

# Plant Sciences (PLSC)

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**PLSC 110. World Food Crops. 3 Credits.**

Scientific principles of crop growth, worldwide production, management alternatives, and processing for domestic and international consumption. 2 lectures, 1 discussion, 1 tutorial laboratory. F, S.

**PLSC 111. Genetics and You. 2 Credits.**

Basic concepts in genetics with emphasis on current human genetics. 2 lectures. S.

**PLSC 150. Introduction to Horticulture Therapy. 3 Credits.**

Horticultural therapy involves the use of plants and gardening activities to facilitate mental and physical rehabilitation. Students will become familiar with facilitation techniques, programs, clients, staff, budgets, facilities, equipment, and the various populations that horticulture therapists serve. 2 lectures and 2 lab hours per week. S.

**PLSC 177. Floral Design I. 2 Credits.**

History of floral design, care, handling, and identification of fresh cut flowers and dried materials. Use of tools, equipment, and supplies used in the industry and application of basic design styles, holiday designs, and displays. 1 lecture, 1 two-hour laboratory. S.

**PLSC 194. Individual Study. 1-5 Credits.****PLSC 196. Field Experience. 1-15 Credits.****PLSC 199. Special Topics. 1-5 Credits.****PLSC 200. Career Preparation in Plant Sciences. 2 Credits.**

Develop techniques to prepare for successful employment, identify and use resources to search for employment opportunities. Develop effective written and oral communication skills and gain exposure to several avenues of employment and career paths. S.

**PLSC 210. Horticulture Science. 3 Credits.**

Principles of plant classification, structure, function, growth, propagation, culture, and use of horticultural crops. Covers vegetable and fruit production in the home garden, growing flowers and planting flower beds, and landscaping principles and materials. 3 lectures. F.

**PLSC 211. Horticulture Science Lab. 1 Credit.**

Exercises in plant identification, propagation, nutrition, gardening, greenhouses, lawn care, landscape design, interior plants, pruning, and culture of horticultural crops. 1 two-hour laboratory. F.

**PLSC 215. Weed Identification. 1 Credit.**

Identification of weed seeds and plants from seedling to mature stages. Emphasis on life cycles, common distribution, and family groupings. 1 one and one half-hour laboratory plus time by arrangement. F.

**PLSC 219. Introduction to Prairie & Community Forestry. 2 Credits.**

Urban and traditional forestry as applied to the Great Plains region, as well as global forests. History, opportunities, and basic interactions of forestry with wildlife, parks and recreation, horticulture, and the ecology of the planet. 2 lectures. F (odd years).

**PLSC 225. Principles of Crop Production. 3 Credits.**

Principles of field crop production with emphasis on relationships of crops to their climate and production considerations as a means of managing resources and environmental factors. 2 lectures, 1 two-hour laboratory. Prereq: PLSC 110. S.

**PLSC 291. Seminar. 1-5 Credits.****PLSC 292. Study Abroad. 1-15 Credits.****PLSC 294. Individual Study. 1-5 Credits.****PLSC 296. Field Experience. 1-15 Credits.****PLSC 299. Special Topics. 1-5 Credits.****PLSC 307. History and Evolution of Wine in America. 1 Credit.**

Introduction to wines and wine industries from a historical perspective. Include an overview of cultivar selection, cultivation, harvesting, expressing, fermenting, and processing wines for unique characteristics. Wine tasting is needed to link sensory perceptions to wine characteristics. 1 lecture. Students must be at least 21 years old. F.

**PLSC 312. Expanding the Boundaries of Learning with Service. 1 Credit.**

This course is designed to build on the speaking, writing, interpersonal and team skills, and citizenship of our students. This course uses a service learning approach and can be repeated for credit. S.

**PLSC 315. Genetics. 3 Credits.**

Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 3 lectures. Cross-listed with BIOL 315, BOT 315, and ZOO 315. F, S.

**PLSC 315L. Genetics Laboratory. 1 Credit.**

Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 1 two-hour laboratory. Cross-listed with BIOL 315L, BOT 315L, and ZOO 315L. F, S.

**PLSC 320. Principles of Forage Production. 3 Credits.**

Introduction to alfalfa and other forage crops and their management, identification, preservation, forage quality characteristics, and use of legumes in rotations. 2 lectures, 1 one-hour laboratory, 1 tutorial by arrangement. Prereq: PLSC 110. F.

**PLSC 323. Principles of Weed Science. 3 Credits.**

Introduction to biological, chemical, cultural, and mechanical weed control; characteristics of weeds and their identification; pesticides application and dissipation. 2 lectures, 1 discussion, 1 tutorial laboratory. S.

**PLSC 335. Seed Technology & Production. 2 Credits.**

Techniques involved in production, harvest, and processing of seed. Special attention to maintenance of genetic and mechanical quality during growth, harvesting, and processing. 3 lectures, 2 two-hour laboratories. Prereq: PLSC 110. S/2.

**PLSC 340. Grain Grading. 2 Credits.**

Description and interpretation of the Grain Standards Act and instruction in grading of grain. 3 lectures, 3 two-hour laboratories. Recommended Prereq: PLSC 225. S/2.

**PLSC 341. Landscape Bidding, Contracting and Operations. 2 Credits.**

This course presents an overview of the landscaping industry from a business perspective. Students will learn about bidding, business law, employee and customer relations, money management, installation, and maintenance. Two lecture hours per week. S.

**PLSC 350. Sugarbeet Production. 2 Credits.**

History, growth, and development; soil and fertility management; weeds, insect, and disease control; cultivars; harvesting, storage, and processing of sugarbeets. Prereq: PLSC 110, PLSC 210. F.

**PLSC 355. Woody Landscape Plants. 3 Credits.**

Nomenclature, identification, and landscape characteristics of native and introduced deciduous and evergreen woody plants commonly used in the Northern Plains. Field trips. 1 lecture, 2 two-hour laboratories. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 210. F.

**PLSC 360. Horticultural Food Crops. 4 Credits.**

History, classification, culture, physiological principles, post harvest handling, and marketing of major fruit and vegetable crops. 4 lectures. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 210. S (odd years).

**PLSC 362. Potato Science. 2 Credits.**

History, botany, cultural practices, harvesting, breeding, physiology, storage, and processing of the potato. 2 lectures. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 110 or PLSC 210. F/2 (odd years).

**PLSC 365. Herbaceous Landscape Plants. 2 Credits.**

Production, identification, and uses of annual, perennial, and bulbous ornamentals in home and public landscapes with consideration to insect and disease problems. 3 one-hour lecture/laboratories. Recommended Coreq: PLSC 210. F (odd years).

**PLSC 368. Plant Propagation. 3 Credits.**

Principles and practices of seed propagation and of asexual propagation: cuttings, layering division, specialized structures, grafting, budding, and micropropagation. 2 lectures, 1 two-hour laboratory. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 210. S.

**PLSC 370. Landscape Management. 3 Credits.**

Introduction to basic landscape management principles and practices. Commercial management practices associated with the landscape design/build and maintenance industry are emphasized. F (odd years).

**PLSC 375. Turfgrass Management. 3 Credits.**

Species characteristics of cool and warm season turfgrasses, including cultural requirements for home lawns, parks, and sports turf. 3 lectures. Coreq: BIOL 150 or BIOL 151, PLSC 110 or PLSC 210. F.

**PLSC 375L. Turfgrass Management Laboratory. 1 Credit.**

This lab will provide students an opportunity to gain hands-on experience in turf-related topics discussed in the turfgrass management class. 1 two-hour laboratory. Co-req: PLSC 375. F.

**PLSC 379. Study Tour Abroad. 1-6 Credits.**

**PLSC 381. Sports Turf Operations. 3 Credits.**

Strategic management practices in sports turf and golf course operations, including development of cultural practices adhering to environmental regulations, personnel management, and budgeting. 3 lectures. Prereq: PLSC 375. F.

**PLSC 386. Arboriculture Climbing and Rigging Operations. 2 Credits.**

Introduction to the basics of tree climbing and rigging focusing on tree hazard assessment, climbing line placement, ascending, descending and moving around in the canopy as well as methods of safely rigging down branches and trunk sections of trees.

**PLSC 391. Seminar. 1-5 Credits.****PLSC 392. Study Abroad. 1-15 Credits.****PLSC 394. Individual Study. 1-5 Credits.****PLSC 397. Cooperative Education. 1-4 Credits.****PLSC 399. Special Topics. 1-5 Credits.****PLSC 411. Genomics. 3 Credits.**

An integrated presentation of genome organization, genome sequencing and characterization, comparative genomics, transcriptomics, proteomics, and metabolomics. Recommended Prereq: BIOL 150, STAT 330. F {Also offered for graduate credit - see PLSC 611.}.

**PLSC 412. Nursery Production and Management. 3 Credits.**

Industry overview, production-management practices, facilities, equipment, nursery stock standards, storage, and over wintering. Field trips. 3 lectures. Coreq: PLSC 368. S (odd years).

**PLSC 415. Vegetable Crop Production. 2 Credits.**

Vegetable Crop Production explores the history, classification, culture, physiological principles, post-harvest handling, and marketing of major vegetable crops. 2 lectures. Recommended Prereq: BIOL 150 or BIOL 151; PLSC 210 and PLSC 211. S (odd years). {Also offered for graduate credit - see PLSC 615}.

**PLSC 416. Fruit Crop Production. 2 Credits.**

Principles of tree fruit and small fruit production, emphasizing cool climate production. Plant establishment, pruning and training, harvesting and storage, and physiological, environmental, and cultural control of productivity, fruit quality, and pest damage. Recommended Prereq: BIOL 151, PLSC 210 and PLSC 211. F (even years). {Also offered for graduate credit - see PLSC 616}.

**PLSC 422. Greenhouse Production and Management. 3 Credits.**

Greenhouse structure and construction, environmental control, plant nutrition, growth regulation, pest control, and business management in relation to commercial production of greenhouse crops, including pot, cut flower, bedding, foliage, and vegetable crops. Field trips. 2 lectures, 1 two-hour laboratory. Recommended Coreq: PLSC 368. S (even years).

**PLSC 431. Intermediate Genetics. 3 Credits.**

Expansion of classical and molecular concepts of genetics; basic concepts of Mendelian, quantitative, population, molecular, and evolutionary genetics. 2 lectures. Prereq: PLSC 315. Cross-listed with BOT 431 and ZOO 431. F {Also offered for graduate credit - see PLSC 631.}.

**PLSC 433. Weed Biology and Ecology. 2 Credits.**

Principles of weed biology and ecology including seed biology, phenotypic plasticity, seedbank dynamics, population and community structure and dynamics, interference, invasion biology, gene flow and evolution, biological control, and ecologically based weed management. Prereq: BOT 380. S (even years).

**PLSC 444. Applied Plant Breeding and Research Methods. 3 Credits.**

Principles of genetics, experimental design, and crop management applied to conventional and transgenic crop improvement methodologies. Ethical and societal issues will be considered, in addition to technical and economic constraints. F Prereq: PLSC 225, PLSC 315, STAT 330.

**PLSC 453. Advanced Weed Science. 2 Credits.**

Integrated weed control programs for crops, pastures, non-cropland, and aquatic environments. Herbicide formulation and mixtures. Herbicide absorption, translocation, and action. 2 lectures. Prereq: PLSC 323. F {Also offered for graduate credit - see PLSC 653.}.

**PLSC 455. Cropping Systems: An Integrated Approach. 3 Credits.**

Integrative capstone focus on the scientific professional and ethical issues associated with crop production and management practices using decision case studies. 3 lectures. Recommended Prereq: Senior standing. S {Also offered for graduate credit - see PLSC 655.}.

**PLSC 457. Horticulture and Turfgrass Systems. 3 Credits.**

A problem-solving approach to many facets of horticulture and turfgrass management that addresses important issues such as the environment, ecology, biotechnology, pesticides, employment, and business management. An emphasis will be placed on literature reviews, problem solving and communications. 3 lectures. Recommended Prereq: Senior Standing. S.

**PLSC 465. Advanced Landscape Plants. 2 Credits.**

Nomenclature, identification, and landscape characteristics of native and introduced deciduous and evergreen woody plants grown in Upper Midwest. Emphasis on cultivar introduction, trademarks/patents, adaptation, and diversity within species. Field trips required. 2 two-hour laboratories. Prereq: PLSC 355. S (even years) {Also offered for graduate credit - see PLSC 665.}.

**PLSC 468. Landscape Irrigation Design. 2 Credits.**

Students will learn the basic issues of water resources, water management, and irrigation system design. 2 lectures. Prereq: Junior standing. Cross-listed with ASM 468. F (odd years).

**PLSC 469. Landscape Irrigation Installation and Management. 2 Credits.**

Irrigation system installation, winterization, start-up, troubleshooting, renovation, and drainage. 2 lectures. Prereq: Junior standing. Cross-listed with ASM 469. S (even years).

**PLSC 480. Advanced Turfgrass Topics. 3 Credits.**

Development of the turfgrass industry and the scientific basis of strategic turfgrass management, including relationships between turfgrasses, the environment, management and methodologies in turfgrass research. Prereq: PLSC 375. S (even years) {Also offered for graduate credit - see PLSC 680.}.

**PLSC 484. Plant Tissue Culture and Biotechnology. 3 Credits.**

Principles and techniques of plant tissue culture and genetic manipulation and their applications to plant improvement. Hands-on experience with plant tissue culture and genetic engineering. 2 lectures, 1 two-hour laboratory. Prereq: PLSC 315. F {Also offered for graduate credit - see PLSC 684.}.

**PLSC 485. Arboriculture Science. 3 Credits.**

Tree, shrub, and vine care based on the physiology of shoot and root growth and limitations of the environment. Includes plant and site selection, transplanting, staking, fertilizing, pruning, mulching, and related subjects. 3 lectures. Recommended Prereq: PLSC 355. F (even years) {Also offered for graduate credit - see PLSC 685.}.

**PLSC 486. Applied Crop Physiology. 3 Credits.**

Application of physiological principles on plant growth and development and crop production. 3 lectures. Prereq: BOT 380. S {Also offered for graduate credit - see PLSC 686.}.

**PLSC 491. Seminar. 1-5 Credits.**

**PLSC 492. Study Abroad. 1-15 Credits.**

**PLSC 494. Individual Study. 1-5 Credits.**

**PLSC 496. Field Experience. 1-15 Credits.**

**PLSC 499. Special Topics. 1-5 Credits.**

**PLSC 611. Genomics. 3 Credits.**

An integrated presentation of genome organization, genome sequencing and characterization, comparative genomics, transcriptomics, proteomics, and metabolomics. F {Also offered for undergraduate credit - see PLSC 411.}.

**PLSC 615. Vegetable Crop Production. 2 Credits.**

Vegetable Crop Production explores the history, classification, culture, physiological principles, post-harvest handling, and marketing of major vegetable crops. 2 lectures. S (odd years). {Also offered for undergraduate credit - see PLSC 415.}.

**PLSC 616. Fruit Crop Production. 2 Credits.**

Principles of tree fruit and small fruit production, emphasizing cool climate production. Plant establishment, pruning and training, harvesting and storage, and physiological, environmental, and cultural control of productivity, fruit quality, and pest damage. F (even years). {Also offered for undergraduate credit - see PLSC 416.}.

**PLSC 631. Intermediate Genetics. 3 Credits.**

Expansion of classical and molecular concepts of genetics; basic concepts of Mendelian, quantitative, population, molecular, and evolutionary genetics. 2 lectures. Cross-listed with BOT 631 and ZOO 631. F {Also offered for undergraduate credit - see PLSC 431.}.

**PLSC 633. Weed Biology and Ecology. 2 Credits.**

Principles of weed biology and ecology including seed biology, phenotypic plasticity, seedbank dynamics, population and community structure and dynamics, interference, invasion biology, gene flow and evolution, biological control, and ecologically based weed management. S (even years) {Also offered for undergraduate credit - see PLSC 433.}.

**PLSC 653. Advanced Weed Science. 2 Credits.**

Integrated weed control programs for crops, pastures, non-cropland, and aquatic environments. Herbicide formulation and mixtures. Herbicide absorption, translocation, and action. 2 lectures. F {Also offered for undergraduate credit - see PLSC 453.}.

**PLSC 655. Cropping Systems: An Integrated Approach. 3 Credits.**

Integrative capstone focus on the scientific professional and ethical issues associated with crop production and management practices using decision case studies. 3 lectures. S {Also offered for undergraduate credit - see PLSC 455.}.

**PLSC 665. Advanced Landscape Plants. 2 Credits.**

Nomenclature, identification, and landscape characteristics of native and introduced deciduous and evergreen woody plants grown in Upper Midwest. Emphasis on cultivar introduction, trademarks/patents, adaptation, and diversity within species. Field trips required. 2 two-hour laboratories. S (even years) {Also offered for undergraduate credit - see PLSC 465.}.

**PLSC 680. Advanced Turfgrass Topics. 3 Credits.**

Development of the turfgrass industry and the scientific basis of strategic turfgrass management, including relationships between turfgrasses, the environment, management and methodologies in turfgrass research. S (even years) {Also offered for undergraduate credit - see PLSC 480.}.

**PLSC 684. Plant Tissue Culture and Biotechnology. 3 Credits.**

Principles and techniques of plant tissue culture and genetic manipulation and their applications to plant improvement. Hands-on experience with plant tissue culture and genetic engineering. 2 lectures, 1 two-hour laboratory. F {Also offered for undergraduate credit - see PLSC 484.}.

**PLSC 685. Arboriculture Science. 3 Credits.**

Tree, shrub, and vine care based on the physiology of shoot and root growth and limitations of the environment. Includes plant and site selection, transplanting, staking, fertilizing, pruning, mulching, and related subjects. 3 lectures. F (even years) {Also offered for undergraduate credit - see PLSC 485.}.

**PLSC 686. Applied Crop Physiology. 3 Credits.**

Application of physiological principles on plant growth and development and crop production. 3 lectures. S {Also offered for undergraduate credit - see PLSC 486.}.

**PLSC 690. Graduate Seminar. 1-3 Credits.****PLSC 695. Field Experience. 1-15 Credits.****PLSC 696. Special Topics. 1-5 Credits.****PLSC 710. Professional Development I. 1 Credit.**

This course introduces students to professional society structure and function, mechanics of data presentation, and written discussion. Assignments will emphasize skills needed to complete a research proposal and prepare a research presentation. F.

**PLSC 711. Professional Development II. 1 Credit.**

This course emphasizes manuscript preparation, manuscript review, poster development, and grantsmanship. Consideration of professional ethics underlies all topics. S.

**PLSC 718. Genetics & Plant Improvement. 3 Credits.**

Genetic principles and their application to plant improvement. Crop evolution, chromosome structure, and population dynamics related to crop improvement methodology. Genetically modified plants, their impact on breeding technique, and the release of improved varieties. 3 one-hour lectures. Prereq: PLSC 315 and PLSC 315L. F.

**PLSC 721. Genomics Techniques. 2 Credits.**

Principles, techniques, and applications of the large-scale analysis of DNA organization and sequence, RNA expression, protein sequence, and structure. Prereq: PLSC 611. Cross-listed with BIOC 721. S.

**PLSC 724. Field Design I. 3 Credits.**

Application of various field designs, factorial and split-plot arrangements, orthogonal and non-orthogonal comparisons, models, components of variance, correlation, and regression to biological problems. 3 lectures. Recommended Prereq: STAT 725. F.

**PLSC 727. Crop Breeding Techniques. 1 Credit.**

Evaluation and practice of breeding methods used to develop superior genotypes in crop species across public and private breeding programs. Understanding why certain breeding techniques are used for adaptation, genetic improvement, and cultivar development. Prereq: PLSC 718, PLSC 724. Recommended prereq: PLSC 710, PLSC 734. SS (odd years).

**PLSC 731. Plant Molecular Genetics. 3 Credits.**

Molecular aspects of plant genome organization and expression; basic and applied usages of molecular markers and gene transfer techniques. 3 lectures. Prereq: PLSC 631. S (even years).

**PLSC 734. Field Design II. 2 Credits.**

Application of incomplete block designs, confounding and covariance analyses to biological problems. 2 lectures. Prereq: PLSC 724. S (odd years).

**PLSC 741. Cytogenetics. 4 Credits.**

Chromosome behavior during mitosis and meiosis; chromosome structure, function, and recombination; inheritance in aneuploids and polyploids; haploid formation and utilization. 3 lectures, 1 three-hour laboratory. F (even years).

**PLSC 750. Crop Stress Physiology. 3 Credits.**

Application of physiological principles to enhancement of stress tolerance in crops. S (odd years) Prereq: PLSC 686.

**PLSC 751. Advanced Plant Genetics. 3 Credits.**

Advanced topics in plant genetics regarding the study of genetic linkage, marker-assisted selection, statistical analysis and interpretation of genetic data, and the study of the inheritance in autotetraploid species. 3 lectures. Prereq: PLSC 631. S (odd years).

**PLSC 753. Action & Fate Of Herbicides. 2 Credits.**

Herbicide mode of action and fate of herbicides in plants and soil, physiology of herbicide resistance, and herbicide antidotes. 2 lectures. Prereq: PLSC 653. S (even years).

**PLSC 755. Advanced Crop Management Decision Making. 3 Credits.**

Problem-based learning approach focusing on the scientific, professional, personal, and ethical issues associated with advanced crop management decision-making. Recommended Prereq: PLSC 655. F (even years).

**PLSC 763. Laboratory Methods-Weed Science. 2 Credits.**

Chemical, analytical, and physiological methods for determining pesticide residues in soil and ground water; and herbicide absorption, translocation, and metabolism in plants. 2 two-hour laboratories. Prereq: PLSC 653. S (odd years).

**PLSC 776. Advanced Plant Breeding. 4 Credits.**

Application of genetic principles to improvement of self- and cross-pollinated crops. 4 lectures. Prereq: PLSC 718, PLSC 724. S (odd years).

**PLSC 779. Study Abroad: Sustainable Agriculture and Renewable Energies in Europe. 1-3 Credits.**

This study abroad course covers the main aspects of sustainable agriculture and renewable energy production in Europe. SS.

**PLSC 780. Population Genetics. 2 Credits.**

Concepts and principles related to genetic properties governing random and non-random mating populations. 2 lectures. F (odd years).

**PLSC 781. Quantitative Genetics. 2 Credits.**

Applied quantitative genetics and implications on plant breeding. 2 lectures. Prereq: PLSC 718, PLSC 724, PLSC 780. Recommended Prereq: PLSC 711, PLSC 734. S (even years).

**PLSC 785. Crop Breeding Programs Management. 2 Credits.**

Development of student ability to understand, examine, and evaluate crop breeding and improvement programs. Prereq: PLSC 718, PLSC 724. S (even years).

**PLSC 790. Graduate Seminar. 1-3 Credits.**

**PLSC 791. Temporary/Trial Topics. 1-5 Credits.**

**PLSC 792. Graduate Teaching Experience. 1-6 Credits.**

**PLSC 793. Indiv Study/Tutorial. 1-5 Credits.**

**PLSC 794. Practicum. 1-8 Credits.**

**PLSC 795. Field Experience. 1-15 Credits.**

**PLSC 796. Special Topics. 1-5 Credits.**

**PLSC 797. Master's Paper. 1-3 Credits.**

**PLSC 798. Master's Thesis. 1-10 Credits.**

**PLSC 892. Graduate Teaching Experience. 1-6 Credits.**

**PLSC 899. Doctoral Dissertation. 1-15 Credits.**