BOTANY, M.S.

The Department of Botany consists of 18 faculty members with about 45 graduate students pursuing M.S. and Ph.D. degrees.

Graduate students work with faculty and staff on a range of projects in plant biology at all levels of organization, from molecules, through cells and organs, to populations, communities, and lineages of organisms. Major research areas include molecular, cellular, and developmental biology; structural plant biology; ecology; evolution; and systematics. We also provide advanced instruction and opportunities for research in phycology, bryology, mycology, ethnobotany, paleoecology, conservation and restoration ecology, taxonomy, genetics, and physiology.

Increasingly, graduate student projects encompass two or more of these categories. Master's students may complete a non-thesis program in conservation or restoration ecology designed to prepare them for careers in environmental consulting, natural resource agencies, and nongovernmental organizations.

Students interested in fields bordering botany will find rich opportunities for course work, collaborative research, and seminars in many other departments and schools such as Agronomy, Bacteriology, Biochemistry, Chemistry, Engineering, Entomology, Forest and Wildlife Ecology, Genetics, Geography, Geoscience, Horticulture, Physics, Plant Breeding/ Plant Genetics, Plant Pathology, Soil Science, Zoology, and the Nelson Institute for Environmental Studies. Interdisciplinary work is encouraged.

Graduate study in the Department of Botany requires a combination of advanced course work, participation in seminars, and original research. Course requirements follow one of five pathways: general botany; ecology; evolution; molecular, cellular, and developmental biology; or the non-thesis master's degree in conservation and restoration ecology. The department encourages students to pursue independent research soon after arriving. In consultation with the faculty advisor, each student selects a pathway that includes courses and research topics related to his or her interests and training in the array of techniques and approaches needed to pursue research.

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/).

| Requirements | Detail |
|-------------------------|--|
| Fall Deadline | December 1 |
| Spring Deadline | The program does not admit in the spring. |
| Summer Deadline | The program does not admit in the summer. |
| GRE (Graduate Record | Not required but may be considered if available. |
| Examinations) | |

| English Proficiency Test | 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 (https://grad.wisc.edu/apply/ requirements/#english-proficiency). |
|--|--|
| Other Test(s) (e.g., GMAT, MCAT) | The GRE subject test in Biology or in Cell and Molecular Biology is not required but, if available, will be considered. |
| Letters of Recommendation Required | 3 |

The Department of Botany will consider applicants for graduate degrees who surpass the minimum admissions requirements of the Graduate School. Candidates for fall admission should submit their full applications to the department by December 1 to be considered for financial support. Applications may be reviewed until April 15. The general Graduate Record Exam (GRE) is not required, but if available, will be considered in the admissions process. The GRE subject test in Biology or in Cell and Molecular Biology is not required but, if available, will be considered. Admission is based on the applicant's statement of purpose, undergraduate record, letters of recommendation, experience in research, and the interests they share with one or more potential faculty advisors.

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 is available to qualified graduate students in the form of teaching, research and project **assistantships** and **fellowships**. Typically, there are approximately 35 graduate students who hold assistantships or fellowships in the botany department. In addition, graduate students are eligible for a number of **intradepartmental awards and grants**.

Graduate students who have a teaching, research or project assistantships of at least a 33.3% appointment (approximately 13.3 hours per week) for a fall or spring term are eligible to receive **remission of full tuition**. Fellowships or traineeships that are payrolled through the university and that carry stipends equivalent to at least a 33.3% research assistantship also qualify for remission of nonresident tuition. Tuition remission is conditionally awarded at the start of the semester based on the expectation that actual earnings during the semester will be at least 33.3% of the full-time rate. All students pay segregated fees. The only exception is that fellowships paid through the Graduate School have segregated fees waived in addition to tuition.

Assistantships and fellowships also provide **eligibility for an excellent health insurance program**, an extremely valuable benefit that provides single or family coverage that is more comprehensive than individuals can usually purchase on their own.

TEACHING ASSISTANTSHIPS

The most common source of support is a teaching assistantship. Historically, stipend rates for teaching and project assistants are governed by the Teaching Assistants' Association (TAA) bargaining unit.

To receive a teaching assistantship, candidates for admission must meet the following requirements:

- evidence (usually from the undergraduate transcript) of an appropriate background in the relevant subject matter of the course(s) to which appointment is being considered;
- evidence (usually from letters of recommendation or verbal communication) of the candidate's potential as a teaching assistant;
- an undergraduate GPA of 3.0 or above (on a 4.0 scale); and
- for students whose native language is not English, evidence of competence in spoken English through the SPEAK test that is administered by the UW. International applicants should note that a TA appointment is not normally possible during the first year of graduate study.

Current students, who apply for their first teaching assistantship, are also subject to the above criteria, as well as their performance as a graduate student. Reappointment as a teaching assistant depends upon satisfactory progress as a graduate student, satisfactory performance as a teaching assistant, and completing the Equity/Diversity TA Training.

Teaching assistants may be eligible for University teaching awards (https:// grad.wisc.edu/taawards/), including the UW-Madison Early Excellence in Teaching Award, UW-Madison Exceptional Service Award, UW-Madison Innovation in Teaching Award, UW-Madison Capstone Ph.D. Teaching Award, and the College of Letters & Science Teaching Fellow.

RESEARCH OR PROJECT ASSISTANTSHIPS

Research and project assistantships are made possible by grants awarded to individual professors for particular research programs. Recipients are selected by the individual professor concerned. Availability of research and project assistantships varies.

ADVANCED OPPORTUNITY FELLOWSHIPS

Advanced Opportunity Fellowships (AOF) are granted to the UW– Madison's Graduate School by the State of Wisconsin and are combined with other graduate education funds to support the recruitment and retention of highly qualified underrepresented students in UW–Madison graduate programs. Fellowships are competitive and merit based. AOF funding is intended to increase the racial and ethnic diversity of the graduate student population, as well as to support economically disadvantaged and first generation college students. AOF fellowships are paid through the Graduate School by the College of Letters & Science's Community of Graduate Research Scholars (http://ls.wisc.edu/currentstudents/graduate-students/cgrs/) (C-GRS) program.

EXTERNAL FELLOWSHIPS

Fellowships from professional societies and outside agencies provide another important source of aid for which students may apply either before or after commencing graduate work at UW–Madison. If necessary, external fellowships can often be supplemented with university funds up to prevailing university fellowship rates.

All qualified students who are US citizens, nationals or permanent resident aliens of the US are urged to apply to the National Science Foundation for the pre-doctoral fellowship competition. Students apply directly to NSF; the closing date is usually in early November. Please check the NSF website (http://www.nsf.gov/) for the application instructions and deadline.

INTRADEPARTMENTAL FELLOWSHIPS AND AWARDS

For more information on Intradepartmental Fellowships and Awards, please see the latest descriptions (https://botany.wisc.edu/financial-support/) on the botany website.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

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

MAJOR REQUIREMENTS MODE OF INSTRUCTION

| Face to Face | Evening/ Weekend | Online | Hybrid | Accelerated |
|--------------|---------------------|--------|--------|-------------|
| Yes | No | No | No | No |

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

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.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

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.

CURRICULAR REQUIREMENTS

Requirement Detail

| Minimum Credit Requirement | 30 credits |
|---|---|
| Minimum Residence Credit Requirement | 16 credits |
| Minimum Graduate | 15 credits must be graduate-level coursework. Details can be found in the Graduate School's Minimum Graduate |

Coursework Coursework (50%) policy (https://policy.wisc.edu/library/ Requirement UW-1244 (https://policy.wisc.edu/library/UW-1244/)).

| Overall Graduate GPA Requirement | 3.00 GPA required. This program follows the Graduate School's policy: https:// policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/ library/UW-1203/). |
|---|---|
| Other Grade Requirements | Students must earn a B or above in all track coursework. |
| Assessments and Examinations | A written thesis or research report based on work conducted in a formal research course and a final oral exam are required of all students who expect to continue for the Ph.D. degree. All master's theses must be deposited at Memorial Library. Students who wish to terminate their graduate studies at the master's level may submit a literature review instead of a thesis. |
| Language Requirements | No language requirements. |

COURSES REQUIRED

A minimum of 30 credits in natural sciences (undergraduate and graduate program courses combined) is required. A minimum of 6 credits in graduate-level botany courses must be completed at UW-Madison. Seminars and research credits do not count toward the 6 credits in botany. Courses may be required to address deficiencies in the following: GENETICS 466 Principles of Genetics or equivalent;CHEM 103 General Chemistry I and CHEM 104 General Chemistry II or equivalent; CHEM 341 Elementary Organic Chemistry or equivalent; a physics course including electricity and light; one semester of statistics; one semester of calculus. Contact the department for more information.

M.S. students complete a minimum of 16 credits while in residence at the UW, including:

- Courses required for their selected pathway (see below)
- Six (6) credits within the botany department (can also fulfill pathway requirements)
- Two (2) seminar courses (at least one in BOTANY; see full list of seminars below)
- Courses assigned by the Academic Advisory Committee and/or the student's M.S. committee
- · Research credits (see full list of research courses below)

Each graduate student in botany selects one of the following pathways:

General Botany Pathway¹

M.S. students must have one course from at least six of the seven.

- genetics,
- biochemistry, cell or molecular biology,
- plant physiology or plant developmental biology,
- · cryptogamic botany,
- · plant anatomy or morphology,
- ecology, and
- evolution or systematics

1

These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Ecology Pathway¹

M.S. students must have a minimum of five courses as follows:

- · at least three courses (minimum of 9 credits) in ecology,
- one course in evolution, and
- one course in any of the following: systematics; cryptogamic botany; biochemistry, cell or molecular biology; plant physiology or plant developmental biology; plant anatomy or morphology; or genetics

1

These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Evolution Pathway¹

M.S. students must have a minimum of five courses, at least one from each of the following:

- evolution,
- · systematics or cryptogamic botany,
- · population or quantitative genetics,
- ecology, and
- one course in any of the following: biochemistry, cell or molecular biology; plant physiology or plant developmental biology; or plant anatomy or morphology

1

These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Molecular, Cellular, and Developmental Biology (MCDB) Pathway¹

M.S. students must have a minimum of five courses, at least one from each of the following:

- plant anatomy or morphology,
- · biochemistry, cell or molecular biology,
- plant physiology,
- plant developmental biology or genetics, and
- one course in any of the following: ecology; systematics; evolution; or cryptogamic botany

1

These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Seminar Course Options

| Code | Title | Credits |
|---|---|---------|
| BOTANY/ATM OCN/ CIV ENGR/ ENVIR ST/GEOSCI/ ZOOLOGY 911 | Limnology and Marine Science Seminar | 1 |
| BOTANY 920 | Seminar in Algology: Fresh Water Algae | 1 |
| BOTANY/ PL PATH 930 | Seminar-Mycology | 1 |

| BOTANY 940 | Seminar in Plant Systematics and | 1 | ZOOLOGY 955 | Seminar-Limnology | 1 |
|---------------------|-----------------------------------|-----|-------------------------------|-------------------------------------|---------|
| | Evolution | | ZOOLOGY 956 | Seminar-Ecology | 1 |
| BOTANY 950 | Seminar-Plant Ecology | 1 | ZOOLOGY 957 | Seminar-Evolution | 1 |
| BOTANY 960 | Seminar-Plant Physiology | 1 | ZOOLOGY 958 | Seminar-Biophysical and | 1 |
| BOTANY/ATM OCN/ | Earth System Science Seminar | 1 | | Physiological Ecology | |
| ENVIRSI/ | | | ZOOLOGY 960 | Seminar in Cellular Biology | 1 |
| GEOG/GEOSCI/ | | | ZOOLOGY/ | Earth System Science Seminar | 1 |
| ZOOLOGY 980 | | | AIM OCN/ BOTANY/ENI/IR ST/ | | |
| ENTOM 601 | Seminar in Methods of Scientific | 1 | F&W ECOL/GEOG/ | | |
| | Oral Presentations | | GEOSCI 980 | | |
| ENTOM 901 | Seminar in Organismal Entomology | 1 | ENVIR ST/ | Energy Analysis and Policy Capstone | 3 |
| GENETICS 670 | Seminar in Clinical Cytogenetics | 1 | PUB AFFR/ | | |
| GENETICS 672 | Seminar in Laboratory Operations | 1 | URB R PL 810 | | |
| | and Quality Control | | ENVIR ST 900 | Seminar | 1-3 |
| GENETICS 673 | Seminar in Clinical Cytology | 1 | ENVIR ST/ | Seminar-Land Problems: | 2-3 |
| GENETICS/AN SCI/ | Seminar in Animal Breeding | 0-1 | | Institutional Development | 1.0 |
| DY SCI 951 | Consiner Direct Dreading | 1 | ATM OCN 925 | Seminar-Climatology | 1-2 |
| GENETICS/ | Seminar-Plant Breeding | I | ENIVIR ST 950 | Environmental Monitoring Seminar | 2 |
| HORT 957 | | | F&W FCOL / | Introduction to Ecology Research at | 1-2 |
| GENETICS 993 | Seminar in Genetics | 0-1 | AGRONOMY/ | UW-Madison | 12 |
| GEOG 900 | Seminar in Geography | 1-3 | ATM OCN/ | | |
| GEOG 901 | Seminar in Cultural Geography | 2-3 | BOTANY/ENTOM/ | | |
| GEOG 918 | Seminar in Political Geography | 2-3 | ENVIR ST/GEOG/ | | |
| GEOG 920 | Seminar in Physical Geography | 1-3 | ZUULUGY 953 | Wildlife Consister | 1 |
| GEOG 930 | Seminar in People-Environment | 2-3 | F&W ECOL 961 | Wildlife Seminar | 1 2 |
| | Geography | | GE03CI 920 | Geology | 1-5 |
| GEOG/ | Seminar in American Environmental | 3 | GEOSCI 929 | Seminar-Hydrogeology | 1-2 |
| HISTORY 932 | History | | GEOSCI 940 | Seminar in Paleontology | 1 |
| GEOG 970 | Seminar in Geographic Information | 1-3 | GEOSCI 970 | Seminar-Geochemistry | 2 |
| GEOG/ATM OCN/ | Farth System Science Seminar | 1 | GEOSCI 991 | Seminar: Geophysics | 1-3 |
| BOTANY/ENVIR ST/ | | | AGRONOMY 920 | Seminar | 1 |
| F&W ECOL/ | | | AGRONOMY/ | Seminar-Plant Breeding | 1 |
| GEOSCI/ | | | GENETICS/ | | |
| ZOOLOGY 980 | | | HORT 957 | | |
| GEOG/AAE/ | Interdepartmental Seminar in the | 1-3 | ATM OCN 900 | Seminar-Meteorology | 1-2 |
| HISTORY/LACIS/ | | | AIMOCN/ | Seminar-Climatology | 1-2 |
| POLI SCI/PORTUG/ | | | ATM OCN 965 | Seminar-Oceanography | 1-2 |
| SOC/SPANISH 982 | | | M S & F 900 | Materials Research Seminar | 1 |
| GEOG/AFRICAN/ | Interdepartmental Seminar in | 3 | M&FNVTOX 800 | Seminar | 1 |
| ANTHRO/ | African Studies Topics | | | | |
| POLISCI 983 | | | Research Course | e Options | |
| HORT 910 | Seminar | 1 | Code | Title | Credits |
| HORT/AGRONOMY/ | Seminar-Plant Breeding | 1 | BOTANY 699 | Directed Study | 1-4 |
| GENETICS 957 | | · | BOTANY 698 | Directed Study | 1-4 |
| SOIL SCI 728 | Graduate Seminar | 1 | BOTANY 990 | Research-Phycology | 1-12 |
| ZOOLOGY/ | Limnology and Marine Science | 1 | BOTANY 993 | Research: Fungal Biology | 1-12 |
| ATM OCN/BOTANY/ | Seminar | | BOTANY 994 | Research-Plant Systematics | 1-12 |
| CIV ENGR/ | | | BOTANY 995 | Research-Plant Ecology | 1-12 |
| ENVIRSI/ | | | BOTANY 996 | Research-Plant Physiology | 1-12 |
| | Seminar in Endocripology- | 0-1 | BOTANY 999 | independent Work | 1-3 |
| OBS&GYN 954 | Reproductive Physiology | 0-1 | | | |

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (https:// grad.wisc.edu/acadpolicy/) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES PRIOR COURSEWORK

Graduate Work from Other Institutions

No credits from other institutions are allowed to count toward the minimum graduate degree credit requirement and the minimum graduate coursework requirement.

UW-Madison Undergraduate

No credits from a UW–Madison undergraduate degree are allowed to count toward the minimum graduate degree credit requirement and the minimum graduate coursework requirement.

UW-Madison University Special

No credits earned as a UW–Madison Special student are allowed to count toward the minimum graduate residence credit requirement, the minimum graduate degree credit requirement, or the minimum graduate coursework requirement.

PROBATION

This program follows the Graduate School's Probation policy. (https://policy.wisc.edu/library/UW-1217/)

ADVISOR / COMMITTEE

A major professor must be chosen as soon as possible after beginning graduate study and in all cases by the end of the first year. A vice major professor is required.

Students meet with an advisory committee before their first semester and with their M.S. committee by the end of their first year to plan their coursework.

Students meet with their advisor on a regular basis to assess progress.

CREDITS PER TERM ALLOWED

15 credits

TIME LIMITS

The master's degree should be completed within two and one-half years of study.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (https://doso.students.wisc.edu/bias-or-hatereporting/)
- 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)

Students should contact the department chair or program director with questions about grievances. They may also contact the L&S Academic Divisional Associate Deans, the L&S Associate Dean for Teaching and Learning Administration, or the L&S Director of Human Resources.

OTHER

Assistantships are only available for thesis M.S. and Ph.D. degrees.

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.

LEARNING OUTCOMES

- 1. Acquire and demonstrate fundamental understanding of the basic properties of plant life from the subcellular to the ecosystem level of organization.
- Use critical elements of the methodological or theoretical framework in a specialized botanical subdiscipline to develop hypotheses, acquire scientific information, and interpret results in the context of the historical scientific literature.
- 3. Develop the skills of communicating scientific information, especially in written form.
- 4. Engage in the critical evaluation of botanical scientific data and its interpretation.
- 5. Recognize and apply ethical conduct in the collection, analysis, and presentation of scientific data.

 Develop the skills essential to critical debate, discussion, and exchange of scientific information among peers and audiences of diverse intellectual and personal backgrounds.

PEOPLE

Faculty: Professors Ane, Baum, Cameron (chair), Emshwiller, Gilroy, Givnish, Hotchkiss,Otegui, Spalding, Sytsma; Associate Professors Maeda, Pringle; Assistant Professors Keefover-Ring, McCulloh; Affiliate and Adjunct Faculty: Amasino, Damschen, Spooner, Wiedenhoft, P. Zedler