CROP SCIENCES (CPSC)

CPSC 117 Agriculture and Science of Coffee credit: 3 Hours.
The growth and production of coffee and its impact on society and culture. The botanical aspects of coffee, coffee varieties/cultivars, and technologies for coffee growth, harvesting, post-harvest processing, and roasting will be discussed. The wide variety of coffee beverages, coffee flavor evaluation, coffee chemistry, coffee economics, and the physiological effects of coffee will also be examined.

CPSC 131 Agriculture in Mythology credit: 3 Hours.
Compare and contrast the role agriculture and plant sciences played in the development of ancient cultures. Study agricultural references in ancient global mythology. Develop an appreciation of how agricultural diversity of various ancient cultures influenced mythology in the cultures in different regions.
This course satisfies the General Education Criteria for:
Cultural Studies - Non-West

CPSC 180 Medicinal Plants and Herbology credit: 3 Hours.
Same as HORT 180. See HORT 180.

CPSC 190 African American Food Systems credit: 3 Hours.
Introduces students to the many foods commonly considered American that are in fact African in origin; explores the neglected story of how people, crops, and knowledge from Africa were transplanted into the New World; examines the historical, cultural, and agricultural roots of African American food systems; and evaluates the scientific (physical and social) and cultural aspects of these food systems to understand the origins, evolution, and contributions of African American food culture.

CPSC 199 Undergraduate Open Seminar credit: 0 to 5 Hours.
Experimental course on a special topic in crop sciences. Topic may not be repeated except in accordance with the Code. Approved for Letter and S/U grading. May be repeated up to a maximum of 12 hours in separate terms if topics vary.

CPSC 213 Evolution in Action credit: 2 Hours.
Introduction to evolutionary theory. Examination of how domesticated species have evolved. Develops an appreciation of how agroecosystems have influences evolution of adjacent natural ecosystems. Elucidation of evolutionary mechanisms necessary for agricultural species to adapt to global climate change.

CPSC 215 The Prairie and Bioenergy credit: 3 Hours.
Designed for students who are interested in bioenergy and its production from prairie land. Instructors will provide information on the global trend of bioenergy production and consumption, importance of bioenergy, the role of Illinois prairie land in bioenergy production, potential U.S. bioenergy production, biofuels from plants, and socio-environmental benefits of bioenergy.

CPSC 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.

CPSC 241 Intro to Applied Statistics credit: 3 Hours.
Introduces fundamental statistical procedures used to analyze and interpret data. General principles of descriptive and inferential statistics, measures of central tendency and dispersion, probability, correlation and regression, and tests of hypotheses are covered. An emphasis is placed on biological, environmental, and agricultural sciences, but numerous examples from other areas are discussed. Course content enhances students’ ability to critically assess statistical information encountered in professional and every day activities. Credit is not given for both CPSC 241 and STAT 100 or ACE 261.
This course satisfies the General Education Criteria for:
Quantitative Reasoning I

Information listed in this catalog is current as of 04/2018
**CPSC 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: Nat Sci Tech - Life Sciences

**CPSC 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.

**CPSC 266 Data in Biology and Agriculture** credit: 4 Hours.
This course focuses on the use of computing and data analysis to solve problems in biology and agriculture and includes an overview of computer methods and limitations of current computer, network and storage hardware for big data sets. The nature, use and future potential of different types of computer hardware and software in biology and agriculture (e.g. mobile applications, high performance computing, wireless networking) will be discussed. Examples of computing-related and computing-limited problems in biology and agriculture, such as image analysis, remote sensing and genetic analysis will be used as case studies. The potential of computing to improve the food system, medicine and other applications will be presented.

**CPSC 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: Nat Sci Tech - Life Sciences

**CPSC 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. Approved for S/U grading only. 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.

**CPSC 294 On-Campus Crop Sci Internship** credit: 1 to 5 Hours.
Supervised, on-campus learning experience with faculty engaged in research. Approved for S/U grading only. 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.

**CPSC 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.

**CPSC 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.

**CPSC 352 Plant Genetics** credit: 4 Hours.
The principles of heredity in relation to plant improvement. Same as NRES 352. Prerequisite: IB 103 or IB 104.

**CPSC 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.

**CPSC 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.

**CPSC 407 Diseases of Field Crops** credit: 3 Hours.
Same as PLPA 407. See PLPA 407.

**CPSC 408 Integrated Pest Management** credit: 3 Hours.
Examination of fundamental concepts of pest management including a historical review of pests and pest management; an overview of major pests (insects, weeds, plant diseases and vertebrate) in a variety of settings (agronomic, specialty crops, urban and structural); management options (area-wide, chemical, biological, cultural and physical); regulatory issues; and topics of current interest. 3 undergraduate hours. 3 graduate hours. Prerequisite: CPSC 226 or CPSC 270 or equivalent, both are preferred but only 1 is required.

**CPSC 412 Principles of Crop Advising** credit: 3 Hours.
Fundamentals in crop development and management, soil structure, management, and fertility, and how crops and soils interact are examined. Students learn how to diagnose real-world problems in fields and field crops grown in the Midwestern US, and to develop practical solutions to such problems. Prepares students to be competitive in careers within commercial crop agriculture and to pass the Certified Crop Adviser examination. 3 undergraduate hours. 3 graduate hours. Prerequisite: CPSC 112 and NRES 201, or equivalent, or consent of instructor.

**CPSC 413 Agriculture, Food, and the Environment** credit: 2 Hours.
Advanced course in the complex interactions of food production resulting from different agricultural systems and the environment. Develop an appreciation of the intricacies of producing food for a growing world population while minimizing the impact on the natural environment. Understand the implementation of new technology and strategies for future food production. 2 undergraduate hours. 2 graduate hours. Prerequisite: CPSC 112 or CPSC 113 or equivalent course or consent of instructor. For Online MS Program.
CPSC 434 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. 3 undergraduate hours. 3 graduate hours. Offered in alternate years. Prerequisite: An introductory class in biology.

CPSC 415 Bioenergy Crops  credit: 3 Hours.
Provides an overview and understanding of biomass feedstock production systems for sustainable biofuels production. 3 undergraduate hours. 3 graduate hours. Prerequisite: CPSC 112 or consent of instructor.

CPSC 416 Native Plants and Agroecosystems  credit: 4 Hours.
Introduction to native plants and to their conservation use and agronomic benefit. Topics include learning to identify native plants using a regional flora, knowing the different ecological niches in the state of Illinois and which plants inhabit them, and choosing appropriate native plants to enhance the interaction between agronomic crops and natives. 4 undergraduate hours. 4 graduate hours. Credit is not given for CPSC 416 if credit for NRES 415 has been earned. Prerequisite: HORT 100 or IB 103.

CPSC 418 Crop Growth and Management  credit: 3 Hours.
Crop physiology and management as influenced by environment, plant species, and cropping system; relates plant growth processes to crop production practices based on current research. 3 undergraduate hours. 3 graduate hours. Prerequisite: IB 103 or CPSC 112 or equivalent, or consent of instructor.

CPSC 419 Midwest Agricultural Practices  credit: 1 Hour.
Introduces agronomic production practices in the Midwest and economics of the crop production value chain. Specifically designed for beginning graduate students in crop genetic improvement from non-agricultural backgrounds. 1 undergraduate hour. 1 graduate hour.

CPSC 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. 3 undergraduate hours. 3 graduate hours. Prerequisite: CPSC 226 or consent of instructor.

CPSC 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. 2 undergraduate hours. 2 graduate hours. Prerequisite: CPSC 226 or CPSC 426 or consent of instructor.

CPSC 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. 3 undergraduate hours. 3 graduate hours. Offered in alternate years. Prerequisite: CPSC 112 or IB 103.

CPSC 433 Basic Toxicology  credit: 3 Hours.
Same as CB 449, ENV 480 and FSHN 480. See FSHN 480.

CPSC 436 Conservation Biology  credit: 4 Hours.
Same as ENV 420 and IB 451. See IB 451.

CPSC 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. 3 undergraduate hours. 3 graduate hours. Offered in alternate years. Prerequisite: IB 100 or IB 103 or equivalent.

CPSC 438 Soil Nutrient Cycling  credit: 3 Hours.
Same as NRES 438. See NRES 438.

CPSC 439 Env and Sustainable Dev  credit: 3 Hours.
Same as NRES 439. See NRES 439.

CPSC 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. 4 undergraduate hours. 4 graduate hours. Prerequisite: MATH 112 or equivalent.

CPSC 448 Biological Modeling  credit: 3 or 4 Hours.
Same as ANSC 449, GEOG 468, and IB 491. See GEOG 468.

CPSC 452 Advanced Plant Genetics  credit: 3 Hours.
Survey of selected contemporary topics in plant genetics and genomics. Topics include the nature of genes and genomes, crop domestication, selection, allelic diversity in populations, and genetics mapping. Serves as an introduction to functional genomics, population genetics, transmission genetics, quantitative genetics, and bioinformatics. Same as IB 478. 3 undergraduate hours. 3 graduate hours. Prerequisite: CPSC 352 or IB 204, or consent of instructor.

CPSC 453 Principles of Plant Breeding  credit: 4 Hours.
Principles, concepts and tools used in plant breeding. Includes methods and breeding schemes used with different plant species. Same as HORT 453. 4 undergraduate hours. 4 graduate hours. Prerequisite: IB 103; CPSC 352 or equivalent.

CPSC 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. 2 undergraduate hours. 2 graduate hours. Offered summer only in alternate years. Prerequisite: CPSC 453.

CPSC 462 Plant Molecular Biology  credit: 1 Hour.
Same as IB 472. See IB 472.

CPSC 466 Genomics for Plant Improvement  credit: 2 Hours.
An overview of applying the methods of genomics to discover variation in genes and their expression, creating new genetic variation, and applying this information to the improvement of economically important plants. Emphasis is on recent advances in genomic science and activities where functional genomics information is used to efficiently create and manipulate desirable phenotypes. Same as IB 477. 2 undergraduate hours. 2 graduate hours. Prerequisite: CPSC 352 or a similar course, or consent of instructor.

CPSC 467 Plant Genomics  credit: 1 Hour.
Same as IB 473. See IB 473.
CPSC 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 insects, and deployment of transgenic
crops for management of insect pests. Case studies describing various
pest management programs in field-crop settings will be provided. 3
undergraduate hours. 3 graduate hours. Prerequisite: CPSC 270 or an
equivalent course, or consent of instructor.

CPSC 475 Insect Pathology  credit: 3 Hours.
Same as IB 483. See IB 483.

CPSC 479 Insect Pest Management  credit: 3 Hours.
Same as IB 482. See IB 482.

CPSC 484 Plant Physiology  credit: 3 Hours.
Same as IB 420. See IB 420.

CPSC 488 Soil Fertility and Fertilizers  credit: 3 Hours.
Same as NRES 488. See NRES 488.

CPSC 489 Photosynthesis  credit: 3 Hours.
Same as BIOP 432 and IB 421. See IB 421.

CPSC 491 Ugrad Bioinformatics Seminar  credit: 0 to 2 Hours.
Same as INFO 491 and IS 493. See INFO 491.

CPSC 498 Crop Sci Professional Develpmnt  credit: 1 Hour.
Topics related to professional development including resumes, interview
skills, business etiquette, ethics, and presentations on opportunities in
crop sciences and horticulture. 1 undergraduate hour. No graduate credit.
Prerequisite: Junior standing in Crop Sciences or Horticulture.

CPSC 499 Seminar  credit: 1 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.

CPSC 501 Programming for Genomics  credit: 4 Hours.
Same as IB 501. See IB 501.

CPSC 505 Research Methods in Plant Sci  credit: 4 Hours.
Lectures, discussions, demonstrations, and laboratory exercises dealing
with methods and apparatus used in plant sciences research. 4 graduate
hours. No professional credit.

CPSC 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.

CPSC 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.

CPSC 538 Environmental Plant Physiology  credit: 4 Hours.
Same as IB 542. See IB 542.

CPSC 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 451. Prerequisite: CPSC 440 or equivalent.

CPSC 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.

CPSC 543 Appl. Multivariate Statistics  credit: 4 Hours.
This class introduces students to statistical methods that consider
several variables at once. Emphasis will be given to the applications of
multivariate methods to data sets in biology and ecology. Students will
develop good knowledge as to how multivariate methods work, they will
be able to apply these methods using SAS and R and they will be able to
make inferences on the results of the analyses for subsequent scientific
publication. Same as STAT 543. Prerequisites: CPSC 440 or equivalent
or consent of instructor.

CPSC 545 Statistical Genomics  credit: 3 or 4 Hours.
Same as ANSC 545 and IB 557. See ANSC 545.

CPSC 553 Advanced Plant Breeding  credit: 3 Hours.
A practical application of plant breeding, genetics, and statistics to devise
effective approaches to meet particular breeding goals. Highlighting
real life situations and key decisions facing the plant breeder, the course
builds upon knowledge of plant breeding methods and quantitative
genetic theory. Four specific functional areas, which reflect divisions
of labor in the seed industry are addressed: population development,
population evaluation, trait integration, and product commercialization
and supply. Offered in alternate years. Prerequisite: CPSC 453 or
equivalent; CPSC 558 or equivalent; CPSC 542 or equivalent.

CPSC 555 Crop Germplasm Resources  credit: 2 Hours.
In this course students will explore the use, curation and collection
of germplasm resources to facilitate crop improvement. Genetic
diversity is the foundational resource that plant breeders use for the
benefit of society; however, it is often challenging to identify, access,
and use desirable genes from relatives of crop plants. Strategies and
methods employed by plant breeders, curators and collectors will
be discussed. Topics will include using distant relatives in breeding
program, selecting a subset of accessions for evaluations when large
collections are available, circumventing breeding barriers to obtain wide-
cross progenies, navigating intellectual property issues, and writing a
successful plant exploration proposal. 2 graduate hours. No professional
credit. Prerequisite: Introductory courses in genetics (e.g. CPSC 352) and
plant breeding (e.g. CPSC 453) or equivalent.

CPSC 556 Plant Breeding Literature  credit: 1 Hour.
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.
CPSC 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 or equivalent.

CPSC 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. 3 graduate hours. No professional credit. Prerequisite: CPSC 352 or consent of instructor.

CPSC 564  Molecular Marker Data Analyses  credit: 3 Hours.
Topics include QTL mapping, association mapping, genomic selection, linkage disequilibrium, estimation and control of population structure, and the analysis of genotypic datasets produced using next-generation sequencing technology. All topics will be explored using real datasets analyzed in R (www.cran.org), and each class will include a lecture/discussion followed by a computer exercise. 3 graduate hours. No professional credit. Prerequisite: Previous course work in evolutionary, population, or quantitative genetics is recommended.

CPSC 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.

CPSC 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 450, or consent of instructor.

CPSC 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. Prerequisite: Graduate level status or consent of instructor.

CPSC 569  Applied Bioinformatics  credit: 4 Hours.
Same as ANSC 542 and IB 506. See ANSC 542.

CPSC 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 450.