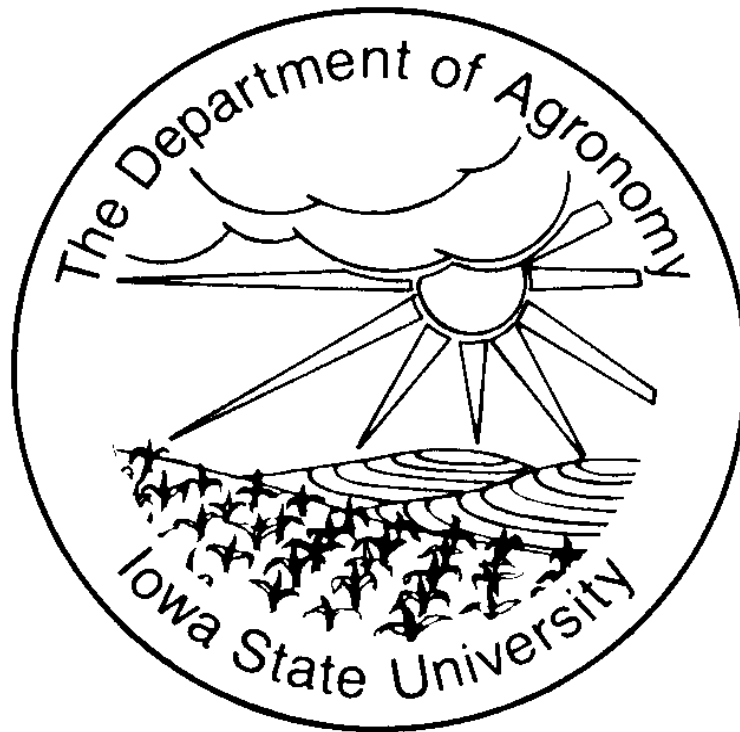


Crop Production and Physiology



A Guide to Graduate Study
in the Agronomy Department
at Iowa State University

revised July 2014

CROP PRODUCTION AND PHYSIOLOGY PROGRAM

The Iowa State Agronomy Department offers MS and PhD degrees in Crop Production and Physiology (CP&P). The program goals are to provide every graduate with the theoretical concepts and practical experience needed to function effectively as an independent scientist in the public or private sector. The learning experience in the Crop Production and Physiology Program has three major components: academic courses, thesis or dissertation research, and informal interaction among faculty and students. We believe that a collegial environment is essential for personal intellectual growth.

Graduate students can select from a wide range of advanced courses in agronomy, biochemistry, genetics, horticulture, meteorology, molecular biology, plant physiology, seed and weed science, and sustainable agriculture. Depending upon research interest and career focus, the student, in consultation with his/her advisory committee (POS Committee), will design a program of study (POS) from courses taught in several departments. The CP&P Program has no foreign language requirement.

GUIDELINES FOR GRADUATE COURSE REQUIREMENTS

Guidelines for Entrance

Entering students are expected to have a basic competence in physical science, mathematics, and plant science. Minor deficiencies in these areas usually can be addressed during graduate study.

PROGRAM OF STUDY (POS) GUIDELINES

All MS and PhD candidates are to establish their program of studies through discussion with their major professor and their POS Committee. It is recommended that students take at least one course from each of the following CORE AREAS.

CORE AREA 1 MOLECULAR BIOLOGY / BIOCHEMISTRY		
Course	Course Title	Credits
BBMB 404	Biochemistry I	3
BBMB 405	Biochemistry II	3
BBMB 501	Comprehensive Biochemistry I	4
BBMB 502	Comprehensive Biochemistry II	4
BBMB 542A-G	Introduction to Molecular Biology Techniques	1-5
BBMB 607	Plant Biochemistry	2
PLBIO 545	Plant Molecular, Cell and Developmental Biology	3

CORE AREA 2 GROWTH and DEVELOPMENT		
Course	Course Title	Credits
BIOL 454	Plant Anatomy	4
BIOL 428	Topics in Cell Biology	3
GDCB 528	Advances in Molecular Cell Biology	3
HORT 551	Growth and Development of Perennial Grasses	2

CORE AREA 3 PLANT PHYSIOLOGY and METABOLISM		
Course	Course Title	Credits
AGRON 516	Crop Physiology	3
AGRON 508	Biophysical Crop Ecology	3
AGRON 519	Herbicide Physiology and Biochemistry	2
AGRON 538	Seed Physiology	2
AGRON 553	Soil-Plant Relationships	3
AGRON 616	Advanced Topics in Plant Physiology and Biochemistry	4
BBMB 645	Molecular Signaling	2
PLBIO 513	Plant Metabolism	2

CORE AREA 4 CROP ECOLOGY AND MANAGEMENT		
Course	Course Title	Credits
AGRON 509	Agroecosystem Analysis	4
AGRON 515	Integrated Crop and Livestock Production Systems	3
AGRON 530	Ecologically Based Pest Management Strategies	3
AGRON 553	Soil-Plant Relationships	3
BIOL 474	Plant Ecology	3
EEOB 570	Landscape Ecology	3
EEOB 582	Analysis of Environmental Systems	3
EEOB 584	Advanced Ecosystem Ecology	3
BIOL 472	Community Ecology	3
EEOB 589	Population Ecology	3
HORT 524	Sustainable and Environmental Horticulture Systems	3
PL P 577	Bacterial-Plant Interactions	3
PL P 594	Seed Pathology with lab	3

CORE AREA 5 STATISTICS/QUANTITATIVE METHODS		
Course	Course Title	Credits
AGRON 526	Field Plot Technique	3
Stat 401	Statistical Methods for Research Workers	4
Stat 402	Statistical Design & the Analysis of Experiments	3
Stat 407	Methods of Multivariate Analysis	3
Stat 505	Environmental Statistics	3
Stat 512	Design of Experiments	3
BCB 596	Computational Molecular Biology	3
CRP 551	Introduction to Geographic Information Systems	3
NREM 546	Integrating GPS AMD GIS for Natural Resource Management	3

OTHER REQUIREMENTS

For Research, Agron 699B, students are expected to register for a minimum of 7 credits for the MS (thesis) and 24 credits for the PhD.

DESIGNATED "MINOR ONLY" COURSES

CP&P graduate students may take 400-level Agronomy courses outside the major, and not required for the BS in Agronomy, for credit toward their MS or PhD degree. The candidate is limited by the department to no more than three such courses. The POS Committee may choose, however, not to accept any such credits to fulfill the degree requirements.

Additionally, courses specifically designated for the Master of Science in Agronomy and Master of Professional Agriculture degrees may be accepted for graduate credit toward the MS or PhD, but they are restricted to the "minor only" category. These courses may not be used to substitute for any POS-required course.

GRADUATE STUDENT POLICIES – ANNUAL REVIEW

The department will evaluate graduate student progress annually. Graduate students will be asked to submit an Annual Report Form by 1 February. Reports are to be signed by the major professor and submitted to the Graduate Student Coordinator by the date indicated.

TEACHING ASSISTANTS (TAs)

The teaching activities for TAs average 15 hours per week per semester and 5 hours per week during the summer semester (actual hours per term may vary). The nature of the teaching responsibilities shall be arranged in consultation with the graduate student and major professor. Teaching assistants will be involved primarily in the undergraduate teaching program and receive three credits in Agron 698 for each term of involvement.

AGRONOMY 698 TEACHING PRACTICUM

The Department of Agronomy at Iowa State recognizes the importance of teaching and extension experiences in the professional development of MS and PhD candidates. Students have the opportunity to receive credit for teaching/extension experiences, Agron 698, Teaching Practicum. Students earn one credit in Agron 698 for each 5 hours of effort. The course is offered on a satisfactory-fail basis only and the grade will be awarded by the staff member supervising the teaching/extension experience. Graduate students are encouraged to visit with teaching or extension faculty in the department in order to select the most appropriate experience.

WRITTEN PRELIMINARY EXAMINATION—CROP PRODUCTION AND PHYSIOLOGY

All PhD students majoring in Crop Production and Physiology at Iowa State are required to take a written preliminary examination. If a student fails the examination, the respective POS Committee may require the student to retake the examination, to answer additional written questions, or proceed with the oral examination. The final decision regarding the student's suitability as a doctoral candidate resides with the student's POS Committee.

GRADUATE FACULTY IN CROP PRODUCTION AND PHYSIOLOGY

Kathleen Delate. Professor. Organic agriculture/horticulture. Improving organic production through soil amendments, crop rotation, varietal selection, and biologically-based pest management; agroecology of sustainable cropping systems. (*kdelate@iastate.edu*)

Susana Goggi. Associate Professor. Influence of genotype and environment on seed development, maturation and quality. Physiology of seed deterioration. Development and standardization of seed quality tests. (*susana@iastate.edu*)

Robert Hartzler. Professor. Influence of cultural practices on weed management systems. Weed population dynamics as affected by management practices. (*hartzler@iastate.edu*)

Jerry Hatfield. Professor. (USDA-ARS National Soil Tilth Lab). Production efficiency and environmental quality of farming systems, sustainable agriculture and microclimate of farming systems. (*jerry.hatfield@ars.usda.gov*)

Emily Heaton. Assistant Professor. Production and management of dedicated energy crops. Sustainable integration of food and fuel in agricultural systems. (*heaton@iastate.edu*)

Douglas L. Karlen. Professor. (USDA-ARS National Lab for Ag and Environment). Sustainable biomass feedstock production, crop rotations, and soil management as they affect crop growth, development and yield (*doug.karlen@ars.usda.gov*)

Tom Kaspar. Professor. (USDA-ARS National Lab for Ag and Environment). Tillage systems, cover crops, and soil spatial variability as they affect soil and water quality, crop growth, development and yield. (*tom.kaspar@ars.usda.gov*)

Allen D. Knapp. Professor. Influence of abiotic stresses on germination, autotrophic seedling growth. Physiological and morphological elements of yield construction in maize. (*adknapp@iastate.edu*)

Andy Lenssen. Associate Professor. Cropping systems, corn, soybeans, other pulse crops, forages, crucifer oilseeds, and cover crops. (*alenssen@iastate.edu*)

Matt Liebman. Professor. Diversified cropping systems, soil organic matter dynamics, weed ecology and management, and the use of native perennial species for soil and water conservation and biofuel production. (*mliebman@iastate.edu*)

Fernando Miguez. Assistant Professor. Crop and soil statistical and mathematical modeling. Crop performance database, integrating data and models and scaling-up predictions. (*femiguez@iastate.edu*)

Kenneth J. Moore. Dist. Professor. Alternative crops and cropping systems; bioenergy, forage, and fiber crops. (*kjmoore@iastate.edu*)

Russell E. Mullen. Professor. Stress mediated changes in whole-plant and seed physiology; seed quality and chemical composition of crop seeds. (*remullen@iastate.edu*)

Micheal D.K. Owen. University Professor. Tillage and management systems on weed population dynamics and weed seed biology. Environmental stress on weed development. Herbicides and herbicide resistant weeds. (*mdowen@iastate.edu*)

Mark E. Westgate. Professor. Reproductive physiology of corn and soybeans. Environmental effects on seed formation and seed development. Physiological and environmental control of seed composition. (*westgate@iastate.edu*)

Mary Wiedenhoef. Professor. Production and management of alternative cropping systems, sustainable agriculture, and agronomic education. (*mwiedenh@iastate.edu*)

FACILITIES

The Agronomy Department occupies a state-of-the-art facility with over 10,000 square feet of laboratory space for Crop Production and Physiology research. A greenhouse facility and phytotron facility with 30 growth chambers are available for controlled environment studies. And field studies can be conducted at 14 ISU research and demonstration farms across the state. The main 700-acre field research station is within 7 miles of campus. Seed Science Laboratories and the National Laboratory for Agriculture and the Environment (NLAE) also provide modern research facilities adjacent to Agronomy Hall.