

Plant Breeding Graduate Program

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

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IOWA STATE UNIVERSITY
Department of Agronomy

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GENERAL INFORMATION

The Iowa State Agronomy Department offers MS and PhD degrees in Plant Breeding (PL BR). This handbook is a guide to the graduate program in PL BR. The information presented provides graduate students basic information about the program and requirements related to MS and PhD programs, departmental procedures and standards, including the MS Online degree in PL BR.

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: <https://www.grad-college.iastate.edu/handbook/>

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

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

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

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

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

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

Graduate College Forms: <https://www.grad-college.iastate.edu/student/forms/>

PLANT BREEDING PROGRAM AND LEARNING GOALS

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. Learning Goals that students in this program are expected to meet include:

1. Demonstrate comprehensive understanding of scholarly literature in the area of study, i.e., plant breeding.
2. Form testable hypotheses and articulate research objectives that, when met, will lead to significant contributions to the field of study.
3. Conduct original research via appropriate experimental design, data acquisition, analysis, and reporting of data.
4. Interpret research results appropriately, integrating them into the existing knowledge in the discipline.
5. Clearly and accurately communicate research findings orally and in writing, and appropriate use of display items (tables, figures, and other appropriate types of presentation), electronic or other forms of media.
6. Conduct scholarship, in teams or with independence, in ways that consistently demonstrate ethical practice and professionalism.

The learning experience in the PL BR 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, biotechnology, genetics, horticulture, meteorology, molecular biology, plant breeding, plant physiology, quantitative genetics, seed science, statistics, and other disciplines. Depending upon research interest and career focus, the student, in consultation with his/her advisor (major professor used later), will propose a program of study (POS) from courses taught in Agronomy and other departments, which will be reviewed, revised, and approved by the POS Committee.

GUIDELINES FOR GRADUATE DEGREE AND 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

The academic courses used to satisfy requirements for a graduate degree are listed on the student's Program of Study (POS).

For on-campus programs: In their first year, all on-campus MS students are to establish their program of studies committee through discussion with their major professor. Before the end of second year, but preferably sooner, PhD students are to establish their program of studies committee through discussion with their major professor. The POS must be approved by the student's POS committee which is made up of at least three faculty at the MS degree level. Two of these members must be faculty in the PL BR. At the PhD level the POS committee must have at least five members: three of these members must be faculty in the PL BR. The POS committee members can be tenured or non-tenured but each must be members of ISU's graduate faculty. The chair of the POS committee is called the "major professor" and is the student's advisor. The student and the major professor work together to assemble the POS and to choose the POS committee. The major professor has to be an employee of ISU, while affiliate faculty (non-ISU employee, but with faculty status at ISU) can serve as a co-major professor.

It is recommended that students organize at least one POS committee meeting each year to update on their project and solicit feedback from the entire committee.

The program of study is determined by the student, major professor, Program of Study Committee, Director of Graduate Education (DOGE), Graduate College, and academic units to accommodate the unique features of each student's program. Although no courses are mandatory, graduate students take AGRON 521, AGRON 522, AGRON 523, AGRON 524, AGRON 528, AGRON 561, GEN 510, STAT 587 or equivalent. PhD students also take AGRON 621 and often include AGRON 625. The recommended courses (all 3 credits) for distance MS in Plant Breeding students are: AGRON 501, AGRON 506, AGRON 513, AGRON 520, AGRON 521, AGRON 523, AGRON 524, AGRON 528, AGRON 537, and AGRON 544 (<https://www.agonline.iastate.edu/programs/plant-breeding-ms/recommended-courses>). The creative component (AGRON 599) accounts for 3 credits. For Research credits, students are advised to discuss with their major professor number of credits she/he should take each semester.

For distance MS PL BR students: students are expected to have their major professor identified and POS established by the time they reach 12 credits. All incoming students are strongly encouraged to take Agron 599M. The POS committee consists of only two faculty members; i.e., major professor (PL BR faculty member) and one additional faculty member at ISU.

Plant Breeding MS and PhD graduate students may take up to two 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 two such courses. The POS Committee may choose, however, not to accept any such credits to fulfill the degree requirements. These courses may not be used to substitute for any POS-required course.

In order to be considered full-time, a typical graduate student (on a "1/2-time appointment") must be registered for a minimum of 9 credits with a maximum of 12 credits each fall and spring semester. Since there is no difference in tuition between 9 and 12 credits, it is in the best interest of both the student and our department for the student to register for the full 12 credits each fall and spring semester. Consequently, students should register for the appropriate number of research credits that when added to the credits associated with courses the sum is 12. During the summer, on campus graduate students should register for one credit of course work to remain full-time. Normally this credit will be in AGRON 599 (MS students) or 699 (PhD students). If a graduate student is registered for more than one credit, then additional summer tuition will be assessed. In the semester of graduation, graduate students must be registered for at least one credit.

WRITTEN PRELIMINARY EXAMINATION

Each pre-doctoral graduate student in the Department of Agronomy with a Plant Breeding major must pass a written preliminary examination. The examination has several purposes: to identify areas of strength and weakness early in the graduate program, to establish uniformly high standards of proficiency and scholarship, to review plant breeding principles and underlying science, to demonstrate knowledge and creativity in fundamental plant breeding principles and methods in an integrated manner, and to provide students with the opportunity to express their thoughts, knowledge and creativity in writing. Students may not schedule their oral preliminary examination until they have successfully completed the written preliminary examination.

Scheduling: Students are urged to complete the examination within the first 1.5 to 2.0 years of their Ph.D. program (assume a four-year program). At a minimum it is highly recommended that students pass each section of the examination by their fifth semester after enrollment in the Ph.D. program of the graduate college. A delay in taking the examination limits the flexibility of a student's program, hinders preparation for the oral examination, and very likely results in additional time needed to complete their Ph.D. programs.

Students are eligible to take the examination during their first full semester in the graduate plant breeding program with the approval of their major professors. The examination is offered the last Thursday and Friday of each January and September when one or more students have signed up to take the exam. Students may choose to take all questions or selected questions at these times. If a student decides to take only a certain question(s), the student and major professor **MUST** specify the question(s) and inform the DOGE in writing at least two weeks prior to the scheduled examination date. During the exam, a student will only be given the question(s) they signed up to take. A student must pass each question to complete the examination.

Content: To provide comprehensive coverage of fundamental plant breeding principles and methods each examination includes one question from each of these topical areas:

1. Plant breeding methods
2. Transmission genetics related to crop improvement
3. Biometrics and experimental design in plant breeding
4. Quantitative genetics in plant breeding
5. Genomic and Biotechnologies

The scope of the examination topics and expected depth of knowledge are based on content covered in Agron 521, 523, 528, and 561, GDCB 510, Stat 587 or their equivalents.

The questions may be of various form (e.g., short answer, essay, calculations, design of research and breeding schemes, etc.). The nature of an acceptable response may vary considerably depending on the question; some being heavily dependent upon factual, objective information whereas others may depend upon the creativity and logic developed by the student (e.g., some questions do not have known, established answers and are intended to test the student's ability to integrate information and think logically and creatively). Students are permitted two full days (8:00 AM — 5:00 PM) to complete the examination, one day for each subset of questions. Sub-sections will be offered on each day. The examination shall be held in one location and monitored by the chair of the examination committee or another member of the committee appointed by the committee chair. Exams can be open or closed book, as per the direction of the faculty member setting the exam.

Development and evaluation: An examination committee of plant breeding faculty members is appointed by the DOGE. The committee formulates the examination questions, conducts the examination sessions, summarizes faculty evaluations of the students' answers and communicates decisions to the DOGE. The DOGE maintains examination records.

Upon completing the examination, answers from a student are submitted to DOGE. Two faculty members shall evaluate each answer, the author of the question and a member of the plant breeding faculty assigned by the DOGE. The evaluators shall assign a pass or fail grade to the answer. When an evaluator decides that the answer fails to address the examination question, the evaluator shall clearly indicate the strengths and weaknesses of the answer in writing and provide written information (references, rationale, etc.) to the student which clearly outlines an acceptable response to the question. Failure to provide such written information may invalidate the grade and be considered sufficient cause to exclude the grade in the overall evaluation of the student's answer. Students who receive two pass grades for a question will have completed successfully that part of the examination. Students who receive two fail grades for a question will not successfully complete that part of the examination. If the two evaluators differ in their assessment of the answer (one fails it and the other passes it), the DOGE will appoint a third faculty member from the plant breeding faculty to evaluate the answer. Students who do not pass have the opportunity to repeat remaining sections of the examination on the next regularly scheduled examination date.

The DOGE records all scores and copies are retained in the student's file in the Agronomy main office. Within four weeks after the examination date, all scores, the examination questions, written evaluations, and the students' answers shall be returned to the students and their major adviser by the DOGE.

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 1st February of each year. Reports are to be signed by the major professor and submitted to the Student Services Specialist by the date indicated.

The annual report will contain the following sections: (1) courses completed in the previous year (Jan-Dec), (2) brief update on research projects and progress (each project update should not be more than 500 words), (3) peer-reviewed papers submitted, published, (4) poster presentations, (5) invited talks, (5) awards and scholarships, and (6) any additional information not covered in points 1-5.

GRADUATE RESEARCH ASSISTANTS (GRAs)

A graduate student is only accepted in the on-campus graduate program if major professor provides documentation of funds to support the student through a graduate research assistantships. However, an incoming graduate student may bring their own scholarship or fellowship from other agencies. The admission of student in the Distance MS in Plant Breeding program is not conditional on GRA support, and the students in this program are self- or employer-funded.

GRADUATE TEACHING ASSISTANTS (GTAs)

Currently, there are no TA positions for any graduate level plant breeding course. If this changes, the program graduate handbook will be updated. The nature of the teaching responsibilities shall be arranged in consultation with the graduate student and major professor. A PL BR graduate student may take up TA in the undergraduate teaching program, and can earn credit for Agron 698 (see below).

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.

COURSE 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. Student Services Specialist has a supply of add/drop slips.

PLANT BREEDING MINOR

To obtain a minor in plant breeding, students will need to take 9 credits hours which will be decided by discussion with the plant breeding faculty member as the minor representative in the POS Committee and consideration on student project areas. These 9 credit hours will come from the following:

- 3 credits from: Potentially, AGRON 421 if a student has minimal plant sciences/breeding background, else AGRON 521
- Other 6 credits can be from this list
 - Agron 506 (3 cr) Crop Genetics
 - Agron 520 (3 cr) Plant Breeding Methods
 - Agron 521 (3 cr) Principles of Cultivar Development
 - Agron 522 (2 cr) Field Methods in Plant Breeding (summer session, alternate years only)
 - Agron 523 (3 cr) Molecular Plant Breeding
 - Agron 524 (3 cr) Applied Molecular Genetics & Biotechnology
 - Agron 528 (3 cr) Introduction to Quantitative Genetics for Plant Breeding
 - Agron 600A (1 cr) Plant Breeding Seminar
 - Agron 561 (4 cr) Population and Quantitative Genetics for Breeding
 - Agron 621 (3 cr) Advanced Plant Breeding
 - Agron 625 (3 cr) Genetic Strategies in Plant Breeding

FACILITIES

The Agronomy Department provides lab and office space to graduate students, generally through the assigned spaces for the major professor. The Iowa State University maintains an extensive farm network for field studies spanning 14 ISU research and demonstration farms across the state. The main 700-acre field research station is within 10 miles of campus.

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. 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 18th 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 Kevin Desjean, Student Services Specialist (kdesjean@iastate.edu).

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 Agronomy Hall. Check in with the Student Services Specialist or your major professor when you first arrive. The Student Services Specialist 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 Agronomy 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

Please visit: : <https://www.policy.iastate.edu/policy/travel/authorization>

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.

FORMS

All Graduate College forms can be found at:

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