

Course Catalog - Fall 2006

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.

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.

416 Perennial Grass Ecosystems Credit: 4 hours.

Same as HORT 436. See HORT 436.

417 Crops and Society Credit: 3 hours.

Interpretations of the role of crop plants in the development of culture and civilizations. Crops are described primarily in terms of their origins, evolution and influence on social and political institutions. Prerequisite: A general

biology course and a general chemistry or physical science course, or the consent of the instructor.

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 549. 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.

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. Prerequisite: CPSC 352 (Plant and Animal Genetics) or a similar course, or consent of instructor.

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, Introductory Entomology, 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: 2 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.

484 **Plant Physiology** Credit: 3 hours.
Same as IB 420. See IB 420.

485 **Plant Physiology Laboratory** Credit: 4 hours.
Same as HORT 422, and IB 422. See IB 422.

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 BIOP 432.

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: Senior 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.

540 **Applied Statistical Methods II** Credit: 4 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.

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.

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 **Molecular Cytogenetics** Credit: 4 hours.
This class 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 350, 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 ANSCI 445 or equivalent) and familiarity with SAS recommended.

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: 2 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. Students may not receive credit for this course and CPSC 499 Bioinformatics and System Biology. 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. See ANSC 542.

585 *Plant Biochemical Genetics* Credit: 4 hours.

Describes the practice and uses of plant tissue culture in modern plant biology including callus, suspension, protoplasts, anther, embryo and organ culture and their use for basic and applied studies such as propagation, mutant selection, gene amplification, somaclonal variation and transformation. The plant biochemical genetics aspects encompass mutagenesis, mutant selection, mutant characterization and the use of genetic transformation to alter plant biochemistry. The mutations characterized will include photosynthesis, dwarf, viviparous, lipid, seed traits, blue fluorescent and herbicide resistant. A laboratory of three hours per week outside of the regular class time will be arranged for carrying out experimentation predominately with plant tissue culture. Prerequisite: CPSC 352 or MCB 350, 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. Instructor Approval Required.

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.