

PLSC - PLANT SCIENCES

PLSC400 Plant Physiology (4 Credits)

An in-depth examination of the unique molecular and physiological principles necessary to understand how plants grow and respond to the environment at the cellular and organismal levels. Plants evolved unique metabolism and survival strategies, so students should be prepared to enter a world that may be new to them.

Prerequisite: Minimum grade of C- in BSCI170 and (BSCI180 or BSCI171); or minimum grade of C- in PLSC201 and PLSC206; and minimum grade of C- in CHEM231 and CHEM232; or minimum grade of C- in CHEM237.

Cross-listed with: BSCI442.

Credit Only Granted for: BSCI442 or PLSC400.

PLSC401 Pest Management Strategies for Turfgrass (3 Credits)

Interdisciplinary view of weed, disease, and insect management from an agronomy perspective. Plant responses to pest invasion, diagnosis of pest-related disorders, and principles of weed, disease and insect suppression through cultural, biological and chemical means are discussed.

Prerequisite: PLSC205.

PLSC402 Sports Turf Management (3 Credits)

Sports turf management, including design, construction, soil modification, soil cultural techniques, pesticide use, fertilization, and specialized equipment.

Prerequisite: PLSC305 and PLSC401.

PLSC404 Plant and Fungal Metabolism (3 Credits)

An introduction to biochemistry and metabolism in plants and fungi, covering the biosynthesis of compartments in plant and fungal cells with biological molecules such as nucleic acids, amino acids and lipids. Energy flow processes such as photosynthesis, carbohydrate metabolism and respiration, are covered in the course. The integration of different pathways in plant development and responses to environmental stresses will be discussed.

Prerequisite: Minimum grade of C- in BSCI170 and (BSCI180 or BSCI171); or minimum grade of C- in PLSC201 and PLSC206.

PLSC405 Agroecology (3 Credits)

How can we balance the multiple, and often competing objectives of sustainable agricultural intensification to promote both agricultural productivity and human wellbeing? The answer to this question requires a transdisciplinary, agroecological perspective. Agroecology is the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions. This course is designed to introduce various topics in agroecology (e.g. organic agriculture, biodiversity, the Farm Bill). We will take an ecosystems approach to the study of agriculture that will enable students to analyze the environmental, social, and economic interconnections within various types of agricultural systems locally and globally.

Prerequisite: At least one course in ecology with a minimum grade of C-; or permission of instructor.

Recommended: BSCI361 or PLSC471; or any BSCI or ENST ecology course.

Credit Only Granted for: PLSC405 or PLSC605.

Additional Information: Class will be held on campus, with two day-long field trips to local farms.

PLSC407 Advanced Crop Science (3 Credits)

Focuses on the study of the agronomic principles and practices required for the production of food, feed, fiber and fuel crops. This is a project-based course where students will develop a farm plan from knowledge gained in previous courses and built upon in this course. Students will learn to integrate data and information from many sources in order to build and operate a successful and sustainable agronomic farm operation using current and new technology. The use of farm management software will be an integral part of the course and farm project.

Prerequisite: (PLSC110 and PLSC111) OR (PLSC112 and PLSC113), BSCI160 and (BSCI180 or BSCI161), and MATH113 or higher.

Recommended: ANSC101.

Credit Only Granted for: PLSC407 or AGST400.

Formerly: PLSC407.

Additional Information: There will be two required Saturday field trips during the semester. Because of the changing nature of agriculture, the dates of these field trips will be decided upon at the beginning of the semester by discussion among the students and based on cooperators availability and environmental factors. Students will have a minimum of two weeks notice as to the dates of the field trips.

PLSC410 Commercial Turf Maintenance and Production (3 Credits)

Agronomic programs and practices used in hydroseeding, commercial lawn care, sod production and seed production. Current environmental, regulatory and business management issues confronting the turfgrass industry.

Prerequisite: PLSC305; or permission of AGNR-Plant Science & Landscape Architecture department.

PLSC411 Plant Genetics (3 Credits)

An introduction to genetic principles and technologies in plants, centered on linking phenotype to genotype. Topics include Mendelian inheritance of single and complex traits, epigenetics, population genetics and plant breeding. Examples on creating and mapping genetic mutations in both model plants and non-model crops are discussed. Current genetic and genomic approaches are highlighted, such as genome engineering and reprogramming, TILLING, and genome-wide association mapping.

Prerequisite: Minimum grade of C- in BSCI170 and (BSCI180 or BSCI171).

PLSC420 Principles of Plant Pathology (4 Credits)

An introduction to the causal agents, nature and management of plant diseases with particular attention paid to economically important diseases of horticultural and agronomic crops.

Prerequisite: Minimum grade of C- in CHEM131, CHEM132, PLSC201, and PLSC206; or students who have taken courses with comparable content may contact the department.

PLSC425 Green Roofs and Urban Sustainability (1 Credit)

The integration of disciplines associated with sustainability issues. Topics range from plant science to design to policy, all of which can contribute to improving the urban environment.

Credit Only Granted for: PLSC425 or PLSC489V.

Formerly: PLSC489V.

PLSC427 Plant Microbe Associations (3 Credits)

Encompasses advanced investigation and analyses of the ecology, physiology and molecular genetics of plant-microbe interactions along with their impact on crop production, ecological and food production systems.

Credit Only Granted for: PLSC489W or PLSC427.

Formerly: PLSC489W.

PLSC430 Water and Nutrient Planning for the Nursery and Greenhouse Industry (3 Credits)

Skills will be developed in order to write nutrient management plans for the greenhouse and nursery industry. Completion of this course can lead to professional certification in nutrient planning by the State of Maryland after MDA examinations are passed.

Prerequisite: Minimum grade of C- in CHEM131 and CHEM132; or minimum grade of C- in ENST200; or permission of instructor.

Recommended: PLSC432.

PLSC432 Greenhouse Crop Production (3 Credits)

The commercial production and marketing of ornamental plant crops under greenhouse, plastic houses and out-of-door conditions. Integrating an understanding of basic plant physiological mechanisms into the decision-making process for the design, construction, maintenance and day-to-day management of greenhouse operations.

Prerequisite: Minimum grade of C- in PLSC201 and PLSC206.

PLSC433 Technology of Fruit and Vegetable Production (4 Credits)

A critical analysis of research work and application of the principles of plant physiology, chemistry and botany to practical problems in the commercial production of fruit and vegetable crops.

Prerequisite: Minimum grade of C- in PLSC201, PLSC206, PLSC271, and ENST200; or permission of instructor.

Restriction: Junior standing or higher.

PLSC434 The Quest for Color (3 Credits)

Finding sources of color in nature has motivated mindful inquiry and technical innovation across cultures. Yet, the quest for new colors has been both a result of and an excuse for colonization, appropriation of indigenous knowledge, and enslavement. When natural dyestuffs were largely replaced by synthetic dyes derived from coal tar in the late 1800s, color development posed new ecological and cultural challenges. In spite of these threats, practitioners worldwide have maintained their traditional methods without exploitation or petroleum products. This course integrates the history and chemistry of dye materials from plants and insects with hands-on practice in sustainable color creation. Students will hone the practical skills needed to source and process foraged dye materials, and apply them sustainably to fibers. Via this scientific process students will gain insight into the benefits of a naturally sourced approach to color and to life.

Credit Only Granted for: PLSC434 or HONR218R.

Formerly: HONR218R.

PLSC452 Environmental Horticulture (3 Credits)

Environmental horticulture principles used in the establishment and maintenance of plant materials in residential and commercial landscapes will be addressed. The effect of soil conditions, environmental factors, and commercial practices will be discussed in relation to the growth and development of newly-installed plant materials. Field diagnostics will be used by students to assess significant problems of plant decline. Environmental sustainability will be combined with current commercial practices of storm water management, nutrient management, and irrigation management to achieve an integrated approach to plant management.

Prerequisite: Minimum grade of C- in PLSC110 and PLSC111; or minimum grade of C- in PLSC112 and PLSC113.

Recommended: Minimum grade of C- in PLSC253 and PLSC254.

PLSC453 Weed Science (3 Credits)

Weed identification, ecology, and control (cultural, mechanical, biological, and chemical methods).

PLSC460 Application of Knowledge in Plant Sciences (3 Credits)

A capstone course based on interactions with plant science professionals and student-led class discussions. Students will apply their knowledge and experience to practical issues in the discipline, further develop critical thinking ability, and enhance their communication, teamwork, and professional skills. Topics will include nutrient management, integrated pest management, plant interactions with urban and rural ecosystems, planning of public grounds, plant biotechnology, and teaching skills.

Prerequisite: Minimum grade of C- in PLSC110 and PLSC111; or minimum grade of C- in PLSC112 and PLSC113; or minimum grade of C- in PLSC201 and PLSC206; or permission of instructor.

Recommended: ENGL393 and ENST200; and (PLSC389 or PLSC399).

Restriction: Senior standing or higher.

PLSC461 Cultural Management of Nursery and Greenhouse Systems: Substrates (1 Credit)

One of three 1-credit modules (PLSC461, PLSC462 and PLSC464) covering the management techniques used in the intensive culture of plants in commercial operations. Specifically, this module covers the composition, handling, physical and chemical properties of substrates and how they should be managed to maximize plant growth.

Credit Only Granted for: PLSC461 or PLSC489T.

Formerly: PLSC489T.

Additional Information: Course material is delivered primarily online, but a four hour face-to-face lecture/lab will be held at the end of the module. PLSC461, PLSC462 and PLSC464 will be taught sequentially during the semester.

PLSC462 Cultural Management of Nursery and Greenhouse Systems; Irrigation (1 Credit)

One of three 1-credit modules (PLSC461, PLSC462 and PLSC464) covering the management techniques used in the intensive culture of plants in commercial operations. Specifically, this module covers water quantity and quality issues, water supply (basic hydraulics), irrigation system design and irrigation system evaluation (performance) to maximize water application efficiency.

Credit Only Granted for: PLSC462 or PLSC489W.

Formerly: PLSC489W.

Additional Information: Course material is delivered primarily online, but a four hour face-to-face lecture/lab will be held at the end of the module. PLSC 461, 462 and 464 will be taught sequentially during the semester.

PLSC464 Cultural Management of Nursery and Greenhouse Systems: Nutrients (1 Credit)

One of three 1-credit modules (PLSC461, PLSC462 and PLSC464) covering the management techniques used in the intensive culture of plants in commercial operations. Specifically, this module covers the basics of fertilization, different fertilization strategies and nutrient use and efficiency, to optimize nutrient application practices in intensive plant production systems.

Credit Only Granted for: PLSC464 or PLSC489Z.

Formerly: PLSC489Z.

Additional Information: Course material is delivered primarily online, but a four hour face-to-face lecture/lab will be held at the end of the module. PLSC 461, 462 and 464 will be taught sequentially during the semester.

PLSC471 Forest Ecology (3 Credits)

An understanding of the forest ecosystem, its structure and the processes that regulate it are provided. It also considers changes that occur in forests, the interaction of environment and genetics in promoting ecosystem sustainability, and the role of human influences on urban forest ecosystems.

Prerequisite: Minimum grade of C- in PLSC201; or minimum grade of C- in BSCI160 and (BSCI180 or BSCI161).

PLSC472 Capstone-Urban Forest Project Management (3 Credits)

Students will synthesize the ideas and information learned from their studies in urban forestry. Working in teams, students will complete projects involving real-world issues. Student projects will use scientific, social, political and ethical considerations in an interdisciplinary approach to provide solutions to their problem.

Prerequisite: Minimum grade of C- in ENST200, PLSC272, and PLSC471.

Restriction: Senior standing or higher; and must be in a major within AGNR-Plant Science & Landscape Architecture department.

PLSC473 Woody Plant Physiology (3 Credits)

Concentration is placed on physiological processes important to woody plant growth and development. Emphasis will be placed on current concepts and theories of how woody plants grow and develop, and the critical assessment of current research in woody plant physiology. Course readings will include textbook assignments and selected papers from the current scientific literature.

Prerequisite: Minimum grade of C- in PLSC400 or BSCI442; or minimum grade of C- in PLSC201 and PLSC206; or students who have taken courses with comparable content may contact the department.

PLSC476 Data Wrangling and Visualization Using R (3 Credits)

Through a combination of lecture, hands-on demos, quizzes, and increasingly independent coding exercises and a project, you will learn the fundamentals of using the R statistical language. You will gain experience getting your data into R, wrangling it into the form needed for your chosen analysis, visualizing the data, getting your results out of those analyses, and documenting your workflow greater scientific community. Instead of focusing on a few specific types of analyses, you will learn basic skills and general principles that you can use to analyze data for your field.

Credit Only Granted for: PLSC489R or PLSC476 .

Formerly: PLSC489R.

PLSC480 Urban Ecology (3 Credits)

Cities are rapidly increasing in number and size across the globe, transforming local ecosystems. This course examines urban environments as coupled social-ecological systems at multiple scales, from streets and parks to urban landscapes patterns and global patterns of biodiversity. Ecological principles are applied in the urban context, including habitats, biodiversity, ecological processes, and ecosystem services of urban environments, with applications to problems in urban land management, decision-making and design.

Prerequisite: Minimum grade of C- in PLSC471, ENST360, BSCI363, or BSCI160; or other coursework/experience considered for instructor permission.

Additional Information: Class will be held both on campus and at other locations such as the U.S. Botanic Garden, local parks, and urban and suburban locations off campus.

PLSC481 Vegetation Assessment and Analysis (2 Credits)

An overview of vegetation assessment through the collection of data in the field (e.g. plots and transects) and the analysis of existing data and remotely detected images (e.g. Aerial photographs and GIS layers).

Prerequisite: PLSC110 and PLSC111; or BSCI160 and (BSCI180 or BSCI161); or permission of instructor.

Recommended: PLSC201, BSCI360, PLSC226, or PLSC471.

PLSC489 Special Topics in Plant Science (1-3 Credits)

A lecture and or laboratory series organized to study a selected phase of Plant Science not covered by existing courses. Credit according to time scheduled and organization of the course.

Repeatable to: 6 credits if content differs.

PLSC602 Advanced Crop Breeding II (2 Credits)

Quantitative inheritance in plant breeding including genetic constitution of a population, continuous variation, estimation of genetic variances, heterosis and inbreeding, heritability, and population movement.

Prerequisite: PLSC601; and must have completed a graduate statistics course.

PLSC605 Advanced Agroecology (3 Credits)

How can we balance the multiple, and often competing objectives of sustainable agricultural intensification to promote both agricultural productivity and human wellbeing? The answer to this question requires a transdisciplinary, agroecological perspective. Agroecology is the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions. This course is designed to introduce various topics in agroecology (e.g. organic agriculture, biodiversity, the Farm Bill). We will take an ecosystems approach to the study of agriculture that will enable students to analyze the environmental, social, and economic interconnections within various types of agricultural systems locally and globally. Students will be required to plan and execute group discussions and learning activities.

Prerequisite: At least one course in ecology with a minimum grade of C-; or permission of instructor.

Recommended: BSCI361 or PLSC471; or any BSCI or ENST ecology course.

Additional Information: Class will be held on campus, with two day-long field trips to local farms.

PLSC608 Research Methods (2 Credits)

An overview of research methods and applications related to plant sciences. Topics covered include current research advances, professional conduct and ethics, and preparation of grant proposals, manuscripts, and scientific presentations.

Prerequisite: Permission of AGNR-Plant Science & Landscape Architecture department.

Repeatable to: 6 credits if content differs.

Credit Only Granted for: AGRO608, NRSC608, or PLSC608.

Formerly: NRSC608.

PLSC609 Integrated Pest Management (1-4 Credits)

A modular course with an interdisciplinary approach to the theory and practice of integrated pest management. Topics of modules, each 3-4 weeks long, vary each semester over a three year time frame, with the first module serving as a prerequisite for all other modules. See www.EntmClasses.umd.edu for description of modules.

Restriction: Permission of instructor.

Repeatable to: 10 credits if content differs. Cross-listed with ENTM609.

Credit Only Granted for: ENTM609, NRSC609, or PLSC609.

Formerly: NRSC609.

PLSC618 Advances in Research; Critiquing Primary Plant Science Literature (1 Credit)

Discussion of advances in plant science research based on classic and current scientific literature.

Repeatable to: 7 credits.

PLSC619 Seminars in Plant Science and Landscape Architecture (1 Credit)

Enhancement of student learning and enrichment of student curriculum for the Plant Science Graduate Program through a combination of research seminar attendance and post-seminar discussion. Research seminars will be given by prominent scientists in the field of plant sciences and post-seminar discussions will be facilitated by the instructor along with student discussion leaders.

Repeatable to: 7 credits if content differs.

PLSC682 Methods of Plant Science Research (4 Credits)

The application of biochemical and biophysical methods to problems in biological research with emphasis on plant materials.

Credit Only Granted for: HORT682, NRSC682, or PLSC682.

Formerly: NRSC682.

PLSC685 Advanced Plant Ecophysiology (3 Credits)

Growth, productivity and survival are intimately linked to a plant's ability to adjust to its environment. The information provided in this course is designed to provide an introduction to the basic physical and physiological principles necessary for understanding the interactions between plants and their environment. The overall objective of this course is to understand plant responses and adaptations to the environment and the ecological relevance of these responses.

Credit Only Granted for: NRSC685 or PLSC685.

Formerly: NRSC685.

Additional Information: Must have completed one course in plant physiology.

PLSC689 Special Topics (1-3 Credits)

Credit according to time scheduled and organization of the course. Organized as a lecture series on a specialized advanced topic.

Repeatable to: 6 credits if content differs.

Credit Only Granted for: HORT689, NRSC689, or PLSC689.

Formerly: NRSC689.

PLSC782 Physiology, Biochemical and Molecular Biology of Herbicides and Plant Growth Regulators (3 Credits)

In this class we will study natural and synthetic chemicals which regulate the growth and development of plants. The mechanism by which herbicides and plant growth regulators express their activity on plants and the impact of these chemicals on the environment will be a primary focus of this course. The interaction of these chemicals with biotechnology advances will also be examined.

Additional Information: Students must have prior coursework similar to the content offered in undergraduate courses PLSC400 or BSCI442 with a minimum grade of C-.

PLSC785 Advanced Post-Harvest Physiology (3 Credits)

Physiological, biochemical and molecular aspects of senescence of detached plant organs, such as fruits, leaves and flowers.

Additional Information: Students must have prior coursework similar to the content offered in undergraduate courses PLSC474 and BCHM461 with a minimum grade of C-; or permission of AGNR-Plant Science & Landscape Architecture department.

PLSC789 Advances in Research (1 Credit)

Discussion of advances in plant science research based on classic and current scientific literature.

Repeatable to: 7 credits if content differs.

Credit Only Granted for: AGRO789, NRSC789, or PLSC789.

Formerly: NRSC789.

PLSC798 Graduate Seminar (1 Credit)

First and second semester.

Repeatable to: 6 credits if content differs.

Credit Only Granted for: AGRO798, HORT798, NRSC798, or PLSC798.

Formerly: NRSC798.

PLSC799 Master's Thesis Research (1-6 Credits)**PLSC802 Epidemiology and Plant Disease Management (3 Credits)**

An in-depth advanced course for graduate students in plant pathology, agronomy, entomology and horticulture emphasizing the principles of effective plant disease management in the agroecosystem.

PLSC805 Advanced Crop Physiology (2 Credits)

Major emphasis will be on physiological processes affecting yield and productivity of major food fiber and industrial crops of the world. Topics such as photosynthesis, respiration, photorespiration, nitrogen metabolism will be related to crop growth as affected by management decisions. Topics of discussion will also include growth analysis and the use of computer modeling of crop growth by plant scientists.

Additional Information: Students must have prior coursework similar to the content offered in undergraduate courses PLSC400 or BSCI442 with a minimum grade of C-; and must have completed advanced training in plant sciences.

PLSC898 Pre-Candidacy Research (1-8 Credits)**PLSC899 Doctoral Dissertation Research (1-8 Credits)**