

# HORTICULTURE, PHD

The program provides graduate training leading to the doctor of philosophy in horticulture. Each doctoral student will have a major advisor who will supervise their program of study and their thesis research. Specializations are available in several aspects of crop science: organic and sustainable horticulture, diversified crop production for urban and regional food systems, environmental impact of horticultural practices, environmental regulation of plant growth and development, plant breeding, biochemistry and molecular biology of horticultural plants, microculture and biotechnology, weed control and herbicide physiology, and biostatistics. Students have the opportunity to develop their research projects using vegetables, fruits, trees, ornamentals, specialty crops, or model species such as *Arabidopsis thaliana*.

The PhD student's dissertation project will involve an in-depth mentored exploration of a research question and the development of a dissertation in conjunction with a graduate committee of at least four faculty members. A public presentation and defense of the dissertation is required.

The department houses research labs, controlled environment chambers, and greenhouse facilities. Field-plot areas with associated storage and laboratory facilities are available at the UW-Madison Arboretum (<https://arboretum.wisc.edu/>), Horticulture Research Farm at Arlington (<https://arlington.ars.wisc.edu/>), and the Agriculture Research Stations (<https://ars.wisc.edu/>) managed by the College of Agricultural and Life Sciences at selected locations throughout the state. In conjunction with the farm at Sturgeon Bay, the world's largest collection of tuber-bearing Solanums is maintained by the Inter-Regional Potato Introduction Project and is available for research use.

## ADMISSIONS

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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                    | September 1   |
| Summer Deadline                    | December 1    |
| GRE (Graduate Record Examinations) | Not required. |

**English Proficiency Test** Every applicant whose native language is not English, or whose undergraduate instruction was not exclusively in English, must provide an English proficiency test score earned within two years of the anticipated term of enrollment. Refer to the Graduate School: Minimum Requirements for Admission policy: <https://policy.wisc.edu/library/UW-1241> (<https://policy.wisc.edu/library/UW-1241/>).

**Other Test(s) (e.g., GMAT, MCAT)** n/a

**Letters of Recommendation Required** 3

The Horticulture graduate program accepts applications for fall, spring, and summer entry. The applicant's academic preparation should include fundamental courses in the plant sciences such as botany, bacteriology, genetics, and physiology, as well as courses in chemistry (general, organic, quantitative), physics, mathematics, and biochemistry. The academic average should be at least 3.0 (on a 4.0 scale) with evidence of proficiency in subjects related to agriculture and plant sciences.

### PREPARATORY COURSEWORK

Students are expected to enter the program having taken the following coursework. Deficient courses may be taken while in the program in consultation with the student's graduate committee.

- Physical Sciences - one course in each of the following:
  - Physics, including electricity, heat, and light
  - Calculus
  - Organic Chemistry lecture
  - Organic Chemistry lab or Biochemistry lab
- Biological Sciences - one course in each of the following:
  - Crop Production
  - Plant Breeding or Genetics
  - Plant Structure, Plant Taxonomy, or Plant Physiology
  - Plant Pathology or Entomology
- One Statistics Course
- One Soil Science Course

### APPLICATION CHECKLIST

A complete application should include the following items:

1. Graduate School Application and Application Fee
2. Supplementary Application: The supplementary application will appear as a part of the Graduate School's electronic application once the applicant selects Horticulture.
3. Statement of Purpose: Your essay should be a concise description of your reasons for choosing to study horticulture at the University of Wisconsin-Madison. Please include your research interests and career goals as well as a description of your preparation for graduate study including relevant coursework, related employment, research experience, publications, presentations, awards, and honors.
4. Transcripts: We require all applicants to submit an unofficial transcript in PDF format to their online application. If an applicant is recommended for admission, then they will be required to submit their official transcript to the Graduate School. International academic records must be submitted in the original language and accompanied

by an official English translation. Documents must be issued by the institution with an official seal/stamp and an official signature.

5. Three Letters of Recommendation
6. Proof of English Proficiency: Applicants, whose native language is not English, or whose undergraduate instruction was not in English, must follow the Graduate School's guidelines for proof of English proficiency.

## FACULTY ADVISORS

The Horticulture MS and PhD programs do not support lab rotations. All students are admitted directly into a faculty member's lab. Thus, we strongly encourage applicants to contact faculty members who work in their areas of interest before and during the application and admissions process.

## FUNDING

### 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

All applicants to the graduate program in Horticulture are automatically considered for financial support. There is no need to submit a separate application. Most of our students are supported through research assistantships, but additional sources of internal financial support include teaching assistantships, project assistantships, scholarships, 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

| Face to Face | Evening/<br>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              | 51 credits  |
| Minimum Residence Credit Requirement    | 32 credits  |
| Minimum Graduate Coursework Requirement | 26 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: <a href="https://policy.wisc.edu/library/UW-1244">https://policy.wisc.edu/library/UW-1244</a> ( <a href="https://policy.wisc.edu/library/UW-1244/">https://policy.wisc.edu/library/UW-1244/</a> ).  |
| Overall Graduate GPA Requirement        | 3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: <a href="https://policy.wisc.edu/library/UW-1203">https://policy.wisc.edu/library/UW-1203</a> ( <a href="https://policy.wisc.edu/library/UW-1203/">https://policy.wisc.edu/library/UW-1203/</a> ).   |
| Other Grade Requirements                | n/a   |
| Assessments and Examinations            | Doctoral students are required to take a comprehensive preliminary/oral examination after they have cleared their record of all Incomplete and Progress grades (other than research and thesis). Deposit of the doctoral dissertation in the Graduate School is required.   |
| Language Requirements                   | Contact the program for information on any language requirements.   |
| Graduate School Breadth Requirement     | All doctoral students are required to complete a doctoral minor or graduate/professional certificate. Refer to the Graduate School: Breadth Requirement in Doctoral Training policy: <a href="https://policy.wisc.edu/library/UW-1200">https://policy.wisc.edu/library/UW-1200</a> ( <a href="https://policy.wisc.edu/library/UW-1200/">https://policy.wisc.edu/library/UW-1200/</a> ). |

## REQUIRED COURSES

### Specific Course Requirements

The only specific course requirements for the PhD in Horticulture are HORT 799 Practicum in Horticulture Teaching and the seminar requirement, listed below. Apart from these, each student is required to work with the major professor and the PhD committee to design a program of coursework that best meets the individual student's needs and interests. The resulting program of coursework must satisfy the program requirements as well as the requirements specified by the Graduate School. The final determination of a student's required coursework is made by the student's PhD committee as part of the certification process.

### Seminar Requirement

During their graduate careers, students are required to present a minimum of three seminars in advanced seminar courses and receive a passing grade in each seminar. Advanced seminar courses offered by the

departments other than the Department of Plant and Agroecosystem Sciences may be used to satisfy this requirement.

### Required Teaching / Outreach

All students in the Horticulture PhD program are required to enroll in HORT 799 Practicum in Horticulture Teaching for one semester and obtain a passing grade. Students may enroll in HORT 799 Practicum in Horticulture Teaching for 1 to 3 credits. Each student is expected to work with their PhD advisor to identify an opportunity within the department for the student to engage in teaching or outreach work. This requirement is broadly defined and could include assisting a Horticulture graduate program faculty member with their classroom teaching or working with a Horticulture graduate program faculty member on an extension or outreach project.

## 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 Credits Earned at Other Institutions

Refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

##### Undergraduate Credits Earned at Other Institutions or UW-Madison

Refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

##### Credits Earned as a Professional Student at UW-Madison (Law, Medicine, Pharmacy, and Veterinary careers)

Refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

##### Credits Earned as a University Special Student at UW-Madison

Refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

### PROBATION

Refer to the Graduate School: Probation (<https://policy.wisc.edu/library/UW-1217/>) policy.

### ADVISOR / COMMITTEE

Every graduate student must have a faculty advisor (major professor) who is on the Horticulture graduate program faculty. The major professor advises the student about course work and supervises the student's research. The major professor must approve the student's coursework and research direction. A student may have more than one major professor, in which case at least one of the professors must be a member of the Horticulture graduate program faculty.

Students are responsible for forming their Graduate Committee before the end of the second semester, in accordance with current policy of the Graduate School (<https://policy.wisc.edu/library/UW-1201/>) and in consultation with their advisor. The role of this committee is to provide advice, approve the plan of study (certification), evaluate satisfactory progress, administer the preliminary examination and the dissertation defense (final examination). In addition to the student's advisor, at least three committee members are needed, and the chair (or one of the co-chairs) must be Horticulture graduate faculty. The committee must represent more than one graduate program, including the PhD minor program when option A is selected. Many Horticulture graduate faculty are also graduate faculty in other programs (e.g., agronomy, agroecology, plant breeding & plant genetics) and therefore satisfy this requirement. Continuity in membership of the graduate committee through the student's certification, preliminary exam, and final thesis defense is strongly encouraged.

### CREDITS PER TERM ALLOWED

15 credits

### TIME LIMITS

Refer to the Graduate School: Time Limits (<https://policy.wisc.edu/library/UW-1221/>) policy.

### 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/>)
- 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://employeeabilities.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 Student Assistance and Support (OSAS) (<https://osas.wisc.edu/>) (for all students to seek grievance assistance and support)
- 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 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

n/a

## PROFESSIONAL DEVELOPMENT

### 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

The Horticulture Graduate programs encourage students to develop Individual Development Plans (<https://grad.wisc.edu/pd/idp/>) in collaboration with their major advisor to facilitate professional development. Besides the extensive opportunities offered across the campus at large, students in the Horticulture programs also benefit from activities and programs provided by the Plant Sciences Graduate Council (<http://psgsc.wisc.edu/>), a student-led organization for graduate students at UW-Madison interested in plant science.

## LEARNING OUTCOMES

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1. Articulates challenges and limits with respect to knowledge within the field of horticulture.
2. Independently formulates ideas and/or research methods to advance knowledge within the field of horticulture.
3. Independently conducts research that makes a substantial contribution to the field of horticulture.
4. Demonstrates understanding of the primary field of horticulture in a historical, social, or global context.
5. Communicates complex ideas in a clear and understandable manner.
6. Fosters ethical conduct and professional guidelines.
7. Fosters best practices with respect to diversity, equity, and inclusion in scientific endeavors.

## PEOPLE

### **PEOPLE**

#### **PROFESSORS**

Ané, Colquhoun, Conley, de Leon, Goldman, Jahn, Kaepler, S., Krysan (chair), Kucharik, Lauer, Renz, Stoltenberg

#### **ASSOCIATE PROFESSORS**

Atucha, Dawson, Endelman, Gutierrez, Jull, Kaepler, H., Picasso, Wang, Werle

#### **ASSISTANT PROFESSORS**

Ellison, Hall, Kohmann, Kovaleski