

Course Catalog - Spring 2010

Crop Sciences

111 ***Farming Systems*** credit: 2 hours.

General introduction to the equipment and practices commonly used on Midwest farms. Classes will consist of short lectures followed by demonstrations. All classes and demonstrations will be conducted at the University of Illinois Crop Sciences Research and Education Center. Includes field trips to local production and agribusiness facilities.

112 ***Introduction to Crop Sciences*** credit: 4 hours.

Introductory course covering principles of growth, production, protection, and improvement of crop plants. Topics covered include form, function, and uses of crops; mechanisms and factors responsible for plant growth and development; crop pests and pest protection; specific crops; and advances in crop production. Concepts are discussed in lecture and reinforced in corresponding hands-on laboratory sections.

116 ***The Global Food Production Web*** credit: 3 hours.

Introduces students to the global web involved in the production of food we consume on a daily basis. Selected ecosystems of plants, people, and cultures in Asia, Africa, and Latin America will be studied based on involvement with various crops. Presents the origin and biology of plants; their evolution with humankind in various cultures; the spread and economic importance of crops around the world; and considers current hunger and environmental issues resulting from the global food web. Interactive communications with selected scientists, producers, and traders around the world through the World Wide Web and email system of the INTERNET permit students to get personal exposure to information and activities.

This course satisfies the General Education Criteria for a Non-Western Cultures course.

180 ***Medicinal Plants and Herbology*** credit: 3 hours.

Same as HORT 180. See HORT 180.

199 ***Undergraduate Open Seminar*** credit: 1 to 5 hours.

Experimental course on a special topic in crop sciences. Topic may not be repeated except in accordance with the Code. May be repeated to a maximum of 12 hours.

226 ***Introduction to Weed Science*** credit: 3 hours.

Fundamentals of weed biology, ecology, and management. Emphasis is placed on basic principles and specific management strategies that are relevant to both crop and non-crop ecosystems. Includes a laboratory/discussion. Same as HORT 226. Prerequisite: CPSC 112 or HORT 100 or IB 103.

241 ***Intro to Applied Statistics*** credit: 3 hours.

Introduces fundamental statistics used to analyze and interpret data in the biological and physical sciences of agriculture, environmental sciences, and related areas. Includes descriptive and inferential statistics, measures of central tendency and dispersion, probability, correlation and regression, and tests of hypotheses. Enhances students' ability to critically assess statistical information encountered in professional and every day activities. Credit is not given for both CPSC 141 and STAT 100 or ACE 261.

This course satisfies the General Education Criteria for a Quant Reasoning I course.

261 ***Biotechnology in Agriculture*** credit: 3 hours.

Basic introduction to the techniques and application of biotechnology to a wide range of agricultural areas, and specific examples are given. May serve as either a terminal course explaining the techniques or as an introductory base for future studies. Same as HORT 261. Prerequisite: Any 100-level course in a biosciences discipline.

This course satisfies the General Education Criteria for a Life Sciences course.

265 ***Genetic Engineering Lab*** credit: 3 hours.

Laboratory/discussion course that provides a hands-on introduction to the techniques and principles of genetic engineering, recombinant DNA and the impact of molecular genetics on society. Students will isolate DNA from plants and clone specific genes into bacterial plasmids, perform polymerase chain reactions, DNA restriction analysis and DNA blotting, and discuss the relevance of these techniques to both medicine and agriculture. Prerequisite: A general biology course.

270 ***Applied Entomology*** credit: 3 hours.

Lectures, laboratory, and field trips cover the biology of insects and the recognition and management of insect pests of agricultural, forest, and urban ecosystems. Covers insect structure and physiology, classification, life histories, behavior, and pest management. Same as IB 220 and NRES 270.

This course satisfies the General Education Criteria for a Life Sciences course.

293 ***Off-Campus Crop Sci Internship*** credit: 1 to 5 hours.

Supervised, off-campus experience in a field directly pertaining to a subject matter in crop sciences. May be repeated to a maximum of 10 hours. For registration in this course, students should contact the Department Teaching Coordinator. Prerequisite: Sophomore standing, cumulative GPA of 2.0 or above at the time the internship is arranged, and consent of instructor.

294 ***On-Campus Crop Sci Internship*** credit: 1 to 5 hours.

Supervised, on-campus learning experience with faculty engaged in research. May be repeated to a maximum of 10 hours. For registration in this course, students should contact the Department Teaching Coordinator. Prerequisite: Sophomore standing, 2.0 GPA, consent of the advisor, and consent of the Department Teaching Coordinator.

295 ***Undergrad Research or Thesis*** credit: 1 to 4 hours.

Individual research, special problems, thesis, development and/or design work under the supervision of an appropriate member of the faculty. May be repeated in the same or subsequent terms. No more than 12 hours of special problems, research, thesis and/or individual studies may be counted toward degree. Prerequisite: Junior standing, cumulative GPA of 2.5 or above at the time the activity is arranged, and consent of instructor.

336 ***Tomorrow's Environment*** credit: 3 hours.

Introduction to interdisciplinary methods of analysis of environmental problems in a finite world; examination of the concept of the limits to growth; development of a working understanding of natural systems and environmental economics; and examination of various management strategies (technical, economic, and social) that can be used

to improve environmental quality. Same as CHLH 336, and ENVS 336. Prerequisite: One course in the life sciences and one course in the social sciences, or consent of instructor.

352 ***Plant and Animal Genetics*** credit: 4 hours.

The principles of heredity in relation to plant and animal improvement. Same as ANSC 340 and NRES 352. Prerequisite: IB 103 or IB 104.

382 ***Organic Chem of Biol Processes*** credit: 4 hours.

An overview of the structure, properties, and reactions of carbon-containing compounds relevant to biological processes and cellular structure. The chemistry of hydro carbon, aromatic, as well as oxygen- nitrogen-, phosphorus-, and sulfur-containing compounds will be examined. Macromolecular structures including biological membranes, carbohydrates, proteins and nucleic acids will also be discussed. Prerequisites: CHEM 102 and CHEM 104 or CHEM 202 and CHEM 204.

396 ***Undergrad Honors Res or Thesis*** credit: 1 to 4 hours.

Individual research, special problems, thesis, development and/or design work under the direction of the Honors advisor. May be repeated in the same or subsequent terms. No more than 12 hours of special problems, research, thesis and/or individual studies may be counted toward degree. Prerequisite: Junior standing, admission to the ACES Honors Program, and consent of instructor.

407 ***Diseases of Field Crops*** credit: 3 hours.

Same as PLPA 407. See PLPA 407.

414 ***Forage Crops and Pasture Eco*** credit: 3 hours.

Forages, their plant characteristics, ecology, and production; grasslands of farm and range as related to animal production and soil conservation. Offered in alternate years. Prerequisite: CPSC 112.

418 ***Crop Growth and Management*** credit: 3 hours.

Crop production and management as influenced by environment, plant species, and cropping system; relates plant growth processes to management practices. Prerequisite: NRES 201 and CPSC 112 or equivalent, or consent of instructor.

426 ***Weed Mgt in Agronomic Crops*** credit: 3 hours.

Principles of weed ecology and biology, and their application to weed management. Herbicides and their use in corn, soybeans and other agronomic crops. Specialized topics include weed management in reduced tillage, herbicide tolerant crops and management of problem weeds. Prerequisite: CPSC 226 or consent of instructor.

428 ***Weed Science Practicum*** credit: 2 hours.

Intensive course on field diagnostic skills in weed science. Topics include weed and weed seed identification, sprayer calibration, herbicide application, herbicide injury symptomatology, and field diagnostics. Students who complete the course will be encouraged to enter the North Central Weed Science Society weeds contest, which occurs during the summer. Prerequisite: CPSC 226 or CPSC 426 or consent of instructor.

431 **Plants and Global Change** credit: 3 hours.

The science of global atmospheric and climate change in the 21st Century. Understanding of how plants, including crops, will respond and may be adapted to these changes. Using plants to ameliorate predicted climate change. Same as IB 440 and NRES 431. Prerequisite: CPSC 112 or IB 103.

432 **Genetic Toxicology** credit: 3 hours.

Introduces the field of genetic toxicology; includes the study of physical and chemical induced mutagenesis, survey of genetic indicator organisms and genetic assays, distribution of environmental mutagens and their biochemistry, analysis of case histories of environmental mutagens and risk assessment. Same as ENVS 432. Offered in alternate years. Prerequisite: CPSC 352; CHEM 104; MCB 350, or MCB 452 and MCB 453, or consent of instructor.

433 **Basic Toxicology** credit: 3 hours.

Same as ENVS 480, FSHN 480, and VB 449. See FSHN 480.

435 **Environmental Toxicology** credit: 3 hours.

Same as CHLH 461, ENVS 431, and IB 485. See IB 485.

436 **Conservation Biology** credit: 4 hours.

Same as ENVS 420 and IB 451. See IB 451.

437 **Principles of Agroecology** credit: 3 hours.

Examines the dynamics and function of agricultural ecosystems and reviews fundamental concepts of ecology. Agricultural systems will be compared on the basis of energy flow, nutrient cycling, diversity, stability and required inputs. Offered in alternate years. Prerequisite: IB 100 or IB 103 or equivalent.

438 **Soil Nutrient Cycling** credit: 3 hours.

Same as NRES 438. See NRES 438.

439 **Env and Sustainable Dev** credit: 3 hours.

Same as NRES 439. See NRES 439.

440 **Applied Statistical Methods I** credit: 4 hours.

Statistical methods involving relationships between populations and samples; collection, organization, and analysis of data; and techniques in testing hypotheses with an introduction to regression, correlation, and analysis of variance limited to the completely randomized design and the randomized complete-block design. Same as ABE 440, ANSC 440, FSHN 440, and NRES 440. Prerequisite: MATH 012 or equivalent.

448 **Biological Modeling** credit: 3 or 4 hours.

Same as ANSC 449, GEOG 468, and IB 491. See GEOG 468.

449 ***Spatial Ecosystem Modeling*** credit: 3 or 4 hours.
Same as GEOG 469, IB 492, and NRES 469. See GEOG 469.

452 ***Genetics of Higher Organisms*** credit: 3 hours.
Selected contemporary topics in genetics are covered with examples primarily from plants, humans, and animals. Topics include nature of genes and genomes, mutations and their analysis, allelic diversity, use of recombinant DNA to enhance genetic analysis, structural and functional genomics, molecular marker mapping of quantitative trait loci, marker assisted selection, proteomics, bioinformatics, and transgenics. Prerequisite: CPSC 352, or MCB 106, or consent of instructor.

453 ***Principles of Plant Breeding*** credit: 4 hours.
Genetic and cytological variation in crop plants; the production and control of such variation in developing varieties and hybrids; and the maintenance of high quality seed stocks. Same as HORT 453. Prerequisite: IB 103; CPSC 352 or equivalent.

454 ***Plant Breeding Methods*** credit: 2 hours.
Discussion of the application of current scientific tools and methods available to plant breeders for improving plants; emphasis on actual use of plant breeding methods and production of high quality seed. Offered summer only in alternate years. Prerequisite: CPSC 453.

462 ***Plant Molecular Biology*** credit: 1 hours.
Same as IB 472. See IB 472.

465 ***Ethics in Biotechnology*** credit: 3 hours.
Same as ANSC 465 and HORT 465. See HORT 465.

466 ***Concepts and Tools of Genomics*** credit: 3 hours.
An overview of genomics in the context of molecular biology including: basic principles in molecular biology, accessing biological databases; transcriptional, translational, and post-translational gene regulation; regulatory roles of non-protein coding RNA, signal transduction, genome projects and gene annotation, DNA microarray analysis, protein interaction maps, and integrative functional genomics. Same as IB 477. Prerequisite: CPSC 352 or a similar course, or consent of instructor.

467 ***Plant Genomics*** credit: 1 hours.
Same as IB 473. See IB 473.

468 ***Plant Proteomics*** credit: 1 hours.
Same as IB 474. See IB 474.

469 ***Plant Metabolomics*** credit: 1 hours.
Same as IB 475. See IB 475.

473 **Mgmt of Field Crop Insects** credit: 3 hours.

Ecological principles of insect populations in agroecosystems including: sampling insect populations, threshold development, bioeconomics and decision-making, population regulation, designing management strategies for field crop insect pests, and deployment of transgenic crops for management of insect pests. Case studies describing various pest management programs in field-crop settings will be provided. Prerequisite: CPSC 270 or an equivalent course, or consent of instructor.

475 **Insect Pathology** credit: 4 hours.

Same as NRES 443 and IB 483. See IB 483.

477 **Biological Control** credit: 3 hours.

Same as IB 484. See IB 484.

479 **Insect Pest Management** credit: 4 hours.

Same as IB 482. See IB 482.

482 **Plant Tissue Culture** credit: 4 hours.

Same as HORT 482. See HORT 482.

483 **Outreach Education Skills** credit: 3 hours.

Provides graduate and undergraduate students interested in outreach and extension education programs with opportunities to develop their skills and effectiveness in development and presentation of outreach and extension programs. Same as ANSC 483. Prerequisite: Senior or graduate student status.

484 **Plant Physiology** credit: 3 hours.

Same as IB 420. See IB 420.

488 **Soil Fertility and Fertilizers** credit: 3 hours.

Same as NRES 488. See NRES 488.

489 **Photosynthesis** credit: 3 hours.

Same as BIOP 432 and IB 421. See IB 421.

498 **Undergrad Crop Sci Seminar** credit: 1 hours.

Course includes reports and oral presentations on special topics in a field of study directly pertaining to subject matter in crop sciences. Prerequisite: Junior standing.

499 **Seminar** credit: 0 to 4 hours.

Group discussion or an experimental course on a special topic in crop sciences. Approved for both letter and S/U grading. May be repeated to a maximum of 12 hours.

518 **Crop Growth and Development** credit: 4 hours.

Study of the physiological processes involved in growth and development of crop plants and the interaction of these processes with the environment that influences productivity. Prerequisite: CPSC 418 or CPSC 484.

526 **Herbicide Action in Plants** credit: 4 hours.

Study of various chemicals used to inhibit plant growth, including their uptake, translocation, mode of action, metabolism and resistance mechanisms in plants; and the relationship of chemical structure to the environmental fate of herbicides. Offered in alternate years. Prerequisite: CPSC 426 and CPSC 484.

538 **Environmental Plant Physiology** credit: 4 hours.

Same as IB 542. See IB 542.

541 **Regression Analysis** credit: 5 hours.

The application of regression methods to problems in agriculture and natural resources. Topics include simple linear, multiple linear, and nonlinear regression analysis and correlation analysis. Emphasis is placed on predictor variable selection, diagnostics and remedial measures and validation. Both quantitative and qualitative predictor variables are examined. The SAS system is used for all analyses. Same as ANSC 541. Prerequisite: CPSC 440 or equivalent.

542 **Applied Statistical Methods II** credit: 5 hours.

Statistical methods as tools for research. Principles of designing experiments and methods of analysis for various kinds of designs, experimental (completely randomized, randomized complete block, split plots, Latin square) and treatment (complete factorial); covariate analysis; use of SAS for all analyses. Prerequisite: CPSC 440 or equivalent.

545 **Statistical Genomics** credit: 3 or 4 hours.

Same as ANSC 545 and IB 507. See ANSC 545.

556 **Plant Breeding Literature** credit: 1 hours.

Students will read a diverse group of plant breeding journal articles, will learn skills involved in evaluating a scientific paper, and will discuss articles with plant breeding faculty members. Approved for S/U grading only. May be repeated in separate terms to a maximum of 5 hours. Prerequisite: Graduate student status.

558 **Quantitative Plant Breeding** credit: 4 hours.

Studies the theoretical bases for plant breeding procedures with special emphasis on the relationship between type and source of genetic variability, mode of reproduction, and effectiveness of different selection procedures. Offered in alternate years. Prerequisite: CPSC 453 and CPSC 540, or equivalent.

563 **Chromosomes** credit: 3 hours.

Includes cytogenetic analysis of eukaryotic organisms, the role of chromosomes in genome organization and evolution, and introduction to molecular cytogenetic laboratory techniques such as mitotic analysis, chromosome

banding, flow cytogenetics, somatic cell genetics, chromosomal length polymorphisms, fluorescent microscopy and in situ hybridization. Prerequisite: CPSC 352 and MCB 450, or consent of instructor.

564 ***Molecular Marker Data Analyses*** credit: 2 hours.

Statistical analyses and interpretation of molecular marker data including development of genetic maps, cluster analyses, quantitative trait loci analyses, and plant breeding applications of molecular marker data. Summer session I in alternate years. Prerequisite: CPSC 440 or equivalent, and CPSC 453 or equivalent. An advanced statistics course (e.g. CPSC 540 or ANSC 445 or equivalent) and familiarity with SAS recommended.

565 ***Perl & UNIX for Bioinformatics*** credit: 2 hours.

This intensive course is an introduction to high-throughput bioinformatics and genome data analysis. An introduction to programming with Perl and Bioperl will be given, and students will learn to write scripts relevant to their own research goals. We will also cover the use of UNIX and Perl for automating and customizing bioinformatics tools. Prerequisite: Graduate status or consent of instructor. In addition, familiarity with DNA and protein sequence data, and basic Windows computing skills are required.

566 ***Plant Gene Regulation*** credit: 4 hours.

Current topics and literature on the function and regulation of higher plant genes. Topics of emphasis: transposable elements, their effect on gene expression and variation, and uses in tagging and isolating genes; the developmental, tissue specific, or environmental regulations of plant genes; the structure, synthesis, subcellular targeting, and regulation of major cereal and legume seed proteins; the use of genetic engineering to explore the regulation of plant genes or to alter traits of agricultural importance. Same as HORT 566. Prerequisite: CPSC 352, MCB 350, or consent of instructor.

567 ***Bioinformatics & Systems Biol*** credit: 4 hours.

Bioinformatics and Systems Biology are emerging disciplines that address the need to manage and interpret the massive quantities of data generated by genomic research. In systems biology, advances in genomics, bioinformatics, and structural biology are used to generate global and unified views that integrate fragmentary knowledge of biological systems, their components and their interrelationships. This course is intended for students interested in the crossroads of biology and computational science and includes both lectures and hands-on experience. Same as IB 505. Students may not receive credit for this course and CPSC 499. Prerequisite: Graduate level status or consent of instructor.

568 ***Recombinant DNA Technology Lab*** credit: 2 hours.

Intensive instruction in the core methodologies of recombinant DNA technology. Students will generate and analyze recombinant DNA clones, using methods such as PCR; DNA isolation, restriction and ligation; electrophoresis; hybridization; DNA sequencing; computer-based sequence analysis. Summer session I. Prerequisite: CPSC 352 or MCB 350, or equivalent, and consent of instructor.

569 ***Applied Bioinformatics*** credit: 4 hours.

Same as ANSC 542 and IB 506. See ANSC 542.

574 ***Insect Resistance Management*** credit: 2 hours.

Concepts and strategies for managing insect resistance to crop rotation, insecticides, biological control and host-plant resistance. Includes toxicology, population genetics, modeling, economics, and social contexts of insect resistance. Same as IB 574 and NRES 574. Prerequisite: CPSC 270 or equivalent.

588 **Plant Biochemistry** credit: 4 hours.

Enzymes and pathways involved in plant intermediary metabolism. Basic cell physiology, bioenergetics, and hormonal regulation of metabolism. Same as HORT 588 and IB 524. Prerequisite: CPSC 484 and MCB 350.

590 **Professionalism and Ethics** credit: 2 hours.

Topics related to professional activities of agricultural and natural resource scientists, including scientific writing and publishing, grantsmanship and money management, oral presentation skills, finding and keeping a job, and mentoring and teaching are discussed. Ethical dimensions of these areas are explored through case studies. Same as NRES 590.

593 **Adv Studies in Crop Sciences** credit: 1 to 8 hours.

Directed studies of selected problems or topics relevant to Crop Sciences. Study may be in one of the following fields: 1) Plant Breeding and Genetics; 2) Plant Molecular Biology; 3) Plant Physiology; 4) Crop Production and Ecology; 5) Biometrics; 6) Plant Pathology; 7) Entomology; and 8) Weed Science. Prerequisite: Consent of instructor.

598 **Seminar** credit: 1 hours.

Current research in crops, genetic engineering, plant protection and other topics relevant to Crop Sciences. May be repeated to a maximum of 14 hours if topics vary. Students enrolling in discussion sections receive S/U grading. Students enrolling in lecture-discussion sections receive letter grading. Prerequisite: Graduate standing.

599 **Thesis Research** credit: 0 to 16 hours.

Individual research under supervision of faculty. Required of all students working toward the Master of Sciences (thesis option) or Doctor of Philosophy in Crop Sciences. Approved for S/U grading only. May be repeated to a maximum of 16 hours if topics vary.