Dept. of Plant Sciences: Plant Biology, Genetics and Genomics; Horticultural and Crop Sciences; and Plant Pathology and Microbiology. Goals of the course include: fostering interaction among students with diverse interests and backgrounds, keeping abreast of current publications of broad interest, and providing a forum where free discussion is encouraged.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Repeatable: Course can be repeated for a maximum of 4 units.

Equivalent to: MCB 695A, PLS 695A

Also offered as: MCB 695A, PLP 695A

Course typically offered:

Main Campus: Fall, Spring

Home department: Plant Pathology

PLS 695C: Introduction to Research (1 - 3 units)

Description: Short research projects on average to cover the length of a semester conducted in various departmental faculty laboratories. The projects will be designed to introduce students to the range of research being conducted in the department.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Repeatable: Course can be repeated a maximum of 5 times.

Equivalent to: PLS 695C

Also offered as: PLP 695C

Course typically offered:

Main Campus: Fall, Spring

Distance Campus: Fall, Spring

Home department: Plant Pathology

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 695P: Introduction to Research (3 - 5 units)

Description: Short research projects on average to cover the length of a semester conducted in various departmental faculty laboratories. The projects will be designed to introduce students to the range of research being conducted in the department.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Repeatable: Course can be repeated for a maximum of 15 units.

Also offered as: PLP 695P

Course typically offered:

Main Campus: Fall, Spring

Home department: Plant Pathology

PLS 696A: Interdisciplinary Plant Sciences Seminar (1 unit)

Description: The scope of the work will consist of discussion and critical evaluation of current literature with course instructors and visiting seminar speakers. Written evaluations and oral presentations may be required of course registrants. A grade of SPCDE will be given for this course.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Seminar Required

Repeatable: Course can be repeated a maximum of 8 times.

Equivalent to: PLP 696A

Also offered as: PLP 696A

Course typically offered:

Main Campus: Fall, Spring

PLS 696C: Informatic and Comparative Analysis of Genomes (1 - 3 units)

Description: This course provides hands-on experience in the manipulation and analysis of genomic data and teaches the steps in the preparation of writing scientific manuscripts.

Grading basis: Regular Grades

Career: Graduate

Course Components: Seminar Required
Workshop Required

Repeatable: Course can be repeated a maximum of 4 times.

Equivalent to: ECOL 696C, MCB 696C, PLS 696C

Also offered as: ECOL 696C

Recommendations and additional information: ECOL 553.

Home department: Ecology & Evolutionary Biology

Interdisciplinary Interest Area: BIOC - Biochemistry

Interdisciplinary Interest Area: MCB - Molecular & Cell Biology

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 699: Independent Study (1 - 5 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

Distance Campus: Fall, Winter, Spring, Summer

PLS 900: Research (1 - 8 units)

Description: Individual research, not related to thesis or dissertation preparation, by graduate students.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

PLS 909: Master's Report (1 - 8 units)

Description: Individual study or special project or formal report thereof submitted in lieu of thesis for certain master's degrees.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

PLS 910: Thesis (1 - 8 units)

Description: Research for the master's thesis (whether library research, laboratory or field observation or research, artistic creation, or thesis writing). Maximum total credit permitted varies with the major department.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PLS 920: Dissertation (1 - 9 units)

Description: Research for the doctoral dissertation (whether library research, laboratory or field observation or research, artistic creation, or dissertation writing).

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Winter, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.