

# Crop Production and Physiology



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

revised January 2020

**IOWA STATE UNIVERSITY**  
Department of Agronomy

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## **GENERAL INFORMATION**

The Iowa State Agronomy Department offers MS and PhD degrees in Crop Production and Physiology (CP&P). This handbook is a guide to the graduate program in CP&P. The information presented provides graduate students basic information about the program and requirements related to MS and PhD programs, departmental procedures and standards. If the non-thesis MS degree is chosen, then the student must: register for at least two credits of AGRON 599 (Creative Component); and pass a comprehensive final oral examination. The creative component is work that presents "substantial evidence of individual accomplishment." The POS committee, led by the major professor and with input from the student, will specify the creative component, how it will be documented, and how it will be evaluated.

ISU's *Graduate College Handbook* identifies many more resources regarding university procedures, graduate forms, schedules for submission of forms, deadlines, etc. The *Graduate College Handbook* is available online at <http://www.grad-college.iastate.edu/common/handbook/>.

Links to other ISU websites with resources for graduate students are:

Graduate College: <http://www.grad-college.iastate.edu/>

Office of the Registrar: <http://www.registrar.iastate.edu/>

Electronic Thesis/Dissertations at ISU: <http://www.grad-college.iastate.edu/current/thesis/>

Registration Information: <http://www.registrar.iastate.edu/students>

Academic Calendar: <http://www.registrar.iastate.edu/calendar/>

Graduate College Forms: <http://www.grad-college.iastate.edu/common/forms/index.php>

## **CROP PRODUCTION AND PHYSIOLOGY PROGRAM**

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. Upon graduation students will be able to:

1. Demonstrate comprehensive understanding of basic and applied knowledge pertaining the physiology and production of agronomic crops.
2. Form testable hypotheses and articulate research objectives that, when met, will lead to significant contributions to better understanding crop production and physiology.
3. Successfully acquire, analyze, and report data.
4. Interpret research results and integrate them into the existing knowledge of the discipline.
5. Clearly and accurately communicate research findings in traditional and non-traditional forms such as in-person presentations, scientific publications, outreach publications, social media, blogs, video, and webinars.
6. Conduct scholarship, in teams and independently, in ways that consistently demonstrate ethical practice and professionalism.

The learning experience in the CP&P 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**

In their first year, 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 MS students take at least one course from 3 of the CORE AREAS and Ph.D students take at least one course from the 5 CORE AREAS. These CORE AREAS are:

<b>CORE AREA 1 - MOLECULAR BIOLOGY / BIOCHEMISTRY</b>		
<b>Course</b>	<b>Course Title</b>	<b>Credits</b>
BBMB 404	Biochemistry I	3
BBMB 405	Biochemistry II	3
BBMB 542A-G	Introduction to Molecular Biology Techniques	1-5
PLBIO 545	Plant Molecular, Cell and Developmental Biology	3

<b>CORE AREA 2 - GROWTH and DEVELOPMENT</b>		
<b>Course</b>	<b>Course Title</b>	<b>Credits</b>
AGRON 525	Crop and Soil Modeling	3
BIOL 454	Plant Anatomy	4
BIOL 428	Topics in Cell Biology	3
GDCB 528	Advances in Molecular Cell Biology	3
AGRON 551	Growth and Development of Perennial Grasses	2

<b>CORE AREA 3 - PLANT PHYSIOLOGY and METABOLISM</b>		
<b>Course</b>	<b>Course Title</b>	<b>Credits</b>
AGRON 508	Biophysical Crop Ecology	3
AGRON 516	Crop Physiology	3
AGRON 519	Herbicide Physiology and Biochemistry	2
AGRON 525	Crops & Soils Modeling	3
AGRON 538	Seed Physiology & the Environment	2
AGRON 553	Soil-Plant Relationships	3
BBMB 645	Molecular Signaling	2
BIOL 430	Principles in Plant Physiology	3
PLBIO 513	Plant Metabolism	2

<b>CORE AREA 4 - CROP ECOLOGY AND MANAGEMENT</b>		
<b>Course</b>	<b>Course Title</b>	<b>Credits</b>
AGRON 504	Global Change	3
AGRON 509	Agroecosystem Analysis	4
AGRON 515	Integrated Crop and Livestock Production Systems	3
AGRON 530	Ecologically Based Pest Management Strategies	3
AGRON 546	Strategies for Diversified Farming Systems	3
AGRON 553	Soil-Plant Relationships	3
AGRON 556	Agroecosystems Nutrient Cycles	3
BIOL 474	Plant Ecology	3
BIOL 484	Ecosystem Ecology	3
EEOB 531	Conservation Biology	3
EEOB 564	Wetland Ecology	3
EEOB 581	Environmental Systems I: Introduction to Environmental Systems	3-4
EEOB 582	Environmental Systems II: Analysis of Environmental Systems	3
EEOB 584	Ecosystem Science	3
BIOL 472	Community Ecology	3
EEOB 589	Population Ecology	3
HORT 524	Sustainable and Environmental Horticulture Systems	3
HORT 584	Organic Agriculture Theory and Practice	3
PL P 577	Bacterial-Plant Interactions	3
PL P 594	Seed Pathology with lab	3

<b>CORE AREA 5 - STATISTICS/QUANTITATIVE METHODS</b>		
<b>Course</b>	<b>Course Title</b>	<b>Credits</b>
AGRON 526	Field Plot Technique	3
AGRON 552	GIS for Geoscientists I	3
AGRON 588	GIS for Geoscientists II	3
Stat 407	Methods of Multivariate Analysis	3
Stat 505	Environmental Statistics	3
Stat 512	Design of Experiments	3
Stat 587	Statistical Methods for Research Workers	4
Stat 512	Statistical Theory for Research Workers	4
CRP 551	Introduction to Geographic Information Systems	3
NREM 546	Integrating GPS and GIS for Natural Resource Mgmt.	3

### **Other Course Requirements**

Agron 699B Research in CP&P: 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 that are 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 degree may be accepted for graduate credit toward the MS or PhD.

### **GRADUATE STUDENT POLICIES**

Annual Review: The department will evaluate graduate student progress annually, using the Annual Report Form , [agronomy graduate student annual report form.docx](#). Reports should be signed by the major professor and co-major professor prior to submission to the Graduate Student Coordinator by 1 February of each year.

- **Full-time Status**  
International students and students on assistantships are expected by the university to be registered as full-time students (state number of credits). For ISSO guidelines, the department considers nine or more credits to be a fulltime load for a graduate student: [International Students and Scholars Office](#)
- **Progress Toward Degree**  
To remain in good standing, students must make progress (grades, research, and timeliness) toward their advanced degrees. A student may be recommended for dismissal from a program by the major professor, POS Committee, department, or Graduate College. A student may challenge dismissal based on procedures outlined in the ISU Graduate College Handbook.
- **GPA**  
The department expects its graduate students to maintain a grade point average (GPA) of 3.2 or above. If the GPA drops below a 3.2, the student and those working with the student should be

concerned because the Graduate College has a requirement that students who do not maintain a cumulative GPA of 3.0 (excluding research) may be placed on academic probation until they bring their GPA up to 3.0. If on academic probation, the major professor must submit a memorandum to the Graduate College stating why the student should be allowed to register for the next semester and list the academic improvements of the student. The DOGE must concur before processing the memorandum to the Graduate College. If the student does not improve academically, the student may be informed that he/she is recommended not to continue graduate study in the department. If on an assistantship and the GPA goes below 3.0, graduate students do not qualify to receive the tuition scholarship benefit the next term and until a 3.0 GPA is reached.

### **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 may receive up to two credits in Agron 698 for each class taught. There is an agreement between grad student and teaching faculty that is signed.

### **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 through 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.

### **PRELIMINARY EXAMINATION—CP&P**

**Written:** PhD students majoring in CP&P may be required to take a written preliminary examination at the discretion of the POS Committee. 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.

**Oral:** All PhD students majoring in CP&P are required to take an oral preliminary exam in accordance with Graduate College requirements. More information is available in the Graduate College Handbook: <https://www.grad-college.iastate.edu/handbook/>

### **GRADUATE FACULTY IN CROP PRODUCTION AND PHYSIOLOGY**

**Sotirios Archontoulis.** Associate Professor. Integrated cropping systems modeling; Production, management and environmental performance of diverse cropping systems ([sarchont@iastate.edu](mailto:sarchont@iastate.edu))

**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](mailto:kdelate@iastate.edu))

**Susana Goggi.** 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](mailto: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](mailto:hartzler@iastate.edu))



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

**Prashant Jha.** Associate Professor. Weed population dynamics and management in agroecosystems. Integrated weed management strategies in corn and soybean, optimization and stewardship of herbicide application technology and herbicide use. ([pjha@iastate.edu](mailto:pjha@iastate.edu))

**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](mailto:adknapp@iastate.edu))

**Mark Licht.** Assistant Professor. Integrated cropping systems, corn and soybean production, cover crop management. ([lichtma@iastate.edu](mailto:lichtma@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](mailto:mliebman@iastate.edu))

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

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

**Mary Wiedenhoft.** Morrill Professor. Production and management of alternative cropping systems, sustainable agriculture, and agronomic education. ([mwiedenh@iastate.edu](mailto: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 also provide modern research facilities adjacent to Agronomy Hall.

## **GENERAL GUIDANCE FOR NEW AND CURRENT STUDENTS**

### **[AccessPlus](#)**

AccessPlus is a secure and personalized online resource for accessing important and confidential university information and web applications. AccessPlus is available day or night, seven days a week, from anywhere in the world. To login to AccessPlus, all you need is your University ID or Social Security Number, and your university PIN. Once inside AccessPlus, tabs and menus are customized to meet specific needs. For example, only registered students can view their current course schedule. AccessPlus offers a wide range of services from changing your address and managing your CyCash account, or even paying your university bill online. Some of the other many services available for students through AccessPlus include class registration, class schedules, financial aid, grade reports and transcripts, job board, and residence halls and dining.

### **ISU Identification (ID) and Social Security Number (SSN)**

ISU IDs (also known as the ISU Card) are available from [ISUCard Office](#), Room [0530 Beardshear](#) (294-2727). Pictures are taken Monday thru Friday, from 8:00AM to 4:15PM (during regular business hours). Students, faculty, staff, and retirees all receive their first ISUCard for free. Affiliates (including spouses) of the University will be charged an annual fee. There is also a fee for students requiring



replacement of lost ISUCards. More information regarding fees can be found at the ISU Card Office website <http://www.isucard.iastate.edu/>

### **Internet Access**

When you arrive at Iowa State, you will need to register for a personal Network-ID and e-mail account on Project Acropolis. You must have an ISU ID card to register. Information about registering for a Net-ID can be found at [https://www.it.iastate.edu/howtos/register\\_net-id](https://www.it.iastate.edu/howtos/register_net-id). Note that your university email address is the same as the Net-ID you are assigned upon entering the university. For example, if your Net-ID is "jdoe", your email address is "jdoe@iastate.edu". If a student withdraws or graduates, his/her e-mail account remains active until the 18<sup>th</sup> day of classes in the following fall or spring semester. All departmental- and university-related e-mail correspondence will be sent to your university address.

### **Registration**

Graduate students should register on AccessPLUS as soon as the time period opens for them. You and your major professor or temporary advisor will handle your initial registration. To register for classes, new students must first obtain an [ISUCard](#) and establish an [AccessPlus](#) account. You should receive a letter describing the process of registering for AccessPlus.

All students who attend classes at ISU must register and pay assessed tuition and fees. The ISU [Schedule of Classes](#) is the official source of information about registration and fee payment for all students at ISU and may be found on the Office [Registrar's](#) websites. Registration for summer session should be completed during the spring, at the same time as registration for fall semester.

A reference number is required for all courses. General course numbers are listed on the Registrar's website. Reference numbers for research and special topics courses can be obtained from MaryAnn Grapp in 2101 Agronomy Hall ([magrapp@iastate.edu](mailto:magrapp@iastate.edu)).

### **Add and Drop Procedures**

Students can use Web Registration to process drops until the fifth day of classes. After the fifth day of classes, a Request for Schedule Change or Restriction Waiver (Add/Drop Slip) form is needed for any changes to the class schedule. A class is not automatically dropped if a student does not attend lectures or laboratories. Add/Drop Slips require the signatures of the major professor, instructor, and the Department Chair/Graduate Dean.

A pass/no pass grading option is also offered. The Add/Drop Slip is used to designate this option. The pass/no pass option requires the signature of only the major professor.

Students are responsible for knowing the deadlines for registration and schedule changes, including cancelling and withdrawing from classes. MaryAnn Grapp, Graduate Program Coordinator in 2101 Agronomy Hall has a supply of add/drop slips. There are also forms available on the desk in Agronomy Hall 3010.

### **Forms**

Many of the forms graduate students will need during their tenure at Iowa State are available from the Graduate College website as listed at the end of this document.

## **Mail Boxes**

You will have a mailbox in room 2104P, which is the mailroom in the Agronomy Administration Office suite, 2104 Agronomy Hall. This is where you will receive important notices about department activities and programmatic matters. Each major professor has a mailbox called Support Mailbox which is located directly under his/her mailbox. Each is identified in alphabetical order. Because this mailbox is an important means of communication, you should check it at least twice a week for notices, handouts, letters, and other messages.

## **Office Space and Keys**

New students are assigned a desk by Aaron Brandt. Check in with MaryAnn Grapp, Graduate Program Coordinator in 2101 Agronomy Hall when you first arrive. She will assist you in completing a Directory Information form that will include your office room number and the keys you will require. Within a few days, you will receive a Key form in your Support mailbox to take to the Key Desk in [General Services Building](#) where you will need to sign it in their presence and pick up your key(s). Make sure to take your University ID card with you for identification. Keys usually are ready for pick up after 12 noon the day after the request is processed.

Before students leave the university, all keys must be returned to the Key Desk in the General Services Building or alternate arrangements must be made with the FP&M key coordinator. Students not returning keys or making arrangements at termination will be assessed \$25 for each key. For security reasons, failure to return keys may require rekeying of a room or rooms at a cost to be paid by the individual or by the department.

## **Research-Related Photocopies**

Students on research assistantships should obtain a photocopy account code from their major professor for photocopy use in the Parks Library.

## **Racial/Ethnic and Sexual Harassment Policy**

The Department of Geological and Atmospheric Sciences emphasizes and reaffirms its commitment to maintaining a working and learning environment free from racial/ethnic and sexual harassment. Anyone who believes that she or he has been subject to racial, ethnic, or sexual harassment may elect to proceed informally by bringing the complaint directly to the attention of an appropriate administrator, or by filing a complaint with the Affirmative Action Office. Students may obtain information about the University's harassment policy and resolution procedures in several offices (Dean of Student's Office, Student Counseling Services, and the Sloss Women's Center). The university policies on discrimination and harassment can be found at <http://policy.iastate.edu/policy/discrimination/>. Resources for students who may be victims of sexual misconduct can be found at <http://www.dso.iastate.edu/sexualmisconduct/>.

The Department requires all admitted graduate students to take a web-based Racial/Ethnic and Sexual Harassment Training, available through the AccessPlus System. To start, login to AccessPlus, click on the Employee tab, click on Web-based Training, and click on an appropriate training tab (Racial/Ethnic Harassment Prevention or Sexual Harassment Prevention). Follow training instructions.

## **Student Accident Reporting**

ISU's [Thielen Student Health Center](#) (corner of Sheldon and Union Drive) provides emergency medical services to students who sustain injuries while in academic classes or events sponsored by the University, which are within the campus or the general surrounding areas. Services rendered will be the responsibility of the individual student, either personally or through a health insurance program. [Instructions](#) for downloading and completing the Student Accident Report form.

Supervisors who have Student Workers who sustain injury in the course of and arising out of their employment with ISU should fill out the [First Report of Injury](#) to report a workers compensation incident and send to Lisa McEnaney, Room 2104 Agronomy Hall, within 24 hours of injury. For additional information see the section in the guide on: [Workers' Compensation Work Related Injuries and Illnesses](#).

## **Student Legal Services (SLS)**

[SLS](#) is a legal aid office available to any student currently enrolled at Iowa State University. Registered student groups are also eligible for services. SLS is staffed full time by practicing attorneys. Students may make appointments by calling 294-0978 or by stopping in 0367 Memorial Union.

## **Transportation and Parking**

Students and graduate assistants are not eligible for general staff or reserve permits. ISU Parking Systems subsidizes passes for students, staff, and faculty members who live in Ames to ride [CyRide](#). The subsidized passes are available through the mail, at [University Bookstore](#), or at the CyRide office.

Students and graduate assistants who live outside the corporate city limits of Ames obtain parking permits, when available, for lots designated for commuter students. Students and graduate assistants who live within the corporate city limits are not eligible for on campus permits. Students with special needs should contact the [DPS Parking Division office](#).

Any student may park a vehicle at the Iowa State Center Lots and the shuttle bus (CyRide) to campus. These lots are available Monday through Friday for free. No overnight parking is allowed. For more information visit the [CyRide webpage](#).

Also, Monday through Friday after 5:30 PM and on the weekends most on-campus lots are open for anyone to use them (lot signs should be read carefully).

## **Travel Authorization**

Students on assistantship who leave the state of Iowa during normal school session (including summer session) must fill out a LAS Travel/Absence Approval Form (travel authorization) prior to departure, have it approved by his/her major professor, and submit to DeAnn Frisk, Administrative Specialist II, 253 Science I. Jaci Severson or DeAnn Frisk can give you the form or send it to you electronically.

## **Wireless Access Points**

Current wireless locations on campus are listed at the ISU [Information Technology Office](#) or the Solution Center in Room 195 Durham Center.

## **F-1 and J-1 Credit Requirements**

Information for international students can be found on the International Students and Scholars website.

[https://www.isso.iastate.edu/joomla/index.php?option=com\\_content&view=category&id=30&Itemid=231](https://www.isso.iastate.edu/joomla/index.php?option=com_content&view=category&id=30&Itemid=231).

## **FORMS**

All Graduate College forms can be found at

[https://www.grad-college.iastate.edu/common/forms/student\\_forms.php](https://www.grad-college.iastate.edu/common/forms/student_forms.php).

Links to other university forms and information are available at <http://www.ats.iastate.edu/forms.html> as categorized below:

Accounting and Payroll. Contact: Controller's Office, 515-294-6653

**Financial Aid**. Contact: Office of Student Financial Aid, 515-294-2223

**Graduate Students**. Contact: Graduate College, 515-294-4531

## **Human Resources**

**Housing**. Contact: Department of Residence, 515-294-2900

**International Students and Scholars**. Contact: International Students and Scholars Office, 515-294-0373

**Recreation Facilities**. Contact: Recreation Services, 515-294-4980

**Registrar**. Contact: Office of the Registrar, 515-294-1840