

# Horticulture and Crop Science

The Ohio State University

M.S./Ph.D. Graduate Program Handbook

Updated September 2022

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## 1. Introductory Information

### A. Preface

Welcome to the Department of Horticulture and Crop Science (HCS)!

The mission of the Department of Horticulture and Crop Science is to obtain knowledge about plants and their uses through innovation and discovery, and then disseminate that knowledge to benefit Ohio State University, the people of Ohio, and the world. Through the years our programs have provided outcomes that impact the plant sciences with specific emphasis on Horticulture and the Crop Sciences. We are positioned to contribute through innovation, discovery and application through our teaching, extension, and research efforts to economic growth through the application of biological sciences. Our efforts will provide nutritious foods, plants for quality urban habitat, and plant-based products in an energy efficient and environmentally sustainable way, helping to meet the global challenges of food security and human health, environmental quality and sustainability, and advanced bioenergy and biobased products.

This HCS Graduate Studies Handbook describes the rules, processes, and procedures used in the graduate programs (M.S. and Ph.D.) in HCS. This document is written and updated by the Graduate Studies Committee (GSC), and new versions are approved by all voting faculty in HCS.

### B. Relationship to the Graduate School Handbook

This Department of Horticulture and Crop Science (HCS) Graduate Student Handbook supplements the [Graduate School Handbook](#), and should be used in conjunction with the Graduate School Handbook. This handbook outlines specific rules, procedures, policies, and requirements that apply to graduate students, faculty, and programs involved with the HCS M.S. and Ph.D. graduate programs.

### C. Degrees offered

The department of Horticulture and Crop Science offers the following graduate degrees:

- Masters of Science (M.S.) in Horticulture and Crop Science, thesis option
- Masters of Science (M.S.) in Horticulture and Crop Science, non-thesis option
- Doctor of Philosophy (Ph.D.) in Horticulture and Crop Science

### D. The Graduate Studies Committee

The HCS Graduate Studies Committee (GSC) is selected and operates according to the [Graduate School Handbook](#) and the HCS Pattern of Administration document.

The GSC is responsible for the conduct and administration of graduate programs in the Department. Actions taken by the committee are subject to approval, modification, or reversal by the Graduate Faculty members in the graduate program. Decisions made by GSCs must comply with Graduate School rules. The GSC assumes other responsibilities as assigned to it by the Graduate School, the Graduate Faculty members in the graduate program, the head of the academic unit, or the committee members. The committee reports on its actions taken during the year to Graduate Faculty members in the graduate program.

## E. Student Code of Conduct

We expect HCS Graduate Students to uphold the [OSU Student Code of Conduct](#), and [academic and professional standards](#).

### 3. Application and Admission

#### a. Overview of application process

Applicants can apply to our graduate program via the [online application](#), by selecting the relevant graduate program ([M.S. in Horticulture and Crop Science](#), or [Ph.D. in Horticulture and Crop Science](#)).

**All of the following criteria must be met** for an applicant to enroll as a student in the Department.

- 1) The applicant must be deemed academically eligible.
- 2) A faculty advisor must be identified and the applicant and advisor must agree to work together.
- 3) Funding must be identified for the prospective student's stipend, tuition, fees, and program support.

Here are some details:

**1. Academic eligibility** is determined by the HCS GSC on the basis of all aspects of the application. This includes transcripts, English language proficiency scores (if applicable), letters of reference, personal statement, curriculum vitae, and other materials. The HCS GSC does not require the GRE, but scores may be submitted. The range of course work should indicate a sufficient background in basic science, and the personal statement is expected to demonstrate clear focus and interest in graduate study in this department. Extracurricular activities, including research, professional experiences, service, and international experiences are also considered.

If a student is deemed academically eligible by both the Graduate School and the HCS GSC, the application is considered 'provisionally accepted' and the application is made available to faculty in the Department. Applicants can expect to receive email notification if their application has been provisionally accepted or denied.

**2. A faculty advisor** must be identified. Prior to application or at any point during the application process, prospective students may contact faculty members whose research interests match their own. At the same time, once students are provisionally accepted, faculty members will see this list of applicants and contact those who they wish to discuss an advising relationship with further.

**3. Funding** for the applicant's stipend, tuition, fees, and research support must be identified. A student cannot begin graduate studies until funding is identified. There are several options:

- Students can be financially supported by their adviser (through grants or other means). This is the mechanism by which most graduate students in HCS are supported. (Graduate Research Associateships - GRAs)
- Students can be financially supported by the Department through teaching assistantships (Graduate Teaching Associateships - GTAs).
- Students can be financially supported through the College or University (through Fellowships). These are Fellowships that the GSC applies for on behalf of the student, and are not open for self-nomination.
- Students can be self-funded (funding from one's home government, an external Fellowship, or personal funds).

## B. Academic standards

To be eligible to matriculate into the graduate programs in HCS, the following pre-requisites must be met:

- An earned baccalaureate or equivalent degree from an accredited college or university by the expected date of entry.
- Admission to the combined B.S./M.S. is subject the guidelines indicated by the [College of Food, Agricultural, and Environmental Sciences](#) and the [Graduate School](#).
- A minimum of a 3.0 cumulative grade-point average (CGPA) (on the 4.0 scale used at this university) in the last degree earned by the applicant relevant to the program of study. For international students, the CGPA is calculated on the home institution's grading scheme and the grade key on the transcript is then utilized to approximate an equivalent US grade based on the educational system of that country. Information about the degree programs and grading systems for the top 50 sending countries can be found at the [Graduate and Professional Admissions website](#).
- Training that will enable the student to pursue graduate study in HCS. Given the multidisciplinary nature of work in HCS, no specific courses are universally required. It is recommended that prospective students with undergraduate degrees in non-STEM (Science, Technology, Engineering, or Math) fields contact the GSC Chair prior to submitting an application.
- A minimum score of 79 on the internet-based (IBT), 213 for the computer based (CBT), and 550 for the paper based (PBT) Test of English as a Foreign Language (TOEFL ). Scores of 82 on the Michigan English Language Assessment Battery (MELAB), or 7.0 on the International English Language Testing System (IELTS) are also accepted. This requirement applies only to an applicant from a country where the first language is not English, unless a bachelor's degree or higher was earned in an English-speaking country.

### **Admission to the Ph.D. program without an M.S.**

Most HCS graduate students will have a M.S. degree before entering the Ph.D. program. However, admittance directly into the Ph.D. program (without an M.S.) is allowed. This decision to allow admission to the PhD program without an MS is largely dependent on evidence that the applicant has significant research experience, equivalent to that which would be conducted in an M.S. program.

## C. Application Materials

Summary of required application materials:

1. A completed [online application](#)

An official transcript from each college or university attended, listing all courses taken, grades and degrees earned, and dates of graduation (Ohio State students need not submit transcripts from this university; these will be supplied by internal procedures). For the application process a copy may be used. If the applicant is admitted, then an official transcript must be provided to the admission's office.

2. Three (3) letters of recommendation from persons acquainted with the applicant's academic program, scholastic ability, or professional performance.
  - a. Selection of letter writers: please request the submission of these letters in a timely fashion.
  - b. Timeliness of letter writing: faculty members or others knowledgeable about the student's academic and/or research performance should be invited to serve as

references. It is recommended that applicants choose reference writers carefully. Letters from high level administrators are not necessarily helpful. The best letters are from instructors or mentors who know the applicant well enough to speak to the student's preparation and aptitude for graduate study.

3. A brief (1-2 page) personal statement describing the applicant's educational and professional goals and objectives. The statement should explain the applicant's specific research interests in the department and any potential advisor(s). The personal statement should explain clearly the student's background and highlight previous relevant experiences.
4. A curriculum vitae (CV). A detailed CV should provide contact information, previous educational, professional, and research experiences. Please list presentations, posters, and published papers. Include examples of leadership activities, community service, extracurricular activities, or international experiences as appropriate. Also relevant would be examples of proficiency in field, greenhouse, laboratory, analytical and computational skills. The CV is typically no more than two pages long.
5. [English proficiency requirement](#) (international students from non-English speaking countries)

HCS no longer requires GRE scores for application to its M.S. or Ph.D. programs.

#### **Application timeline deadlines:**

While HCS has rolling admission, to be fully eligible for support, we recommend that applications are received by November 30th. The vast majority of applicants are for entrance in the Fall term (with some choosing to begin in Summer), with far fewer applicants beginning in the Spring term. To be considered for internal University and College fellowships, completed applications must be received by November 30th (for international applicants) or December 13<sup>th</sup> for domestic applicants.

We recommend that students have completed applications submitted by:

<b>Application term</b>	<b>U.S. applicant</b>	<b>International applicant</b>
<b>Summer</b>	Dec 13	Nov 30
<b>Autumn</b>	Dec 13	Nov 30
<b>Spring</b>	Aug 31	Aug 31

#### **4. Advisor and the Student Advisory Committee (SAC)**

##### **a. The Advisor**

The graduate advisor provides counsel and advice to the student on: course selections, individual program development, selection of research topics, and execution of the student's research and educational goals. The graduate advisor also conducts an annual review with each advisee. The advisor of a master's or doctoral student must hold Graduate Faculty membership at the appropriate level (Category M or P for a Master's student and only Category P for a doctoral student) in the Horticulture and Crop Science Graduate Program.

In the event that there are problems or conflicts related to the student's graduate program and/or the student-advisor relationship, the student is advised to meet and discuss the issue with the advisor if appropriate. If the conflict remains unsolved, the student should schedule a meeting to discuss the issue with the Graduate Studies Chair. The Graduate Studies Chair (or as needed, the Chair Elect) should be viewed as the primary contact for mediation. Every effort will be made to keep the issue confidential.

For issues related to academic progress, the student advisory committee (SAC) may be asked for additional input.

Grievances can be addressed through various mechanisms, including at the Graduate School, and through the Office of Institutional Equity (when related to harassment, discrimination and sexual misconduct). A compilation of complaint and grievance systems at OSU can be found through the Office of Academic Affairs.

**Change of Program or Advisor:** In Horticulture and Crop Science, funding is often tied to a major professor, and a project. This funding reality suggests that conflicts between Advisors and students need to be handled transparently and carefully. A student wishing to change to a different program or advisor should notify the advisor and the GSC Chair. A plan for transfer, funding, and formulation of a new SAC should be made within the semester.

#### b. The Student Advisory Committee (SAC)

##### **The role of the SAC**

The purpose of the SAC is to provide guidance in the development of a Course Program, approves the Course Program, provides input on the research proposal colloquium presentation, reviews the written and oral research proposal, reviews the thesis, or dissertation, and resolves matters concerning the student's graduate program. The student must keep the SAC informed on progress in research and coursework. The SAC is intended to be a formal mentoring network, though it is not expected to be the sole source of mentorship or expertise for students in the graduate program.

The student and advisor must together select graduate faculty to constitute the SAC. The selection of the SAC should be completed during the first semester of enrollment. Students should notify the GSC of the final composition of the SAC using [Form 1](#), and the GSC should be advised in writing of any appointments, resignations, etc. from the SAC.

##### **i. Composition of the Master's SAC.**

Specific guidelines for M.S. SAC selection and approval:

1. The chair of the committee (i.e. the Advisor) must have at least Category M status in HCS.
2. The SAC, including the advisor, consists of at least three (3) members, with at least two (2) members having Category M status or higher with the OSU Graduate Faculty
3. If the third member is not a Graduate Faculty member at OSU, then their appointment to the SAC must be approved by the GSC.
4. The SAC should be formed by the end of the student's 1<sup>st</sup> semester.

It is recommended that the student meet at least annually with their SAC to discuss research plans and progress. In addition, students are required to meet their SAC:

1. To prepare the Graduate Course Program (by the end of the 2nd semester)
2. To discuss research as part of the research proposal presentation (Colloquium)
3. For the Exit Seminar and Thesis Defense

The student should make every effort to schedule the colloquium presentation such that each SAC member can be present. The student is ultimately responsible for scheduling SAC meetings, getting approval for the research proposal, scheduling oral and written exams, and keeping the SAC up to date on research progress.

## **ii. Composition of the Ph.D. SAC.**

Specific guidelines for Ph.D. SAC selection and approval:

1. The Chair of this committee (i.e. the Advisor) must have Category P status in HCS.
2. The SAC, including the advisor, consists of at least four (4) or more OSU faculty members having either Category M or Category P status.
3. At least one of the OSU members of the SAC must be from outside HCS.
4. SAC members from outside of OSU require permission of the Graduate School.
5. The SAC should be formed by the end of the student's 1st semester.

It is recommended that the student meet at least annually with their SAC to discuss research plans and progress. In addition, students are required to meet their SAC:

1. To prepare the Graduate Course Program (by the end of the 1st semester)
2. To discuss research as part of the research proposal presentation (Colloquium)
3. For the Candidacy exam
4. For the Exit Seminar and Dissertation Defense

The student should make every effort to schedule the colloquium presentation such that each SAC member can be present. The student is ultimately responsible for scheduling SAC meetings, getting approval for the research proposal, scheduling all oral and written exams, and keeping the SAC up to date on research progress.

The GSC should be notified via a new [Form 1](#) if the Candidacy Exam Committee or the Final Examination Committee is different from the SAC. The Ph.D. Final Examination Committee will also contain a Graduate Faculty Representative assigned by the Graduate School.

## **5. Masters Degree Programs**

### **Course based activities:**

Our curriculum aims to give students a breadth of knowledge in Horticulture and Crop Science. A total of 30 graduate hours are required with a distribution among core focus areas. All students are required to demonstrate an equivalency or take and pass courses in two of three core areas including plant physiology/plant biochemistry; plant breeding/genetics/biotechnology; and plant systems/production/ecology. In addition, a fourth core area of experimental design/statistics is required for all students. Equivalency can be demonstrated through either prior coursework, or relevant research/internship experiences. Students must petition the GSC for approval of core area equivalency. A petition should include demonstration of equivalent material through transcripts, syllabi, and presentations or publications.

Description and forms are available here: <https://hcs.osu.edu/graduate/forms>

Students are required to take course(s) in 2 of 3 core areas from Focus 1-3. Students are required to take one course from "Experimental Design". Additional credits in current topics, professional development, and electives are required.



Core/Focus areas (students must meet requirements in two of three Focus areas and “Experimental Design):

**FOCUS 1 - PLANT BIOCHEMISTRY / PHYSIOLOGY / METABOLOMICS**

HCS 5621	Physiology of Cultivated Plants	3
HCS 5622	Plant Biochemistry	3
HCS 7821	Environmental Physiology of Managed Plant Systems	3

**FOCUS 2 - PLANT GENETICS / BIOTECHNOLOGY / BREEDING (1 course or 3 credits):**

HCS 5325	Plant Genetics	3
HCS 5625	Applied Plant Biotechnology	2
HCS 5825	Plant Breeding	2
HCS 8825	Advanced Plant Breeding	3

**FOCUS 3 - PLANT SYSTEMS / PRODUCTION / ECOLOGY (1 course or 3 credits):**

HCS 5100	Advanced Cropping Systems	3
HCS 5200	Advanced Horticultural Principles and Practices	3
HCS 5306	Sustain. Veg. Prod. Pract.: Planning, Growing and Marketing	3
HCS 5411	Grain, Oilseed, and Fiber Crops	3
HCS 5412	Agroecology of Grasslands and Prairies	3
HCS 5420 <sup>†</sup>	Environmental impacts of Crop-Livestock Systems	3
HCS 5422	Principles of Weed Ecology and Management	3
HCS 5450	Vegetable Crop Production and Physiology	3
HCS 5460	Fruit Crop Physiology and Production	3
HCS 5602	Ecology of Agriculture	3
HCS 5670	Golf Courses and the Environment	2

Experimental design/statistics (MS):

HCS 5887	Introduction to Experimental Design	3
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Graduate Student Professional Development: should be taken during the first Autumn of enrollment

HCS 7001	Graduate Student Professional Development	1
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Current Topics: MS students must take at least one Current Topics course during their degree.

HCS 8830	Current Topics	1
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Seminar and Colloquium: Students will enroll in HCS 7890 a minimum of two times: The first of these should occur by the second semester of enrollment, during which the student will prepare a written proposal for their project and present a Colloquium describing his or her research proposal. The SAC must approve the written proposal and is expected to attend the colloquium presentation. The second and subsequent enrollments can be any semester thereafter. Students enrolling in HCS 7890 for credit must attend all departmental seminars.

HCS 7890	Seminar on HCS Topics (colloquium within first 2 semesters)	1
HCS 7890	Seminar on HCS Topics (register at least one more time)	1

Research credits (MS):

HCS 7999	Research (1-12 cr/term)	varies
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**MS ELECTIVES** a minimum of 17-19 elective credits of HCS graduate courses are required. Electives can come from courses listed in Focus 1-3, or as other coursework agreed to in consultation with the SAC. Coursework assigned by SAC can also be from outside of HCS.

Each student's course plan should be submitted as the "[MS ADVISING SHEET](#)" by the end of the first semester of enrollment.

Credit load: Fulltime M.S. students with a Graduate Associateship or a University/College fellowship should enroll for 18 credits per semester (AU and SP), or 12 credits (SU). Students that are funded via other mechanisms should consult with your advisor and the graduate program associate about the appropriate number of hours to schedule.

Transfer of credits: Graduate credit earned at another university may be transferred to this university. The Graduate School places no limit on the graduate credit hours that may be transferred. However, residence and minimum degree requirements determine the number of graduate credit hours that may be counted toward a graduate degree at OSU. In addition, the HCS GSC must approve the transfer of credits. Information about how to transfer credits can be found [here](#).

### **Co-Curricular Requirements:**

**M.S. Thesis Requirements:** For those students carrying out thesis research, they will form a SAC, complete a colloquium including a written and oral presentation of their thesis proposal, and write and defend their thesis.

By the end of the first semester of the M.S., students should have formed ([Form 1](#)) and met with their SAC to determine their course plan ("[MS ADVISING SHEET](#)"). By the end of the second semester, M.S. students should have completed their colloquium including their thesis proposal. Students must send their M.S. thesis to their SAC no less than three weeks prior to the defense date. At least one week prior to the defense date, the SAC must unanimously agree that the thesis is sufficiently complete to be defended in the final exam. If extenuating circumstances arise, students should consult their SAC for timelines that deviate from the one presented above. Students are encouraged to have discussion with their SAC about what a defensible thesis is. It is the responsibility of the advisor to poll the SAC and inform the student that their thesis is defensible. Edits can be requested by SAC members after the thesis has been deemed defensible, prior to deposition with the graduate school.

**Exit Seminar and Final Examination:** All students will present an Exit Seminar on the day of their final defense, immediately prior to the final exam. The dissertation/final examination committee in HCS is the student's SAC. The student will be responsible for scheduling and notifying the department, SAC members, and associated units, of the time and place of their exit seminar presentation. Exit seminars will be video-linked between campuses. The exit seminar will be 40-50 minutes in duration, allowing 10-15 minutes for open questions and discussion for non-SAC members. The exit seminar is in addition to the final 2-hour exam, thus, Ph.D. exit seminars and final exams should be scheduled for a block of 3 hours. All dissertation examinations involving video conferencing must adhere to the Graduate School's guidelines for video conferencing (see [Appendix B](#)). The oral portion of the doctoral examination must take place during announced university business hours.

Thesis and dissertation format info: Information regarding formatting of theses and dissertations, as well as templates, can be found through the [Graduate School](#).

Non-Thesis Exam: The master's examination for a student pursuing the non-thesis option must include a written portion, either in the form of exam questions or a research report and may include an oral portion. The examination will evaluate the student's proficiency and understanding of their field of study.

Time Limit: The maximum time for receiving departmental financial support, while completing the Master's degree, is 2 years plus one term. Students are permitted more time to complete their degree, but will not be funded from Departmental sources for more than seven (7) terms. The maximum overall time to complete the Master's degree is 5 years. For cases with extenuating circumstances, the GSC and/or Graduate School may be petitioned to extend either the time limit for departmental funding, or the time towards degree completion.

Graduate Research Retreat requirement: The graduate research retreat occurs annually and alternates between the Wooster and Columbus campuses. This is the feature event of the department's graduate education program and it is required that all students attend. Exceptions will be made only for extenuating personal or programmatic considerations.

## 6. Doctoral Degree Program

### **Course based activities:**

Our curriculum aims to give students a breadth of knowledge in Horticulture and Crop Science. A total of 80 credit hours are required in the doctoral degree program. All students are required to demonstrate an equivalency at the advanced undergraduate or graduate level or take and pass courses in two of three focus core areas (plant physiology/plant biochemistry; plant breeding/genetics/biotechnology; or plant systems/production/ecology) and a fourth core focus area of experimental design/statistics. Equivalency can be demonstrated through either prior coursework, or relevant research/internship experiences. Students must petition the GSC for approval of core area equivalency. A petition should include demonstration of equivalent material through transcripts, syllabi, and presentations or publications.

Students are required to take course in 2 of 3 core areas from Focus 1-3 and from "Experimental Design". Additional credits in current topics, professional development, and electives are required.

#### Focus 1 - PLANT BIOCHEMISTRY / PHYSIOLOGY / METABOLOMICS: (1 course or 3 credits)

HCS 5621	Physiology of Cultivated Plants	3
HCS 5622	Plant Biochemistry	3
HCS 7821	Environmental Physiology of Managed Plant Systems	3

#### Focus 2 - PLANT GENETICS / BIOTECHNOLOGY / BREEDING: (1 course or 3 credits)

HCS 5325	Plant Genetics	3
HCS 5625	Applied Plant Biotechnology	2
HCS 5825	Plant Breeding	2
HCS 8825	Advanced Plant Breeding	3

Focus 3 - PLANT SYSTEMS / PRODUCTION / ECOLOGY: (1 course or 3 credits)

HCS 5100	Advanced Cropping Systems	3
HCS 5200	Advanced Horticultural Principles and Practices	3
HCS 5306	Sustain. Veg. Prod. Pract.: Planning, Growing and Marketing	3
HCS 5411	Grain, Oilseed, and Fiber Crops	3
HCS 5412	Agroecology of Grasslands and Prairies	3
HCS 5420†	Environmental impacts of Crop-Livestock Systems	3
HCS 5422	Principles of Weed Ecology and Management	3
HCS 5450	Vegetable Crop Production and Physiology	3
HCS 5460	Fruit Crop Physiology and Production	3
HCS 5602	Ecology of Agriculture	3
HCS 5670	Golf Courses and the Environment	2

Experimental design/statistics:

HCS 8887	Techniques in Experimental Design	4
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Graduate Student Professional Development

HCS 7001	Graduate Student Professional Development	1
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Current Topics: Ph.D. students must take a Current Topics course two times during their degree.

HCS 8830	Current Topics	1
HCS 8830	Current Topics	1

Seminar and Colloquium: Students will enroll in HCS 7890 a minimum of two times: The first of these should occur by the fourth semester (including summer) of enrollment, during which the student will prepare a written proposal for their project and present a Colloquium describing their research proposal. The SAC must approve the written proposal and is expected to attend the colloquium presentation. The second and subsequent enrollments can be any semester thereafter. Students enrolling in HCS 7890 for credit must attend all departmental seminars.

HCS 7890	Seminar on HCS Topics (colloquium within first 4 semesters)	1
HCS 7890	Seminar on HCS Topics (register at least one more time)	1

Electives: students must take 20-24 credits of electives at the 5000 level or higher. Courses that fulfill other requirements are not eligible to double-count as electives.

HCS or other	Electives	20-24
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Research credits:

HCS 8998	Pre-candidacy Research (1-18 cr/term)	varies
HCS 8999	Post-candidacy Research (1-3 cr/term)	varies

Students in the Ph.D. program must take at least 2 courses at the 7000 level or higher in one of the core areas, or as an elective. HCS 7001, 7806, 7890, 8830, 8194, 8998, 8999 do not count towards this requirement.

Other coursework will be agreed to in consultation with the SAC. Coursework assigned by SAC can also be from outside of HCS.

Each student's course plan should be submitted ([HCS PhD Advising Sheet](#)) by the end of the first semester of enrollment.

Credit load: Full time pre-candidacy doctoral students should take 18 credits per semester (AU and SP) or 12 credits (SU). Full time post-candidacy doctoral students should register for 3 credits per semester. Students not on a Graduate Associateship or a University/College fellowship should consult with their advisor and the graduate program associate about the appropriate number of hours to schedule.

Transfer of credits: Graduate credit earned at another university may be transferred to this university. The Graduate School places no limit on the graduate credit hours that may be transferred. However, residence and minimum degree requirements determine the number of graduate credit hours that may be counted toward a graduate degree at OSU. In addition, the HCS GSC must approve the transfer of credits. Information about how to transfer credits can be found [here](#).

### **Co-Curricular Requirements:**

By the end of the first semester, Doctoral students should have formed ([Form 1](#)) and met with their SAC to determine their course plan ([HCS PhD Advising Sheet](#)). By no later than the end of the fourth semester, Doctoral students should have completed their proposal and proposal presentation as part of Colloquium (HCS7890). Students are encouraged to complete the Candidacy exam by the end of their third year. Students who have not completed their Candidacy exam by the end of their third year will require a petition to the GSC to maintain enrollment. This requirement includes students changing from M.S. to Ph.D. program. Students must send their dissertation to their SAC no less than four weeks prior to the Dissertation defense. At least two weeks prior to the defense date, the SAC must unanimously agree that the dissertation is sufficiently complete to be defended in the Dissertation Defense. If extenuating circumstances arise, students should consult their SAC for timelines that deviate from the one presented above. Students are encouraged to have discussion with their SAC about what a defensible thesis is. It is the responsibility of the advisor to poll the SAC and inform the student that their thesis is defensible. Edits can be requested by SAC members after the dissertation has been deemed defensible, prior to deposition with the graduate school. The Ph.D. dissertation should be formatted in accordance with the OSU Graduate School guidelines ([Graduate School Guidelines](#)).

### **Candidacy examination:**

The advisor serves as the chair of the candidacy examination committee, and a member of the committee. The advisor, as chair of the candidacy examination committee, is responsible for coordinating the preparation and conduct of both the written and oral portions of the candidacy examination.

The responsibility for creating and evaluating the written and oral portion of the candidacy examination rest with the SAC. Under special circumstances and with the approval of the GSC, other Graduate Faculty members may participate in generating, administering or scoring parts of the written portion of the candidacy examination. Non-Graduate Faculty members may be appointed to the candidacy examination committee by approval of the GSC and by petition to the Graduate School. Non-Graduate Faculty are in addition to the required four, current Ohio State Graduate Faculty members.

Student, advisor, and SAC should together come to a written agreement in the form of a memorandum of understanding regarding the format and timeline of the candidacy exam. Additionally, the time and date of the written and oral portions of the exam should be determined jointly. In lieu of standard questions from each SAC member, students, and in consultation with their Advisor and SAC, can elect to take the written portion using the "Proposal" option detailed below.

Guidelines for the "Questions" options for Ph.D. Candidacy:

Each portion of the written exam can be either open or closed book, as determined by each SAC member. After the final written exam is completed, the advisor will collate all of the responses and distribute them to the SAC. The SAC will then have one week to determine if the exam response is sufficient to move to the oral exam. It is up to each SAC member whether they would like to make the determination of adequacy of the written exam before proceeding to the oral exam, based on their individual exam, or on the exam as the whole. This is equivalent to passing the written part of the general exam. If a student does not pass the written part of the candidacy exam, the SAC will determine what additional study or other requirements must be met to reschedule the written portion (See Waiver information below). The student must file a notice that they will be taking their candidacy exam with the Graduate School (via GRADFORMS) no later than 14 days before the intended oral exam.

The oral examination must occur within one month of the student distributing the finished written exam to the SAC. The oral exam consists of a two-hour oral examination on topics from the written examination as well as any general knowledge pertaining to the student's program. Upon a unanimous decision that the student has sufficiently completed their candidacy exam, each SAC member (including the advisor) will indicate "Satisfactory" via GRADFORMS.

Guidelines for the "Proposal" option for Ph.D. Candidacy: Student, advisor, and SAC choose a proposal topic. Students are encouraged to prepare one or more abstract(s) to send to the SAC. The Abstract(s) should include an overview of the proposed topic, the hypothesis they intend to investigate, proposed specific aims, and the justification or appropriateness of the topic as a grant proposal. The topic for the proposal will typically be unrelated to the students' dissertation research. However, in consideration of the student's particular situation and with recommendation of the SAC, the proposal can be written on a topic related to the student's dissertation research. Within one week of sending the SAC the proposal Abstract(s) each member must approve/disapprove of the proposal topic(s) in writing.

Once all SAC members approve a proposal topic, the one-month written portion of the candidacy exam begins. Preparation of the written proposal must follow the most current proposal format requirements of NSF, USDA-NIFA or as determined by the SAC.

At the end of the one-month written exam period the proposal is given to each member of the SAC. Within one week of receiving the proposal, each SAC member must give the student written approval/disapproval. This is equivalent to passing the written part of the general exam. Upon SAC approval of the written proposal the student must register for the oral exam with the Graduate School. The Graduate School requires notice of at least two weeks. Prior to one week before the oral exam, each SAC member must provide substantive feedback about the proposal to the student (in person or via email). The oral examination must occur within one month of the student distributing the finished proposal to the SAC. The oral exam consists of a two-hour oral defense of the prepared proposal as well as any general knowledge pertaining to the proposal. Upon a unanimous decision that

the student has sufficiently completed their candidacy exam, each SAC member (including the advisor) will indicate “Satisfactory” via GRADFORMS.

Waiver: If, based on evaluating the written portion, the advisor or another member of the SAC see no possibility for a satisfactory overall performance on the candidacy examination, the student may be advised to waive the right to take the oral portion. The SAC may not, however, deny a student the opportunity to take the oral portion.

Should a student have an unsuccessful first candidacy exam, the exam may be attempted one additional time. Information about a second candidacy exam can be found in the Graduate School Handbook.

Earning Master’s Degree On the Basis of Candidacy Examination: A student in HCS may earn a master’s degree on the basis of satisfactorily completing the doctoral candidacy examination under the following conditions:

1. It is recommended by the student’s advisor and their SAC;
2. The student does not already hold an equivalent master’s degree in the same field;
3. The student submits the Application to Graduate form by the published deadline; graduation deadlines established by the Graduate School are met;
4. Doctoral candidacy has not expired.

Exit Seminar and Final Examination: All students will present an Exit Seminar on the day of their final defense, immediately prior to the final exam. The dissertation/final examination committee in HCS is the student’s SAC. The student will be responsible for scheduling and notifying the department, SAC members, and associated units, of the time and place of their exit seminar presentation. Exit seminars will be video-linked between campuses. The exit seminar will be 40-50 minutes in duration, allowing 10-15 minutes for open questions and discussion for non-SAC members. The exit seminar is in addition to the final 2-hour exam, thus, Ph.D. exit seminars and final exams should be scheduled for a block of 3 hours. All dissertation examinations involving video conferencing must adhere to the Graduate School’s guidelines for video conferencing (see [Appendix B](#)). The oral portion of the doctoral examination must take place during announced university business hours.

Time Limit: The maximum time for receiving departmental financial support, while completing a Ph.D. is 5 and 2/3rd years. Students are permitted more time to complete their degree, but will not be funded from Departmental sources for more than 17 semesters. For cases with extenuating circumstances, the GSC and/or Graduate School may be petitioned to extend either the time limit for departmental funding, or the time towards degree completion.

Publication requirement: Students should make their results available to the scientific community via peer-reviewed scientific publications and to stakeholders via trade publications and technical journals when appropriate. The Department requires Ph.D. students to have at least one manuscript published, in press or submitted to a peer-reviewed journal before graduation. Evidence of this requirement should be provided to the GSC and can include a PDF or printed copy of the article or correspondence from the journal indicating a manuscript has been submitted or accepted.

Thesis and dissertation format info: Information regarding formatting of theses and dissertations, as well as templates, can be found through the [Graduate School](#).

Transfer from M.S to Ph.D. Degree Program in HCS: Eligible students in HCS can transfer from M.S. to Ph.D. programs without completion of the M.S. degree. The request for transfer will be made jointly by the student and advisor with endorsement of the SAC. The transfer will normally be made after 1 year of M.S. study. This transfer will be subject to approval of the GSC, and will be based on four criteria:

1. Student is up to date on required components for M.S. at the time of request (e.g., identified advisor and SAC, completed M.S. proposal, approved course of study).
2. High scholastic performance (e.g. graduate GPA typically >3.5).
3. High aptitude for research (initiative, independence, originality, etc...) and demonstrated research experience at the equivalent of an M.S. level.
4. An expanded scope of proposed research. As part of the request for transfer, documentation of the expanded scope should be provided to the GSC in the form of a revised version of the student's original M.S. proposal.
5. Students will be expected to enroll a third time in HCS7890 and present a written and oral Ph.D. proposal for evaluation.

Transferring from Ph.D. to M.S. Program in HCS: A written request must be submitted by the advisor and signed by the SAC with an explanation of the rationale for the change. The letter must specify whether the change is to an M.S. plan A (thesis) or plan B (non-thesis) degree.

Graduate Research Retreat requirement: The graduate research retreat occurs annually and alternates between the Wooster and Columbus campuses. This is the feature event of the department's graduate education program and it is required that all students attend. Exceptions will be made only for extenuating personal or programmatic considerations.

## **7. Appointments and renewals**

### **a. Graduate Associates (GAs)**

HCS GA are either Graduate Research Associates (GRAs) or Graduate Teaching Associate (GTAs). GRAs will carry out responsibilities in addition to a student's own thesis or dissertation research. GRAs are expected to contribute to non-thesis/dissertation research and other related laboratory activities, as well as providing departmental service, such as serving on committees.

GTAs funded through HCS will be assigned responsibilities that include but are not limited to: weekly laboratory/recitation classes, delivering course lectures, preparation of exam and mid-term questions, and grading of exams and midterms. A GTA position will be a 50% appointment (duties should be limited to approximately 20 hours per week), thus a GTA can also register for classes and continue research during time outside of their teaching duties.

GTAs should be encouraged to provide feedback to faculty concerning the course. The University Center for Academic Teaching (UCAT) offers training seminars for incoming GTAs. An outstanding GTA award (<http://www.gradsch.ohio-state.edu/Depo/PDF/GATAGuidelines.pdf>) is available (GTAs can nominate themselves), as are informational sessions about constructing a professional teaching portfolio.

Departmental support will not be provided for non-thesis MS students.

**Offers and reappointments:** Any student accepting a GA appointment must be provided with a Graduate Associate Appointment document stating the terms of the appointment. This form is signed by the student, the Chair of HCS or their designee(s), the Graduate Studies Chair. All offers of GAs will be in writing, and originated from the office of the Department Chair. In HCS, appointments will normally be



made for one year, but through mutual agreement between the student and the Chair of the Department, short-term appointments may be made (though not less than one semester). The standard GRA appointment will include summer terms. GTA appointments are made for the semester for which the TA'ed course is being offered.

Reappointment shall take place annually and is contingent on satisfactory progress (as indicated in the Annual Progress Report) and availability of funds. Appointments may be terminated for due cause as described in the Graduate Student Handbook. In order to be reappointed, a student must be: (i) in good standing with the Graduate School (GPA > 3.0, and other criteria); (ii) maintaining satisfactory progress in research and (iii) performing service duties adequately. A student who does not maintain reasonable progress toward a degree or who does not fulfill other graduate program requirements, including those regarding professional standards and misconduct, may be denied further registration in that program by the Graduate School on the recommendation of the GSC Chair.

Ordinarily, termination of an appointment for unsatisfactory performance will not occur without a probationary period, during which the student will be given the opportunity to demonstrate improved performance. The GSC reserves the right, however, to terminate an appointment without such a probationary period if such an action is needed in order to protect the integrity of the Department. The Graduate School will disallow reappointment of GAs who are no longer in good academic standing. If a student is not to be reappointed, they will be notified in writing by the Chair of the Department as soon as possible. Reasons for non-reappointment must be stated in writing. For two weeks after the date of the non-reappointment notice, a GA has the right to initiate an appeal to the head of the Department.

**Mid-appointment termination:** GA appointments may be terminated prior to the end of the appointment period only with the written approval of the Graduate School. A GA appointment is terminated prior to the end of the appointment period for any of the following reasons:

1. the GA is no longer enrolled in the Graduate School
2. the GA is registered for fewer than the number of credit hours required for a GA appointment or fewer than three credit hours for a doctoral student who has passed the candidacy examination performance as a GA is determined to be unsatisfactory by the employing unit
3. the GA graduates

**Outside Employment:** Students with outside employment will not be eligible to receive Departmental Support, either as a GTA or GRA. Exceptions will be made only with express permission of the GSC.

Provisions for vacation time: Provision for time off for personal leave of less than two weeks duration, including breaks between academic terms, should be determined in consultation with the advisor (for GRAs) or direct supervisor (for GTAs). It is understood that there are many reasons for longer absences. In cases of dispute between a student and the faculty advisor or direct supervisor, the Graduate Studies Chair shall to be informed of, and play a role in the approval/disapproval of long periods of absence (defined as more than two weeks). Guidelines for short-term absences (less than two weeks) and leaves of absence are given in the Graduate School Handbook.

**Departmental support for associateships will not be provided for students choosing the non-thesis option.** The intended graduation date must be indicated.

**Evaluation of graduate students:** All students will be evaluated annually by both the advisor and themselves, at an annual review meeting, using the Graduate Student Progress Reports. This meeting is

an opportunity for both the advisor and the advisee to check in regarding expectations, research progress and overall well-being. In addition, annual reports allow the GSC to follow each student's progress in cases where there may be potential problems. It is the joint responsibility of the student and advisor to be sure the Graduate Student Progress Report is submitted on time. In some instances, participation in the evaluation by the Department Chair or GSC Chair may be warranted.

Evaluation of GTAs: Faculty supervisors should complete a peer evaluation of GTA teaching (using the current departmental "Peer Review of Teaching" form). GTA's can also receive SEI from students.

### **University/College Fellowships:**

A Graduate School fellowship is a financial award made by the university directly to a graduate student to provide support during a portion of the graduate degree program. Fellows are selected on the basis of academic merit through a university-wide competition without respect to financial need. Graduate fellows cannot be required to perform a service in return for receiving a stipend. Two distinct kinds of Graduate School fellowships are awarded on a competitive basis: 1) first-year fellowships (University and Graduate Enrichment) for students applying to begin a graduate program at Ohio State and 2) Presidential Fellowships, which provide support to students completing their dissertation.

**Eligibility.** Eligibility criteria for a Graduate School fellowship vary by kind of fellowship and are set by the Graduate School. More information on fellowships is available at:

<http://www.gradsch.osu.edu/graduate-school-handbook1.html>

**Nomination.** Candidates for the first-year and Presidential Fellowships are nominated by the GSC. Students interested in being considered for the Presidential Fellowship should state their interest to their advisor or GSC chair.

**Travel Support Grants for HCS Students.** Travel support grants to aid graduate students in presenting their research at professional meetings are available on an annual basis by request to the GSC Chair. The amount of the award is subject to the availability of funding and has generally been in the range of \$500. Each student is eligible to receive one travel grant per degree. The grant is intended to support the presentation of an oral or poster presentation, usually during the student's final year of their program, or to attend a required interview for a prestigious fellowship award. Written requests should state the rationale for the travel and provide an estimate of total expenses. When appropriate, an abstract should be attached to the letter upon submission. The request should be submitted to the GSC Chair and copied to the Graduate Program Associate at least two weeks prior to the intended date of departure.

### **HCS Graduate Student Important Milestones**

M.S. (thesis option):

- Form SAC by the end of the first semester
- Prepare Graduate Course Program by the end of the first semester
- Complete colloquium (i.e., research proposal presentation) by the end of the second semester
- Complete thesis, exit seminar, and thesis defense

Ph.D.:

- Form SAC by the end of the first semester
- Prepare Graduate Course Program by the end of the first semester.
- Complete colloquium (i.e., research proposal presentation) by the end of the fourth semester (including summer).
- Complete candidacy exam by the end of the third year. Option to complete “questions” (open or closed book) or “proposal” options, as determined jointly by the student, advisor and SAC.
- Complete dissertation, exit seminar, and thesis defense

**Appendix 1 – Horticulture and Crop Science (HCS) Graduate Course Listing**  
Elective Options

Course # Course Title # credits

5097.03 Chile Study Abroad Pre-Departure 1  
5100 Advanced Cropping Systems 3  
5194 Group Studies var.  
5200 Advanced Horticultural Principles and Practices 3  
5306 Sustainable Vegetable Production Practicum: Planning, Growing and Marketing 3  
5325 Plant Genetics 3  
5411 Domestication and Utilization of Agronomic Crops 3  
5412 Agroecology of Grasslands and Prairies 3  
5420 Environmental Impacts of Crop-Livestock Systems 3  
5422 Biology and Management of Weeds and Invasive Plants 3  
5450 Vegetable Crop Production and Physiology 3  
5460 Fruit Crop Physiology and Production 3  
5521 Advanced Greenhouse Production 3  
5602 The Ecology of Agriculture 3  
5621 Physiology of Cultivated Plants 3  
5622 Biochemical Processes in Cultivated Plants 3  
5625 Applied Plant Biotechnology 2  
5670 Golf Courses and the Environment 2  
5797.03 Agriculture and Agro-Ecosystems in Chile 3  
5798 Agroecology Field Studies 3  
5825 Plant Breeding 2  
5887 Introduction to Experimental Design 3  
5890 Turfgrass Seminar 1  
7003.02 Agricultural Genomics: Principles and Applications 2  
7004 Genome Analytics 4  
7193 Individual Studies var.  
7194 Group Studies var.  
7600 Metabolomics, Principles and Practice 3  
7625 Plant Breeding and Biotechnology 3

7761 Crop Secondary Products for Survival, Health and Wellbeing 3

7806 Methods in Horticulture and Crop Science 1-2

7821 Environmental Physiology of Managed Plant Systems 3

7830 Phytochemicals in Human Health: Crops to the Clinic 3

8825 Advanced Plant Breeding 3

8830 Current Topics in Horticulture and Crop Science 1

8887 Techniques of Experimental Design 4

Non-Options for Electives

7001 Graduate Student Professional Development 1

7890 Seminar on HCS Topics 1

7999 Graduate Research MS 1-18

8998 Graduate Research Pre-Candidacy PhD 1-18

8999 Graduate Research Post-Candidacy PhD 1-18

## **Appendix 2 – HCS Graduate Program Goals and Expected Learning Outcomes for PhD and MS**

### **Goal A: Analyze, interpret and apply foundational knowledge of plant and related sciences to discovery and problem solving.**

- A1 Describe, explain, and interpret the processes of plant growth and reproduction in response to environmental and evolutionary factors at various scales (i.e. molecular, cellular, tissue, whole plant, field, community, or landscape).
- A2 Use, predict, and optimize plant growth development, and production for research and/or commercial purposes.
- A3 Use appropriate instrumentation or methods to measure, analyze, and interpret the components of plant function and performance.
- A4 Apply knowledge to real world situations, solve problems, inform decisions and provide recommendations relative to plant growth, development, and production.

### **Goal B: Use the scientific method to design, conduct, and evaluate research that makes creative, theoretical and practical contributions to plant science.**

- B1 Critique and evaluate scientific literature and stakeholder practices to identify gaps in current knowledge.
- B2 Design original and creative scientific experiments to address novel research questions in plant science.
- B3 Conduct experiments in plant science.
- B4 Analyze data.
- B5 Contribute novel knowledge or innovation to plant science.

### **Goal C: Professional Development – Demonstrate professionalism, leadership, creativity and responsible conduct of research.**

- C1 Design and conduct research responsibly.
- C2 Plan and manage projects and personnel (organizational and logistical activities.)
- C3 Respond appropriately to unanticipated challenges.
- C4 Establish professional collaborations and network
- C5 Demonstrate continuous learning in response to changes and developments in the discipline.

**Goal D: Communication – Utilize oral, written, and digital forms of communication to clearly convey disciplinary knowledge, its relevant application, and value to peers, stakeholders, students and the public.**

- D1 Orally communicate knowledge of plants, research methodology, results, and implications to both technical and non-technical audiences.
- D2 Demonstrate writing skills for the development of proposals and scientific peer-reviewed, technical, and lay publications.
- D3 Effectively teach and mentor others in the area of plant science

## **Future additions**

List of Graduate forms and current links

A one-page graduation checklist

Timeline

Desk assignments (Wooster and Columbus)

Safety training

Health and wellness information

Grievance procedures

Departmental (travel), college (Krauss, OARDC posters, OARDC SEEDS grants) and University awards (Hayes, Presidential Fellowships)

Continuous enrollment (reiteration of Graduate School Rules)