PLANT BREEDING AND PLANT GENETICS, M.S.

The program leading to the Master of Science in Plant Breeding and Plant Genetics provides a broad exposure in the various disciplines involved with plant improvement. The program is truly interdisciplinary with faculty participants from agronomy, biochemistry, botany, entomology, genetics, horticulture, plant pathology, and statistics. Research areas include biochemical and molecular genetics, bioinformatics, biometry, cytogenetics and cytology, genealogy, genetics, plant breeding, and quantitative genetics.

The Plant Breeding and Plant Genetics Program has been designated a UW System Center of Excellence. The 50–60 students majoring in the program come from throughout the United States and all over the world. Faculty have included members of the National Academy of Sciences, endowed chair professors, and recipients of the National Council of Plant Breeders "Genetic and Plant Breeding Award." The University of Wisconsin leads the nation in the diversity of plant breeding programs and number of graduate students trained. Graduates are found in responsible positions with academic institutions, research institutions, and private companies involved in molecular to cultivar development work.

ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website. Graduate admissions is a two-step process between academic programs and the Graduate School. Applicants must meet the minimum requirements (https://grad.wisc.edu/apply/requirements/) of the Graduate School as well as the program(s).

Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/apply/).

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Deadline</td>
<td>December 1</td>
</tr>
<tr>
<td>Spring Deadline</td>
<td>September 1</td>
</tr>
<tr>
<td>Summer Deadline</td>
<td>December 1</td>
</tr>
<tr>
<td>GRE (Graduate Record Examinations)</td>
<td>Not required.</td>
</tr>
<tr>
<td>English Proficiency Test</td>
<td>Every applicant whose native language is not English or whose undergraduate instruction was not in English must provide an English proficiency test score and meet the Graduate School minimum requirements (<a href="https://grad.wisc.edu/apply/requirements/#english-proficiency">https://grad.wisc.edu/apply/requirements/#english-proficiency</a>).</td>
</tr>
<tr>
<td>Other Test(s) (e.g., GMAT, MCAT)</td>
<td>n/a</td>
</tr>
<tr>
<td>Letters of Recommendation Required</td>
<td>3</td>
</tr>
</tbody>
</table>

Requirements need to be fulfilled by applicants prior to admission into the program. Because we receive many more applications from qualified applicants than we are able to admit, we highly recommend that applicants directly contact any faculty members with whom they are interested in working.

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further
funding information (https://grad.wisc.edu/funding/) is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

PROGRAM RESOURCES
Financial support may be available through research assistantships (RAs) or fellowships. Fellowships are granted to students with very outstanding academic records. We recommend that your application be complete by the application deadlines in order to be considered for funding. Research assistantships are awarded by individual professors through funds available to their research programs.

Please be advised that you do not need to make a separate application for financial support as your admission application will also serve as an application for assistantships and fellowships.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS
Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequirements), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

<table>
<thead>
<tr>
<th>Mode of Instruction Definitions</th>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students are able to complete a program with minimal disruptions to careers and other commitments.</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

CURRICULAR REQUIREMENTS

<table>
<thead>
<tr>
<th>Requirements Detail</th>
<th>Minimum Credit Requirement</th>
<th>Minimum Residence Credit Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Graduate Coursework Requirement</td>
<td>30 credits</td>
<td>16 credits</td>
</tr>
<tr>
<td>Overall Graduate GPA Requirement</td>
<td>3.00 GPA required</td>
<td></td>
</tr>
<tr>
<td>Other Grade Requirements</td>
<td>Students must earn a B or above in all core curriculum coursework</td>
<td></td>
</tr>
<tr>
<td>Assessments and Examinations</td>
<td>A formal M.S. thesis is required</td>
<td></td>
</tr>
<tr>
<td>Language Requirements</td>
<td>No language requirements</td>
<td></td>
</tr>
</tbody>
</table>

REQUIRED COURSES
The specific program of study toward a master's degree is developed by the student and their major professor. Considerable flexibility in the selection of courses is permitted to meet the needs and interests of the candidate. Of the 30 credits required, students must complete a minimum of 12 credits of coursework (not research credit) and at least 9 credits must come from the Core Curriculum, including at least 2 credits in Section A, and 2 credits in Section B or C. Students must also complete 2 credits of Plant Breeding seminar (HORT/AGRONOMY/GENETICS 957 Seminar-Plant Breeding).

Core Curriculum

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Plant Breeding</td>
<td></td>
</tr>
<tr>
<td>HORT/AGRONOMY 501</td>
<td>Principles of Plant Breeding</td>
</tr>
<tr>
<td>HORT/AGRONOMY 502</td>
<td>Techniques of Plant Breeding</td>
</tr>
<tr>
<td>HORT/AGRONOMY 812</td>
<td>Selection Theory for Quantitative Traits in Plants</td>
</tr>
<tr>
<td>B. Genetics</td>
<td></td>
</tr>
<tr>
<td>PL PATH 517</td>
<td>Plant Disease Resistance</td>
</tr>
<tr>
<td>HORT/GENETICS 550</td>
<td>Molecular Approaches for Potential Crop Improvement</td>
</tr>
<tr>
<td>AGRONOMY/AN SCI/GENETICS/HORT 615</td>
<td>Genetic Mapping</td>
</tr>
<tr>
<td>GENETICS 631</td>
<td>Plant Genetics</td>
</tr>
<tr>
<td>GENETICS/BIOCHEM/BOTANY 840</td>
<td>Regulatory Mechanisms in Plant Development</td>
</tr>
<tr>
<td>C. Quantitative Genetics and Biometry</td>
<td></td>
</tr>
<tr>
<td>HORT/F&amp;W ECOL/STAT 572</td>
<td>Statistical Methods for Bioscience II</td>
</tr>
<tr>
<td>HORT/AGRONOMY 811</td>
<td>Biometrical Procedures in Plant Breeding</td>
</tr>
<tr>
<td>AGRONOMY 771 &amp; AGRONOMY 772</td>
<td>Experimental Designs and Applications in ANOVA</td>
</tr>
</tbody>
</table>

D. Additional Core Courses
A Master's Committee is composed of at least three current UW–Madison faculty members, including the major professor. The Master's Committee is empowered by the Program to advise the student regarding coursework and thesis content, and conduct the final master's oral examination. Prior to the end of the first year of graduate study the student, in consultation with their major professor, should select two members of the UW–Madison faculty to serve on their Master's Committee. It is the student's responsibility to seek and obtain (verbal) approval from the faculty selected to serve on this committee.

CREDITS PER TERM ALLOWED

15 credits

TIME CONSTRAINTS

Master's degree students who have been absent for five or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (https://doso.students.wisc.edu/bias-or-hate-reporting/)
- Graduate Assistantship Policies and Procedures (https://hr.wisc.edu/policies/gapp/#grievance-procedure)
- Hostile and Intimidating Behavior Policies and Procedures (https://hr.wisc.edu/hib/)
  - Office of the Provost for Faculty and Staff Affairs (https://facstaff.provost.wisc.edu/)
- Dean of Students Office (https://doso.students.wisc.edu/) (for all students to seek grievance assistance and support)
- Employee Assistance (http://www.eao.wisc.edu/) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (https://employeedisabilities.wisc.edu/) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (https://grad.wisc.edu/) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (https://compliance.wisc.edu/) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office of Student Conduct and Community Standards (https://conduct.students.wisc.edu/) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (http://www.ombuds.wisc.edu/) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (https://compliance.wisc.edu/titleix/) (for concerns about discrimination)

College of Agricultural and Life Sciences: Grievance Policy

In the College of Agricultural and Life Sciences (CALS), any student who feels unfairly treated by a member of the CALS faculty or staff has the right to complain about the treatment and to receive a prompt hearing. Some complaints may arise from misunderstandings or communication

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOCHEM/</td>
<td>Plant Biochemistry</td>
</tr>
<tr>
<td>BOTANY 621</td>
<td></td>
</tr>
<tr>
<td>PL PATH/</td>
<td>Plant-Microbe Interactions:</td>
</tr>
<tr>
<td>BOTANY/</td>
<td>Molecular and Ecological Aspects</td>
</tr>
<tr>
<td>ENTM 505</td>
<td></td>
</tr>
<tr>
<td>GENETICS 633</td>
<td>Population Genetics</td>
</tr>
<tr>
<td>BOTANY 500</td>
<td>Plant Physiology</td>
</tr>
</tbody>
</table>
breakdowns and be easily resolved; others may require formal action. Complaints may concern any matter of perceived unfairness.

To ensure a prompt and fair hearing of any complaint, and to protect the rights of both the person complaining and the person at whom the complaint is directed, the following procedures are used in the College of Agricultural and Life Sciences. Any student, undergraduate or graduate, may use these procedures, except employees whose complaints are covered under other campus policies.

1. The student should first talk with the person at whom the complaint is directed. Most issues can be settled at this level. Others may be resolved by established departmental procedures.

2. If the student is unsatisfied, and the complaint involves any unit outside CALS, the student should seek the advice of the dean or director of that unit to determine how to proceed.
   a. If the complaint involves an academic department in CALS the student should proceed in accordance with item 3 below.
   b. If the grievance involves a unit in CALS that is not an academic department, the student should proceed in accordance with item 4 below.

3. The student should contact the department’s grievance advisor within 120 calendar days of the alleged unfair treatment. The departmental administrator can provide this person’s name. The grievance advisor will attempt to resolve the problem informally within 10 working days of receiving the complaint, in discussions with the student and the person at whom the complaint is directed.
   a. If informal mediation fails, the student can submit the grievance in writing to the grievance advisor within 10 working days of the date the student is informed of the failure of the mediation attempt by the grievance advisor. The grievance advisor will provide a copy to the person at whom the grievance is directed.
   b. The grievance advisor will refer the complaint to a department committee that will obtain a written response from the person at whom the complaint is directed, providing a copy to the student. Either party may request a hearing before the committee. The grievance advisor will provide both parties a written decision within 20 working days from the date of receipt of the written complaint.
   c. If the grievance involves the department chairperson, the grievance advisor or a member of the grievance committee, these persons may not participate in the review.
   d. If not satisfied with departmental action, either party has 10 working days from the date of notification of the departmental committee action to file a written appeal to the CALS Equity and Diversity Committee. A subcommittee of this committee will make a preliminary judgement as to whether the case merits further investigation and review. If the subcommittee unanimously determines that the case does not merit further investigation and review, its decision is final. If one or more members of the subcommittee determine that the case does merit further investigation and review, the subcommittee will investigate and seek to resolve the dispute through mediation. If this mediation attempt fails, the subcommittee will bring the case to the full committee. The committee may seek additional information from the parties or hold a hearing. The committee will present a written recommendation to the dean who will provide a final decision within 20 working days of receipt of the committee recommendation.

4. If the alleged unfair treatment occurs in a CALS unit that is not an academic department, the student should, within 120 calendar days of the alleged incident, take his/her grievance directly to the Associate Dean of Academic Affairs. The dean will attempt to resolve the problem informally within 10 working days of receiving the complaint. If this mediation attempt does not succeed the student may file a written complaint with the dean who will refer it to the CALS Equity and Diversity Committee. The committee will seek a written response from the person at whom the complaint is directed, subsequently following other steps delineated in item 3d above.

OTHER
Financial support may be available through research assistantships (RAs) or fellowships. Fellowships are granted to students with very outstanding academic records. We recommend that your application be complete by the application deadlines in order to be considered for funding. Research assistantships are awarded by individual professors through funds available to their research programs.

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES
Take advantage of the Graduate School’s professional development resources (https://grad.wisc.edu/pd/) to build skills, thrive academically, and launch your career.

PROGRAM RESOURCES
Close working relationships between plant breeding and plant genetics (PBPG) students and faculty with companies, commodity groups, and NGOs allow for exposure to various work environments and potential employers. Opportunities exist for students to complete short-term internships with companies depending on research interests and progress toward the graduate degrees. The Plant Science Graduate Student Council (PSGSC) (http://psgsc.wisc.edu/) fosters communication and social interactions among the graduate students in the plant sciences.

LEARNING OUTCOMES
1. Articulates the theories, research methods, and approaches to inquiry in the field of plant breeding and plant genetics.
2. Identifies sources and assembles evidence pertaining to questions in the field of plant breeding and plant genetics.
3. Demonstrates understanding of the primary field of study in a global context.
4. Selects and utilizes the most appropriate methodologies and practices.
5. Synthesizes information pertaining to questions in the field of plant breeding and plant genetics.
6. Communicates clearly in ways appropriate to the field of plant breeding and plant genetics.
7. Recognizes and applies principles of ethical and professional conduct.

PEOPLE

FACULTY
Agronomy
Jean-Michel Ane
Natalia De Leon (program chair)
Lucia Gutierrez
Heidi Kaeppler
Shawn Kaeppler
Bill Tracy

Biochemistry
Rick Amasino
Sebastian Bednarek

Botany
Hiroshi Maeda
Edgar Spalding

Entomology
Johanne Brunet

Genetics
Patrick Masson
Xuehua Zhong

Horticulture
John Bamberg
Paul Bethke
Julie Dawson
Jeff Endelman
Irwin Goldman
Michael Havey
Shelley Jansky
Patrick Krysan
Jim Nienhuis
Jiwan Palta
Phillip Simon
David Spooner
Yiqun Weng
Juan Zalapa

Plant Pathology
Andrew Bent
Doug Rouse

Statistics
Karl Broman
Brian Yandell