



GRADUATE STUDENT HANDBOOK

Michigan State University Department of Horticulture



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NOTE FROM THE DEPARTMENT CHAIR



Welcome! We are incredibly pleased and excited to have you join the Department of Horticulture, albeit briefly, while you advance your education and work to earn a graduate degree – M.Sc. or Ph.D. -- under the guidance and supervision of one of our faculty members. I encourage you to take advantage of all the resources (intellectual and physical) available here, to best prepare yourself for a rewarding career in applied or fundamental Horticulture (the science and the art!). Get to know your peers and colleagues in and outside the laboratory/classroom/greenhouse/field – these are likely the first of many professional connections that could last a career (a lifetime!)

We hope you can appreciate the differences between undergraduate education and the graduate school experience, and in doing so, flourish here. Course grades are still important, but not the basis of earning your advanced degree. You are transitioning from memorizing the information developed and tested by others in the past, to creating new knowledge for dissemination and application in the future. You are evolving from a student in a classroom to a scientific colleague. You will find that not every question has a simple/concise answer, and not every experiment is guaranteed to succeed as predicted or desired. During your time with us you will become more and more independent, while still needing to work effectively as a team member – being depended upon by others and being dependent upon others for career advancement.

Good luck in your studies- learn a lot, gain valuable skills and be productive and impactful!

HORTICULTURE GRADUATE PROGRAMS OVERVIEW

The Graduate Programs in Horticulture at Michigan State University are among the oldest, largest, and most prestigious Horticulture graduate programs in North America, and are recognized internationally for scholarly development of research scientists, extension specialists, and horticultural business leaders in the economic plant sciences.

One of the strengths of the Horticulture Graduate Program is founded in the interdisciplinary and integrative nature of horticulture, allowing graduate students a great deal of flexibility in designing their individualized programs of study and research. Students have access to state-of-the-art research facilities, including laboratories, greenhouses, growth chambers, and both on- and off-campus field research stations. Horticulture faculty develop and procure funding for individual and multi-disciplinary team research projects, providing a wide range of opportunities for Masters and Doctoral students.



A graduate degree in the Horticulture Graduate Program draws upon the expertise of approximately 36 faculty members in the Department of Horticulture, as well as advisory expertise of many faculty from across campus in basic plant biology, pathology, entomology, forestry, agronomy, genetics, biochemistry, marketing, food science, health and nutrition, engineering, climatology, etc. At MSU, the work towards the graduate degree involves training and experience in research, teaching, and professional communications with peers, industry, and the public. It is the goal of the Horticulture Graduate Programs to produce the leaders of tomorrow who can integrate knowledge and resources from multiple disciplines to improve the performance, production, profitability, and environmental sustainability of high value crops.

This handbook is intended to be a guide to help students succeed as they progress through their graduate studies, and to assist the faculty advisor in mentoring the student. It summarizes the departmental policies, requirements, paperwork, and timelines related to graduate education. Students should retain a copy of this Handbook for guidance and reference throughout their graduate careers.

For questions about the content herein please contact:

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LEARNING OUTCOMES AND GOALS

The Department of Horticulture has defined specific Learning Outcome Goals for its graduate programs. Upon graduation, students in the Horticulture Graduate Programs should be able to:

- 1) Understand the importance of relevant aspects of horticultural management, sustainability and social relevance, plant growth and development, and environmental systems.
- 2) Acquire sufficient quantitative and qualitative analytical and critical thinking skills to be effective and self-motivated problem solvers. For the PhD program, develop testable ideas that contribute creatively to the body of knowledge in the field.
- 3) Effectively communicate scientific concepts, principles, and problem solving in public, professional, and academic environments
- 4) Conduct a thorough scientific literature search and effectively synthesize the material and write a properly cited literature review and a defensible proposal for a research project.
- 5) Understand and participate in the process of responsible conduct of research, peer review, manuscript publication, and grant proposal writing.
- 6) Engage in scholarly, independent, and defensible research with the guidance of a faculty committee.

These goals are met through a partnership between Faculty Advisor, Advisory Committee, Department, College, and Graduate School. Our success in reaching these goals is evaluated each semester by our graduate students, through an anonymous, online survey. Results of the survey are available from the Graduate Programs Assistant.

GRADUATE STUDENT ROLES AND RESPONSIBILITIES

Learning, adhering to, and completing the graduate program requirements for the M.S. and/or Ph.D. degrees is the responsibility of the student, in partnership with guidance from the student's academic advisor, Advisory Committee, and Graduate Programs Committee. Prior to beginning their program, students should fill out the [Expectations Document](#) and discuss those expectations with their advisor.

The graduate student should submit and maintain correct and up-to-date records with their faculty advisor and the Graduate Programs Assistant. The student, the faculty advisor and the Advisory Committee will plan the Program of Study as well as the M.S. Plan A thesis (or M.S. Plan B project) or Ph.D. dissertation research. The faculty advisor is the student's most important advisor in the graduate degree program, and should be kept informed of activities, progress, data, and challenges. Advisory Committee members serve as a valuable function in guidance and research experience. Regular contact with the faculty advisor and Advisory Committee helps prevent miscommunications and/or mismatched expectations later.

FACULTY ADVISOR ROLES AND RESPONSIBILITIES

The faculty advisor will guide, challenge, mentor, and aid the student throughout all phases of the degree process. The faculty advisor should help in establishing the student's Advisory Committee (see below), the Program of Study (see below), and the topic of the graduate research project. Faculty should fill out and discuss the [Expectations Guidelines](#) with their students before their program begins.

SELECTION OF THE FACULTY ADVISOR

For MSU-Horticulture Graduate Programs, the student's faculty advisor is typically determined before the student is admitted and enrolled in the graduate program, in accordance with the interests of the student and the availability and willingness of a faculty member to serve in that capacity. Should a situation arise in which the student feels compelled to change faculty advisors, before relations are severed with the initial academic advisor, the student must identify another faculty member who is willing to serve in that capacity. Any change must have the approval of the Department Chair and the Graduate Programs Director. Failure to do so may result in a request for the student to withdraw from the graduate program.

GRADUATE PROGRAM COMPONENTS AND PLAN OPTIONS

M.S. IN HORTICULTURE, PLAN A

Graduate students in a Plan A Master's program must complete prescribed courses and conduct original research, under the supervision of the Faculty Advisor and the Advisory Committee, on a selected problem related to Horticulture. A review of the literature in the selected area of study and written research proposal should precede the experimental work. The data collected must be analyzed, interpreted, presented, submitted to, and accepted by the Graduate School according to their recommendations/format.

M.S. IN HORTICULTURE, PLAN B

Graduate students in a Plan B Master's program must complete prescribed courses and conduct an independent project, under the supervision of the faculty advisor and the Advisory Committee, incorporating teaching, extension, outreach, and/or research related to Horticulture. A project report or portfolio will be developed, in lieu of an experimental research-based thesis.

PH.D. IN HORTICULTURE

Graduate students in a Doctoral program must complete prescribed courses and conduct original and innovative research, under the supervision of the Faculty Advisor and the Advisory Committee, on a selected problem related to Horticulture. A review of the literature in the selected area of study and written research proposal should precede the experimental work. The data collected must be analyzed, interpreted, presented, submitted to, and accepted by the Graduate School according to their recommendations/format.

INTERDEPARTMENTAL AND CROSS-DEPARTMENTAL GRADUATE PROGRAMS

Students in the Department of Horticulture may participate in non-degree granting interdepartmental graduate programs, such as [Plant Breeding, Genetics and Biotechnology](#) (PBGB), [Environmental Science and Policy](#) (ESP), [Ecology, Evolution and Behavior](#) (EEB) or [Molecular Plant Sciences](#) (MPS). Students participating in such

programs must satisfy all requirements for the Horticulture Graduate Program but may also be subject to additional requirements for the specific interdepartmental graduate program.

DEGREE REQUIREMENTS

DEGREE REQUIREMENTS FOR M.S.

The Program of Study will be developed initially through consultation between the academic advisor and the student. Courses to be taken should fit into a unified plan aimed at providing the student with a comprehensive background in the chosen area of interest. Initiative in program design by the student is encouraged. The program should be presented at the initial meeting with the Advisory Committee.

This must be submitted to the GPC for approval by the end of the first semester.

Course and research credit requirements are as follows:

- At least 30 credit hours beyond a B.S. degree.
- More than half (16) of these credits must be in courses at the 800 or 900 level, including research.
- A minimum of three (3) credit hours of 800 level courses in Horticulture (not including HRT 894 or HRT 899).
- At least one (1) credit hour of Horticulture Seminar (HRT 894) or another graduate seminar approved by their advisory committee.
- Research credits for Plan A (HRT 899) may vary from six to ten (6 to 10) depending on the thesis problem selected. Plan B students must take at least 3 but not more than 6 credits of Independent Study (Horticulture 890) and/or Master's Non-Thesis Research (Horticulture 898)

DEGREE REQUIREMENTS FOR PH.D.

The Program of Study will be developed initially through consultation between the academic advisor and the student. Initiative in program design by the student is encouraged. It should be presented at the initial meeting with the Advisory Committee. This must be submitted to the GPC for approval by the end of the first year.

Course and research credit requirements are as follows:

- The Advisory Committee will consider the background, research needs, and desires of each student to determine required coursework.
- At least two (2) credits of Horticulture Seminar (HRT 894) or another graduate seminar approved by their advisory committee.
- A minimum of 24 and a maximum of 36 research credits (HRT 999).
- PhD Program of Study must be submitted to the GPC for approval by the end of the second semester.

For the PhD degree, one year of attendance on campus beyond the M.S. degree is required. A year of residence/attendance consists of two semesters, involving completion of at least three (3) credits of graduate work each term.

GRADUATE COURSES - SELECTED GRADUATE COURSES

The Horticulture Graduate Program curriculum offers considerable flexibility in student course work. The Department recommends that, at minimum, all Horticulture MS and PhD students undertake graduate academic coursework or equivalent experiential learning related to (1) Production, storage and/or marketing of horticultural crops and (2) Plant growth, development and physiology. In addition, it is recommended that students are trained in approaches and methods in computational/quantitative biology, statistics, scientific communication, and research/analytical techniques. This training can take place while in the Program or from previous education. Other courses relevant to the student's research interests may be chosen in consultation with the guidance committee. Below is a list of courses that are most often taken by Horticulture graduate students. This list is not inclusive, as other courses are available in related disciplines. Additional courses often taken by Horticulture graduate students are listed in the Horticulture Graduate Programs website.

Production, storage and/or marketing of horticultural crops courses

- HRT 403: HANDLING AND STORAGE OF HORTICULTURAL CROPS
- HRT 404: HORTICULTURAL MANAGEMENT
- HRT 405: SUSTAINABLE PRACTICES FOR HORTICULTURAL FOOD CROP PRODUCTION
- HRT 407: HORTICULTURE MARKETING
- HRT 411: LANDSCAPE CONTRACT MANAGEMENT
- HRT 430: EXPLORING WINES AND VINES
- CSS 424: SUSTAINABLE AGRICULTURE AND FOOD SYSTEMS: INTEGRATION AND SYNTHESIS
- CSS 431: INTERNATIONAL AGRICULTURAL SYSTEMS
- CSS 488: CROPPING SYSTEMS

Plant growth, development, and physiology

- HRT 401: ADVANCED HORTICULTURAL CROP PHYSIOLOGY
- HRT 863: ENVIRONMENTAL PLANT PHYS
- PLB 415: PLANT PHYSIOLOGY
- PLB 434: PLANT STRUCTURE & FUNCTION

Computational/quantitative biology

- HRT 841: FOUNDATIONS IN COMPUTATIONAL AND PLANT SCIENCES
- CMSE 890: SELECTED TOPICS IN COMPUTATIONAL MATHEMATICS, SCIENCE, AND ENGINEERING
- CSS 844: FRONTIERS IN COMPUTATIONAL AND PLANT SCIENCES
- PLB 400: INTRODUCTION TO BIOINFORMATICS
- PLB 810: THEORIES AND PRACTICES IN BIOINFORMATICS
- PLB 843: FORUM IN COMPUTATIONAL AND PLANT SCIENCES

Statistics

- ANS 824: RESEARCH METHODS OF QUANTITATIVE AND MOLECULAR GENETICS AND GENOMICS
- IBIO 830: STATISTICAL METHODS IN ECOLOGY AND EVOLUTION I
- IBIO 831: STATISTICAL METHODS IN ECOLOGY AND EVOLUTION II
- STT 464: STATISTICS FOR BIOLOGISTS
- STT 814: ADVANCED STATISTICS FOR BIOLOGISTS
- STT 855: INTRODUCTION TO STATISTICAL GENETICS

Scientific Communication

- HRT 860: SCIENTIFIC WRITING: WORKSHOP
- CSUS 433: GRANT WRITING AND FUND DEVELOPMENT

Research and Analytical Techniques

- HRT 812: LABORATORY RESEARCH TECHNIQUES
- NSC 810: LABORATORY- BIOLOGICAL SCIENCE TRANSMISSION ELECTRON MICROSCOPY
- NSC 820: LABORATORY- SCANNING ELECTRON MICROSCOPY AND ENERGY DISPERSIVE X-RAY MICROANALYSIS
- NSC 837: LABORATORY - LASER SCANNING CONFOCAL MICROSCOPY

Seminar Courses

- HRT 894: HORTICULTURE SEMINAR
- HRT 892: PLANT BREEDING AND GENETICS SEMINAR

DEPARTMENT POLICIES

DEPARTMENT/PROGRAM RESPONSIBILITIES

DESKS

1. If possible, a desk will be made available for each graduate student requesting one. Students who use their desks infrequently may be asked to make the space available to someone else.
 - a) Desk assignments will be made by Greta Orszula when enrollment materials are secured during the student's first term or upon arrival between terms.
 - b) Only registered graduate students (exclusive of summer semester) may occupy desks.
 - c) A student may be assigned and occupy only one desk in the department regardless of location (laboratory or office).
 - d) Desks will be assigned on a seniority basis within the following priority groups:
 - (1) Graduate Assistants
 - (2) Non-university funded students
 - e) Seniority will be based on the date of admission or readmission to graduate school. Desks will be assigned according to availability.
 - f) Desks will not be assigned for sole use as storage for books, data, etc. Such use will result in a request to surrender the assigned desk. Surrendering of desks will be the decision of the Graduate Programs Director.
 - g) Desks and office space must be kept clean and orderly and are subject to random inspection.

SUPPLIES

2. A limited variety of paper, pencils, markers, etc., are available from the main departmental office for University-supported research (not for coursework use). Laboratory chemicals and supplies are available from [University Stores/Spartan Marketplace](#). Supplies can be purchased using a university account number on-site at the University Stores office on Service Drive.

COPY MACHINE/CODES

3. Departmental use is limited to authorized teaching, research, and extension requirements. A PIN copy code will be issued to each graduate student (with the authorization of their advisor). There are two copy machines in room A285 (mail room). Personal use, with or without reimbursement to the Department, is prohibited by University policy.

UNIVERSITY VEHICLES

4. Graduate assistants are authorized to drive University vehicles only for University business, such as conducting research or other University projects. Students not on assistantship must obtain approval in writing from the Department Chairperson. Vehicles are never to be used for personal purposes. Other vehicles may be available by special arrangement with the Horticulture Teaching & Research Center Manager, the Main Office, or individual faculty members with assigned vehicles. To serve everyone, certain guidelines must be followed:
 - a) Complete (annually) the [Employee Driver Certification Form](#). The form certifies that a person driving a University-owned vehicle has a valid unrestricted U.S. driver's license, with proper class and endorsements listed for the vehicle(s) to be operated and a satisfactory driving record. (Manual of Business Procedures, Section 35.III.B.1.).
 - b) Fill out all the information on travel logs in the vehicles, which contains a space for comments or suggestions.
 - c) Always leave the gasoline tank at least 1/4 full. Fill the tank at the University Garage on Service Rd.
 - d) Park the vehicles in the designated areas near the PSSB Bldg. and promptly return the keys. If space is not available near PSSB, park in the Vet Clinic or CIPS parking lots.
 - e) Return vehicles in clean condition! Remove all soil, trash, and other materials when you return the vehicle.
 - f) University property is not to be borrowed for personal use.

ADMISSION

REQUIREMENTS

1. Applicants are strongly encouraged to contact faculty who may be willing to serve as the major professor. Specific faculty interest areas can be found within our [Faculty Directory](#) and [Programs Area](#). The willingness of a specific faculty member to serve as major professor is not required for application but is required at the time of admission. For guidance in identifying a prospective faculty member to serve in this role, please contact the Graduate Programs Director.
2. Applicants for the M.S. program must have completed a Bachelor of Science or arts degree; applicants for the Ph.D. program must have completed an M.S. program or its equivalent.
3. Applicants should have a B.S. or B.A. degree in agriculture or biological sciences. Applicants not trained in these fields will be considered provided they have a robust academic and/or experiential background. Previous courses in college-level physics, chemistry, mathematics, statistics, and plant science are strongly recommended. Applicants should read and understand the [Departmental recommendations for minimum academic coursework](#) to be completed prior to, or during, the program.

4. A minimum GPA of 3.0 on a 4.0 scale, based upon the courses taken during the last two academic years, is required for admission.
5. For non-U.S. students who are not native English speakers, please refer to the updated requirements on the [Graduate School](#) website.
6. Transfer Credits
 - a. Graduate credits earned at another institution may be transferred to Michigan State University for the M.S. (maximum of nine semester credits) or PhD degree in partial fulfillment of the requirements. Credit acceptance is determined by the faculty advisor and Advisory Committee must be approved by the Department and the CANR Associate Dean. The credits must be appropriate to the degree and earned within the time limits given above. The credits must not have been used toward another degree. A “credit evaluation form” must be filed with the Program of Study. This evaluation form must be filed with the Program of Study. This evaluation may result in credits transferred being less than credits earned. ([See University Graduate Studies Catalog](#)).
7. Orientation
 - b. The Graduate Programs Committee and the Horticulture Organization of Graduate Students are jointly responsible for an annual Orientation program for all new students. This program is held prior to the beginning of each Fall semester (mid- to late-August), and attendance is required for all new students. Important departmental, college, and university policies, including those regarding program academic requirements, safety procedures, and ethical conduct of graduate research, are covered during the orientation program.

FIRST SEMESTER

NEW STUDENT EXPECTATIONS FORM

- a. To ensure success in graduate school, it is important that students and their advisors align their expectations of each other from the start. It is strongly encouraged that first-year students and their advisors meet to discuss expectations in person prior to completing their first semester together. Suggested topics for discussion are listed below to help facilitate this discussion. In addition, it is suggested that students and advisors independently complete the ‘Student-Advisor Expectation Scales’ worksheet and share their answers with each other in advance of their discussion so that they can discuss their responses in person.

COMMITTEE FORM – MS STUDENTS

- a. Advisory Committee Roles and Responsibilities
 - i. The role of the Advisory Committee is to provide expanded expertise and guidance to the graduate student in their academic preparations, conduct original research and prepare the student for professional success after graduation. This committee assists the faculty advisor in advising the student regarding courses to be taken and research to be conducted; reviews and approves the student’s thesis/dissertation research proposal; and administers written and oral examinations to determine the student's level of competence.

SELECTION OF THE ADVISORY COMMITTEE

- a. The advisory committee is chosen by the student in collaboration with the Faculty Advisor. The Advisory Committee for M.S. students comprise three or more faculty members, including the academic advisor and at least one member from outside the Department of Horticulture.
- b. Once the guidance committee is designated, the student has the responsibility to call all members to meet at least once each year to review and oversee the student’s progress. A graduate student

may change the membership of the Advisory Committee with the approval of the Graduate Programs Director. Students should complete a [Change of Committee Member](#) form and get GPC approval. Once approved, the committee change can be processed via GradPlan via Campus Solutions/Student Information System. The unit also may change the Committee membership with the concurrence of the graduate student in accordance with University, College, and Departmental policies. The membership of the Committee may be changed as appropriate for changes in the dissertation topic. Advisory Committee members on leave shall provide the necessary guidance of their advisee during their absence.

[PROGRAM OF STUDY FORM](#) – MS STUDENTS

- a. The Program of Study consists of the prescribed course work and research to be performed by the student during the completion of the graduate degree. The programs of study are to be reviewed by the Graduate Programs Committee (GPC) prior to submission in GradPlan. Each program will vary considerably depending on the student's background, interests and areas of research. The Program of Study should be developed with two goals in mind:
 - ii. To provide the necessary tools to carry out the thesis or dissertation research, as well as future professional and scientific endeavors
 - iii. To provide a strong background for the student's vocational interest
- b. Course and research credit requirements are as follows:
 - iv. At least 30 credit hours beyond a B.S. degree.
 - v. More than half (16) of these credits must be in courses at the 800 or 900 level, including research.
 - vi. A minimum of three (3) credit hours of 800 level courses in Horticulture (not including HRT 894 or HRT 899).
 - vii. At least one (1) credit hour of Horticulture Seminar (HRT 894) or another graduate seminar approved by their advisory committee.
 - viii. Research credits for Plan A (HRT 899) may vary from six to ten (6 to 10) depending on the thesis problem selected. Plan B students must take at least 3 but not more than 6 credits of Independent Study (Horticulture 890) and/or Master's Non-Thesis Research (Horticulture 898)
 - ix. Courses below 300 cannot fulfill the credit requirements stated under (2a) above; they may be taken as collateral courses to meet minimum requirements or background deficiencies. Courses numbered 300-399 are allowed only upon written permission from the Associate Dean of the College. For the M.S. degree, a minimum of six (6) credits must be earned in residence on campus. A year of residence consists of two semesters, involving completion of at least three (3) credits of graduate work each term.

[FACULTY ADVOCATE: - ALL STUDENTS](#)

- a. [The] Faculty Advocate serves as a confidential advocate for the student to discuss any issues, including personal and professional conflicts related to their graduate program. It is the duty of the student and their Faculty Advocate to decide whether any action to resolve such issues should be carried out.
- b. The Graduate Program Assistant and a HOGS representative will work together to suggest and coordinate advocates for all new students and/or students who would like an advocate.

SECOND SEMESTER

COMMITTEE FORM – PHD STUDENTS

- a. Advisory Committee Roles and Responsibilities
 - i. The role of the Advisory Committee is to provide expanded expertise and guidance to the graduate student in their academic preparations, conduct original research and prepare the student for professional success after graduation. This committee assists the faculty advisor in advising the student regarding courses to be taken and research to be conducted; reviews and approves the student's thesis/dissertation research proposal; and administers written and oral examinations to determine the student's level of competence.
- b. *Selection of the Advisory Committee*
 - x. The advisory committee is chosen by the student in collaboration with the Faculty Advisor. The Advisory Committee for M.S. students comprise three or more faculty members, including the academic advisor and at least one member from outside the Department of Horticulture.
 - xi. Once the guidance committee is designated, the student has the responsibility to call all members to meet at least once each year to review and oversee the student's progress. A graduate student may change the membership of the Advisory Committee with the approval of the Graduate Programs Director. Students should complete a Change of Committee Member form and get GPC approval. Once approved, the committee change can be processed via GradPlan via Campus Solutions/Student Information System. The unit also may change the Committee membership with the concurrence of the graduate student in accordance with University, College, and Departmental policies. The membership of the Committee may be changed as appropriate for changes in the dissertation topic. Advisory Committee members on leave shall provide the necessary guidance of their advisee during their absence.

PROGRAM OF STUDY FORM – PHD STUDENTS

- a. The Program of Study consists of the prescribed course work and research to be performed by the student during the completion of the graduate degree. The programs of study are to be reviewed by the Graduate Programs Committee (GPC) prior to submission in GradPlan. Each program will vary considerably depending on the student's background, interests and areas of research. The Program of Study should be developed with two goals in mind:
 - i. To provide the necessary tools to carry out the thesis or dissertation research, as well as future professional and scientific endeavors
 - ii. To provide a strong background for the student's vocational interest
- b. Course and research credit requirements are as follows:
 - iii. The Advisory Committee will consider the background, research needs, and desires of each student to determine required coursework.
 - iv. At least two (2) credits of Horticulture Seminar (HRT 894) or another graduate seminar approved by their advisory committee.
 - v. A minimum of 24 and a maximum of 36 research credits (HRT 999).
 - vi. PhD Program of Study must be submitted to the GPC for approval by the end of the second semester.
 - vii. For the PhD degree, one year of attendance on campus beyond the M.S. degree is required. A year of residence/attendance consists of two semesters, involving completion of at least three (3) credits of graduate work each term.

CITI MODULE YEAR 1 DUE – ALL STUDENTS

- a. All graduate students must conduct original research, under the supervision of the academic advisor and the Advisory Committee, on a selected problem related to Horticulture. The Department of Horticulture requires all MS and PhD students to write an acceptable Thesis/Dissertation Research Proposal as part of their graduate program. The research proposal must be approved by their committee and be submitted in pdf format to the Graduate Program Assistant along with the research proposal form signed by their committee. Such proposals should include the Seven Essential Elements of a scientific research proposal (see below). The Research Proposal is not an exact blueprint of all research that may be conducted during the course of the doctoral program, since results from initial or preliminary experiments may dictate alteration of the hypothesis, methodology, or design. Rather, it must demonstrate a sufficient level of understanding of the researchable problem, the appropriate methodology, and scientific rationale to be approved by the student's Advisory Committee for scientific content and by the GPC for the Essential Elements (see Research Proposal Requirement forms). Failure to do so will result in an "unacceptable" evaluation on the semester report, and two consecutive such evaluations may result in termination (see section VII – Minimum Academic Standards for Continued Enrollment). The experimental data collected must be analyzed, interpreted, and presented in the form of a bound thesis (M.S.) or dissertation (Ph.D.). (Candidates for the M.S., Plan B, must submit a project report or portfolio in lieu of a thesis).
- b. *The Seven Essential Elements of a Masters or Ph.D of Science Research Proposal*
 - viii. A baseline expectation for all MS-Plan A and PhD students associated with the MSU Department of Horticulture is that they develop a brief research proposal that addresses each of the following elements pertinent to developing scientific research skills:
 - ix. one or more testable hypotheses
 - x. clear research objectives
 - xi. rationale for the proposed research, including a scientific literature review and, if available, preliminary data
 - xii. feasible proposed research methodology
 - xiii. expected outcomes
 - xiv. potential impact
 - xv. pertinent literature citations
- c. The research proposal, to be developed in close consultation with the faculty advisor, should clearly identify each of the Seven Essential Elements. Students are encouraged to adopt a proposal format similar to that defined for actual research proposals to (e.g.,) NSF or NIFA. The Project Description should provide a clear statement of the work to be undertaken and must include: objectives for the period of the proposed work and expected significance; relation to longer-term goals of the PI's project; and relation to the present state of knowledge in the field, to work in progress by the PI under other support and to work in progress elsewhere. The Project Description should outline the general plan of work, including the broad design of activities to be undertaken, and, where appropriate, provide a clear description of experimental methods and procedures. Proposers should address what they want to do, why they want to do it, how they plan to do it, how they will know if they succeed, pitfalls and alternative strategies, time-line of proposed research aims and what benefits could accrue if the project is successful. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified. These issues apply to both the technical aspects of the proposal and the way in which the project may make broader contributions.
- d. The proposal should be reviewed and approved by the student's graduate advisory committee within one year of initial enrollment in the M.S. program and within two years of initial

enrollment in the Ph.D. program. The Graduate Advisory Committee should assure that the above seven elements are addressed clearly and adequately in the submitted research proposal. Following Advisory Committee approval, the research proposal should be submitted to the Graduate Programs Committee along with the submission form for inclusion in the student's file records, at which time it also will be reviewed by the GPC solely to confirm that the essential elements have been addressed. If there is an omission or inadequacy in the essential elements, the GPC will return the proposal to the student and faculty advisor and identify the element that fails to adhere to departmental expectations. The student will be required to correct the proposal within a specified time to continue making adequate progress towards the completion of their graduate program. If a student would like to see an example of a successful research proposal, please contact the graduate program assistant as there are multiple on file.

SECOND YEAR

RESEARCH PROPOSAL DUE – PHD STUDENTS

- a. All graduate students must conduct original research, under the supervision of the academic advisor and the Advisory Committee, on a selected problem related to Horticulture. The Department of Horticulture requires all MS and PhD students to write an acceptable Thesis/Dissertation Research Proposal as part of their graduate program. The research proposal must be approved by their committee and be submitted in pdf format to the Graduate Program Assistant along with the research proposal form signed by their committee. Such proposals should include the Seven Essential Elements of a scientific research proposal (see below). The Research Proposal is not an exact blueprint of all research that may be conducted during the course of the doctoral program, since results from initial or preliminary experiments may dictate alteration of the hypothesis, methodology, or design. Rather, it must demonstrate a sufficient level of understanding of the researchable problem, the appropriate methodology, and scientific rationale to be approved by the student's Advisory Committee for scientific content and by the GPC for the Essential Elements (see Research Proposal Requirement forms). Failure to do so will result in an "unacceptable" evaluation on the semester report, and two consecutive such evaluations may result in termination (see section VII – Minimum Academic Standards for Continued Enrollment). The experimental data collected must be analyzed, interpreted, and presented in the form of a bound thesis (M.S.) or dissertation (Ph.D.). (Candidates for the M.S., Plan B, must submit a project report or portfolio in lieu of a thesis).
- b. *The Seven Essential Elements of a Masters or Ph.D of Science Research Proposal*
 - i. A baseline expectation for all MS-Plan A and PhD students associated with the MSU Department of Horticulture is that they develop a brief research proposal that addresses each of the following elements pertinent to developing scientific research skills:
 - ii. one or more testable hypotheses
 - iii. clear research objectives
 - iv. rationale for the proposed research, including a scientific literature review and, if available, preliminary data
 - v. feasible proposed research methodology
 - vi. expected outcomes
 - vii. potential impact
 - viii. pertinent literature citations
- c. The research proposal, to be developed in close consultation with the faculty advisor, should clearly identify each of the Seven Essential Elements. Students are encouraged to adopt a proposal format similar to that defined for actual research proposals to (e.g.,) NSF or NIFA. The Project

Description should provide a clear statement of the work to be undertaken and must include: objectives for the period of the proposed work and expected significance; relation to longer-term goals of the PI's project; and relation to the present state of knowledge in the field, to work in progress by the PI under other support and to work in progress elsewhere. The Project Description should outline the general plan of work, including the broad design of activities to be undertaken, and, where appropriate, provide a clear description of experimental methods and procedures. Proposers should address what they want to do, why they want to do it, how they plan to do it, how they will know if they succeed, pitfalls and alternative strategies, time-line of proposed research aims and what benefits could accrue if the project is successful. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified. These issues apply to both the technical aspects of the proposal and the way in which the project may make broader contributions.

- d. The proposal should be reviewed and approved by the student's graduate advisory committee within one year of initial enrollment in the M.S. program and within two years of initial enrollment in the Ph.D. program. The Graduate Advisory Committee should assure that the above seven elements are addressed clearly and adequately in the submitted research proposal. Following Advisory Committee approval, the research proposal should be submitted to the Graduate Programs Committee along with the submission form for inclusion in the student's file records, at which time it also will be reviewed by the GPC solely to confirm that the essential elements have been addressed. If there is an omission or inadequacy in the essential elements, the GPC will return the proposal to the student and faculty advisor and identify the element that fails to adhere to departmental expectations. The student will be required to correct the proposal within a specified time to continue making adequate progress towards the completion of their graduate program. If a student would like to see an example of a successful research proposal, please contact the graduate program assistant as there are multiple on file.

CITI MODULE YEAR 2 DUE – ALL STUDENTS

SIX HOURS OF RECR DISCUSSION TRAINING DUE – ALL STUDENTS

THIRD YEAR

COMPREHENSIVE EXAM – PHD STUDENTS

- a. A comprehensive knowledge of the student's major and related fields must be demonstrated to the Advisory Committee by written and oral examination. The comprehensive examination must be completed successfully for the student to be advanced to candidacy for the doctoral degree and therefore eligible to schedule their dissertation defense. Students must be registered during the semester(s) in which they take the comprehensive exam. In addition, they should pass the written and oral exams no later than the end of the third year of enrollment. In the case of retaken exams, the additional time for preparation and retaking exams is excluded from the three-year limit. Scheduling of the written and oral exams and reserving the examining room, in coordination with the student's academic advisor and via the Graduate Secretary, is the responsibility of the student. The oral and written exams should be scheduled in coordination with each other. However, the oral exam cannot proceed until the written exam is successfully passed.
- b. For students who were enrolled in the Spring and plan to take their comprehensive exams during the immediately following Summer semester, the department can request a waiver of the requirement that the student be enrolled for at least one credit for the semester of the

comprehensive exam. These requests are to be directed to the Graduate School and must be endorsed by the student's department and college.

c. *Conduct and Moderation*

- i. Upon the scheduling (as outlined below) of the written comprehensive examination by doctoral students, a copy (paper or electronic) of these guidelines is to be provided by the Graduate Secretary to the doctoral student and each of the Advisory Committee members. Prior to the oral exam, the Graduate Secretary will provide these guidelines and the Record of Comprehensive Examinations (exam decision) form to the Graduate Programs Committee (GPC) member who will serve as Oral Exam Moderator/Chair for recording the outcomes of the Exams.

d. Ph.D. Written Comprehensive Examination

- i. The written Comprehensive Exam must be taken and passed at least 14 days prior to the oral exam. The length of, and procedures for, the written examination will be determined by the Advisory Committee.

ii. *Charge to the Student:*

1. The student will complete one written comprehensive exam from each member of their Advisory Committee. When scheduling each written exam session, the student is expected to discuss the exam format and timing with each member of their Advisory Committee. It is recommended (but not required), for the mental health of the student, to schedule exam sessions so that there is at least one full day between the end of one exam and the start of the next exam. In many cases, the written exams will be completed within a 2- or 3-week period. The student must communicate the written exam dates with the Graduate Secretary at least 14 days before the first written exam commences.

iii. *Charge to the Advisory Committee:*

1. Within 7 days of completion of each written comprehensive exam, each Advisory Committee member is required to provide written feedback of the student's performance, with a clear indication of the exam outcome. Each exam outcome should also be communicated to the student's Academic Advisor and the Graduate Secretary, who shall add each written exam final outcome to the student's Record of Comprehensive Examinations form (and the addendum, if necessary). The oral comprehensive exam may not proceed unless and until the student completes and passes the written comprehensive exam.
2. The format and duration of each written exam is at the discretion of each Advisory Committee member (committee member discusses with the student). This could include the start and end of the exam period, the format of the exam and whether it is "open book" or "closed book", and suggestions for preparation. A common written exam is one that is completed within one day (e.g., 8am to 5pm) and is open book. If more time will be allowed, the Advisory Committee member is expected to communicate that with the student when the exam is scheduled.

iv. Ph.D. Written Comprehensive Examination – Outcome

1. The potential outcomes of each written exam are 1) pass or 2) fail. If the student passes all written exams, or all but one written exam, they can proceed with the oral exam. If the student fails two or more exams, the outcome is fail, and the student's Advisory Committee should discuss (in person, via E-mail, or virtually) and determine within 14 days whether the student should be provided the opportunity to re-take the failed exams. The major advisor is responsible for organizing this discussion and reporting the outcome to the student and

Graduate Secretary. Any failed exam must be retaken within 4 months of the Advisory Committee discussion. A student may petition the GPC for an extension in time under extenuating circumstances. A student may re-take a written exam only once per Advisory Committee member. Retaking of written exams only occurs when the student fails two or more exams and only the failed individual exams need to be retaken.

e. Ph.D. Oral Comprehensive Examination

- i. Announcement of the date, time, and location of the oral comprehensive exam will be made to the Horticulture faculty in writing by the Graduate Secretary at least 14 days prior to the exam. Oral exams should not be scheduled to begin later than 2:00 p.m. The student must provide the necessary information for the announcement to the Graduate Secretary at least 17 days prior to the exam (i.e., 3 days before the announcement is due). The announcement must include the following statement: "All members of the comprehensive committee, or their designated representatives, must be present during the entire examination." An Advisory Committee member who is unable to attend will identify his/her representative, who must have prior approval by the Graduate Program Director or GPC member who will serve as Moderator of the oral exam.
- ii. The oral comprehensive exam will be chaired by a member of the GPC external to the Advisory Committee; he/she does not have voting privileges but shall moderate the exam, determining the procedures to be followed, appropriate duration and breaks, etc. (see Moderator's Guidelines below) to ensure that the student is given a fair examination. Other (non-Advisory Committee) faculty members may attend the examination, question the student, and discuss student performance, but they (with the exception of the moderator) will be excused immediately prior to voting by the Advisory Committee, which has the responsibility to determine the criteria for the successful passage of the exam.
- iii. Ph.D. Oral Comprehensive Exam – Procedures
- iv. *Selection of the Exam Moderator:*
 1. The student can select a member of the GPC to serve as Oral Exam Moderator and contact them for their availability. In the absence of a student preference for Moderator, the Graduate Secretary will contact the GPC and identify an available member. If no one from the GPC is available on the identified date and time of the Oral Exam, the student can work in consultation with the GPC and Graduate Program Assistant to identify an alternative faculty member in Horticulture. The Moderator should be identified as early as possible, and at least 3 weeks before, the Oral Exam date. Once the Moderator has been identified and confirmed, the student must promptly notify the Graduate Secretary.
- v. *Charge to the Exam Moderator:*
 1. The role of the Oral Exam Moderator is to conduct the flow of the exam, helping to assure rigor and to advocate fairness in communication between the Advisory Committee and the student. The Moderator shall determine the order of questioning, the reasonable duration of overall questioning as well as that by each Committee member (and any attending faculty who are not members of the Advisory Committee), when to take breaks during the exam, etc. The Moderator may also ask questions of the student. Once the period of questioning (which is open-ended) reaches its logical conclusion, the Moderator shall excuse the student to leave the room momentarily and then shall facilitate discussion among the Advisory Committee members of the student's performance. The

discussion should culminate in each Advisory Committee member's vote for 1) unconditional pass, 2) conditional pass with recommended additional preparations, 3) fail with the potential for re-taking the exam, or 4) fail with no potential for re-taking the exam (a de facto recommendation of termination of the graduate program). The comprehensive exam must be passed with no more than one dissenting vote of the Advisory Committee. For any of the four outcomes enumerated above, any Committee member casting a "fail" vote must provide a brief written statement (as an addendum to the Record of Comprehensive Examinations form) regarding their decision, including the major deficiency(-ies) in the performance and any advice for the student's preparation towards an exam re-take if appropriate. The Moderator shall submit the Record of Comprehensive Examinations form (and the addendum, if necessary) to the Graduate Secretary within one business day of the beginning of the oral exam.

vi. *Charge to the Advisory Committee:*

1. The student comes before you as a candidate for the Doctor of Philosophy - thus, not a doctorate of horticulture per se, or biochemistry, or molecular genetics, etc. To be sure, competency in the student's overall coursework and in their research area is of utmost importance and should be rigorously examined. However, competency in broader aspects and issues of the plant sciences, the sciences in general, and indeed, philosophy and matters of current events or importance to a global perspective are not only fair game but should be rigorously explored as well. During the student's oral examination, their academic advisor's role is that of Advisory Committee member, not as Exam Moderator.

vii. *Charge to the Ph. D. Student:*

1. The goal of the doctoral comprehensive examination is to determine what you know and how much you know, including the limits to your knowledge. Thus, there may be times when you don't know an answer or, indeed, there may not be a clear-cut correct answer. In these cases, your Examining Committee will evaluate how you think, problem solve, put together a coherent train of thought to draw upon what information is available to you and move towards a state of greater knowledge, particularly when simple memorization of facts is not sufficient for arriving at your answer.
2. Thus, it is acceptable (and sometimes imperative) to acknowledge that you don't know an answer; yet, be prepared for the questioner to continue to have you pursue moving beyond your acknowledgment of having no ready answer. It may be helpful to rephrase the question back to the questioner, to be clear about what is being asked. When answering a question, it may be necessary to write or draw on a blackboard, digital screen, flipchart, etc. as you or the Examining Committee to work through a biochemical pathway, to graph a cause and effect response, or to sort out a logical flow of information.

viii. *General Flow of the Oral Exam:*

1. The general flow of the oral exam is at the discretion of the Moderator. For example, the Moderator may ask the doctoral student for their preference of order for questioners. The order of questioning by Advisory Committee members should take precedence over that by any guest faculty members. Most oral exams are comprised of at least two rounds of questions by each Committee member - for example, each questioner can pursue their initial line of questions

until they are satisfied or until the Moderator determines that it is time to move on. Any Committee member or guest faculty can join in the follow-up to questions even if they did not ask the original question. Generally, Moderators may attempt to go through the entire Committee's first round of questions before taking a break, but a break should be taken earlier if any Committee member or the student or the Moderator so desire. There will be a second opportunity, and more if needed, for each Committee member to pose additional questions beyond the "first round", until the entire Committee and the Moderator are satisfied with the rigor and content of the exam.

ix. Ph.D. Oral Comprehensive Exam – Outcome

1. The potential outcomes of the oral exam are 1) unconditional pass, 2) conditional pass with recommended additional preparations, 3) fail with the potential for re-taking the exam, or 4) fail with no potential for re-taking the exam (a recommendation of termination of the graduate program). The exam must be passed with a maximum of one dissenting vote of the Advisory Committee.
2. If the outcome is “conditional pass with recommended additional preparations”, the Advisory Committee will determine, within 2 weeks of the exam, what additional preparations and conditions (if appropriate) are necessary. The student must complete the preparations and report to the Advisory Committee within 6 months of their oral exam. If the Advisory Committee is satisfied with the preparations, the Academic Advisor will report to the student and the Graduate Secretary. Otherwise, the Advisory Committee will communicate to the student what additional preparations are still necessary.
3. If the student does not pass but is accorded the potential for re-taking the oral exam, the re-examination must be rescheduled following at least 3 months but no more than 6 months of additional study. A student may petition the GPC for an extension in time under extenuating circumstances. An extension must have approval of the College Dean and the Graduate School. A student may repeat the comprehensive exam only once; failure to pass a second examination within the time limits shall constitute dismissal from the graduate program.

YEAR THREE RECR REFRESHER – PHD STUDENTS

FOURTH YEAR AND BEYOND

1. Three hours of refresher RECR training – PhD Students

THESIS DEFENSE

1. Procedure
 - a. Prior to scheduling of the MS Plan A/PhD thesis defense (final oral examination) or Plan B final oral and/or written examination, all changes to the student's Program of Study must be approved and any incomplete or deferred grades (except HRT 898 or 899) resolved. The defense/examination should be scheduled after the thesis or project report has been reviewed by all members of the Advisory Committee and their suggestions have been incorporated, and no later than five (5) weeks before the end of the semester in which the candidate expects to graduate. Students must be registered for at least one (1) credit hour during the semester of the final oral examination. Term break is considered part of the previous semester.

2. Deadlines
 - a. The [announcement template](#) must be sent to the Graduate Programs Assistant no later than three weeks prior to the defense.
3. Policy
 - a. For Plan A programs, the thesis must conform to University format as directed in the [*Michigan State University FORMATTING GUIDE for Submission of Master's Theses and Doctoral Dissertations*](#) and should not be bound prior to the exam. A departmental seminar based on the student's thesis research will precede the examination. Upon scheduling the seminar, a "Final Examination" form and a copy of the thesis abstract must be filed with the Graduate Program Assistant at least twenty-one days before the examination. Faculty will be notified by the Graduate Program Assistant at least fourteen days prior to the seminar and examination. The oral exam may cover any course work taken, seminars given in the Department, the research project selected, and any related work.
 - b. All members of the Advisory Committee must be in attendance throughout the student's seminar and final examination. If a Committee member must be absent, his/her designated substitute (approved by the Graduate Program Director) must attend. The thesis and the student's performance on the final oral examination must be approved by a positive vote by at least three-fourths of the voting examiners and with not more than one dissenting vote from among the regular MSU faculty members of the Advisory Committee. Within 48 hours after the conclusion of the exam, the faculty advisor shall submit a final examination form to the Graduate Program Assistant. Following the final examination, the thesis shall be modified as directed by the Advisory Committee and submitted for distribution as outlined in the [*Michigan State University FORMATTING GUIDE for Submission of Master's Theses and Doctoral Dissertations*](#).
 - c. In the case of a defense failure, a student may be required to repeat the examination, but must wait at least one full semester, but not more than two, before doing so. If the second exam is not passed, the student will be required to withdraw from graduate studies in the Department of Horticulture. There is a five (5) calendar year time limit, from initial enrollment, for completion of the M.S. degree requirements.

THESIS SUBMISSION

1. Deadlines – please see the [Graduate School ETD website](#) for due dates for each semester.
2. Policy
 - a. The instructions for electronic submissions of Thesis or Dissertation are available at the [MSU Graduate School](#) webpage under Thesis and Dissertation submissions.
 - b. The date for the FINAL APPROVAL of an electronic Thesis or Dissertation to the Graduate School for graduating the semester of that submission is FIVE working days prior to the first day of classes for the next semester. Be aware that a submission via ProQuest does not mean that the document has been ACCEPTED. The review process is interactive and final approval can take anywhere from a few hours to weeks, depending upon the extent of the necessary revisions and how diligent the author is when making the necessary revisions.
 - c. Graduation on the semester of the electronic submission is only guaranteed if the document is APPROVED on or before the target date for that semester.
3. Formatting Workshops are offered by the Graduate School.

4. [Graduate Student Exit Form](#)

RESPONSIBLE AND ETHICAL CONDUCT OF RESEARCH (RECR)

Responsible and ethical conduct of research (RECR) is required for all those involved in research at Michigan State University. All graduate students currently in the Department of Horticulture, including those admitted prior to Spring 2017, are required to undergo formal RCR training. With the new GradPlan system, RECR requirements will be a requirement for graduation and must be finalized and approved.

Departmental training requirements conform to University requirements, outlined at [Research Integrity | The Graduate School](#):

- *Year 1: - All graduate students*

All MS and PhD students complete four basic Collaborative Institutional Training Initiative (CITI) online modules within the first year of enrollment:

- Introduction to the Responsible and Ethical Conduct of Research
- Authorship
- Plagiarism
- Research misconduct
- The modules are included in the *Stage 1 - Basic Course* section of the CITI program. Access to CITI requires login through <https://grad.msu.edu/researchintegrity>. Completion of all CITI modules is tracked automatically using the SABA software system.

- *Year 2: All MS-Plan A and PhD students*

- Within the first two years of enrollment, MS-Plan A and PhD students complete three required CITI training modules.
- Collaborative Research
- Conflicts of Interest
- Data Management

These are included in Supplemental Modules within the *CITI Stage 1-Basic Course* section.

- *Year 3 and subsequent years: PhD students*

- Beginning in the third year of study, PhD students complete three hours of 'annual refresher training. Annual refresher training can include additional CITI modules within the *Basic Course-Supplemental* section (Financial Responsibility, Mentoring, and Peer Review), as well as modules within the online *CITI Conflicts of Interest* and *Biomedical Researchers* sections. Annual refresher training can also include 'Discussion-based training (see below).

- *By completion of program: All graduate students*

- All graduate students must complete at least six hours of discussion-based training prior to graduation. This requirement can be satisfied at any point during the program. Discussion-based training is defined as any activity focusing on RECR issues that involves discussion between trainer(s) and trainee(s).
- Examples of discussion-based training include:
 - University- and Department-sponsored RECR seminars
 - Lab meetings focusing on RECR issues
 - Readings and discussions of RECR-related books

- RECR-focused courses

Discussion-based training is tracked through SIS and students must log the date and time. This will require your major professor's approval.

Graduate research experimental designs, original data, and analyses should be archived in a bound laboratory notebook plus computer files, as appropriate. Students and advisors should agree on expectations regarding how to record and store data.

Students should discuss both raw and analyzed data at regular intervals with their faculty advisors. Regular discussion of data is vital to successful analysis, interpretation, and ultimately peer-reviewed publication of experimental research. The original data, notebooks, and files from all graduate work remains the property of Michigan State University, although copies may be made for graduating students to retain when they leave MSU.

GRADUATE TEACHING EXPERIENCE

The Department of Horticulture strongly recommends that graduate students participate in a meaningful teaching and/or extension experience as a part of their graduate program. The intent of a graduate teaching experience is to provide students with an academic and professional opportunity to prepare and deliver an educational program that will enhance their overall qualifications and preparation for career opportunities. A common method of gaining a teaching experience is to develop a mentoring relationship with a faculty member or members involved in the teaching of an organized course or in the delivery of the educational program at a major extension function during at least one academic semester. Students are responsible for contacting faculty members to arrange for development of this voluntary teaching experience, during which the student will work in conjunction with the faculty in all aspects pertaining to the organization, conduct and evaluation of the course or program. Another option is ISE 870 (Teaching College Science). Generally, the time spent in a teaching experience will vary depending upon a student's background, experience, and course or program requirements, as negotiated with the faculty mentor. The primary responsibility for determining how the teaching experience is to be fulfilled rests with the student and his/her major professor, subject to the opportunities available with teaching mentors during the student's graduate career. Students may develop multiple teaching experiences or mix different types of teaching experiences, such as enrolling in ISE 870, developing a classroom teaching experience, and/or developing an extension teaching experience.

The Graduate School offers a certification program in College Teaching (<https://grad.msu.edu/certification-college-teaching-institute>). It is designed to help graduate students organize and develop their teaching experience in a systematic and thoughtful way, with assistance from faculty and campus offices and programs, in a manner similar to that already in place for research experience. As part of this program, participants will develop a teaching portfolio to highlight, organize and reflect upon their teaching experiences. Upon completion of the program, the student will receive an MSU Certificate in College Teaching from the appropriate department or college. A transcript notation will also be provided. International students whose native language is not English and who develop a teaching experience involving classroom lectures or other verbal guidance to and/or oversight of students should arrange to take the SPEAK test (<http://elc.msu.edu>) at the MSU English Language Center. If a student fails to pass the minimum all-University standard of English proficiency, he/she may not teach classes without the approval of the English Language Center.

GRADUATE EXTENSION EXPERIENCE

GRADUATE CAREER AND PROFESSIONAL DEVELOPMENT

Students in the MSU Department of Horticulture Graduate program are expected to develop professional and leadership skills for their post-graduate careers. The MSU Graduate School offers a variety of resources towards this end, including workshops, activities, web links and contact people to help graduate students organize a wealth of available information according to different phases of their graduate program (<http://grad.msu.edu/>). The PREP website (<http://grad.msu.edu/prep/>) focuses on four professional skills that are key to career and professional development: planning throughout the graduate career to identify and successfully achieve career goals; developing resilience and tenacity to thrive through personal and professional stages; practicing active engagement in making important life decisions and in acquiring the skills necessary to attain career goals; and attaining high standards of professionalism in research and teaching. Employing these skills at every stage of the graduate program helps students to maximize their opportunities for professional growth, discover a fulfilling career path, and enhance their professional success.

SEMESTER PROGRESS REPORTS

Semester progress reports are to document progress made toward the degree. A request for these reports and a template provided will be sent out at the end of each semester (Fall, Spring, and Summer). These reports will be uploaded into Grad Plan via Campus Solutions/Student Information System by the Graduate Program Assistant.

GRADUATE PROGRAMS COMMITTEE (GPC)

1. The GPC is composed of six departmental faculty members appointed by the Department Chairperson, plus a graduate student selected by the Horticulture Organization of Graduate Students (HOGS). All GPC members have voting privileges. The purpose of the Horticulture Graduate Programs Committee (GPC) is to foster and maintain high standards of education and development for all graduate students enrolled in the MSU Department of Horticulture. The GPC develops and recommends departmental graduate policies to the Horticulture faculty and department chair, and monitors adherence to them. The GPC reviews graduate program applicants, awards departmental fellowships, and monitors the progress of each student to avert problems and irregularities that might develop during their graduate career. The GPC is available to meet with all graduate students in the department, individually or collectively, to discuss any issues in their graduate preparation and careers that may arise. Students may also submit written inquiries or issues to the GPC.

GRADUATE PROGRAM DIRECTOR (GPC CHAIR) RESPONSIBILITIES

- a. The Graduate Program Director (aka Graduate Program Committee (GPC chairperson) shall serve the Horticulture faculty and students as the primary resource for Graduate Policy issues relevant to the successful completion of graduate degree programs in Horticulture. The Graduate Program Director serves for a 3-year term (1 July to 30 June); just prior to the end of the term, the Department of Horticulture Chair shall meet with and review the composition of the GPC and consider reappointment or rotation of the Director position to another GPC committee member.
- b. Conduct regular monthly meetings of the GPC (generally scheduled to be held before the monthly faculty meeting); on-going monthly issues should include (but not limited to):
 - i. GPC review and approval of submitted M.S. and PhD Programs of Study
 - ii. Reports by the Graduate Programs Assistant of any pending graduate student program deficiencies
 - iii. Reports by the GPC Recruitment & Fellowship Subcommittee
 - iv. Reports by the GPC Curriculum Subcommittee
 - v. Reports by the Horticulture representative to the CANR Graduate Committee
 - vi. Discussion by the GPC of any College or University issues pertaining to graduate study

- c. Review Recruit & Fellowship Subcommittee recommendations on prospective graduate student applications and approve as “admitted,” “admitted provisionally,” or “declined.”
- d. Review graduate student Semester Progress Reports each semester to act on any problems (student or faculty related) in a timely and appropriately confidential manner.
- e. Upon notification by the Graduate Programs Assistant of a graduate student program deficiency, notify (in writing) the student and the student’s faculty advisor of the need for compliance and impose a “Hold” on the student’s registration until compliance is satisfactory
- f. Attempt to resolve personnel conflicts pertaining to graduate student issues, in confidentiality but with consultation at higher administrative levels (Chair, Assistant/Associate Director, Dean, Ombudsperson, etc.) as required
- g. Organize and conduct an in-depth new student orientation session each Fall, to include meetings with the Horticulture administration (Chair and pertinent office staff) and resource personnel (Graduate Program Director and Programs Assistant; gardens, greenhouse, and farm managers; safety officer; representatives of Horticulture Organization of Graduate Students (HOGS) and MSU Council of Graduate Students (COGS); an information packet pertinent to topics covered during the orientation should be made available to new students who first enroll for Spring (rather than Summer or Fall) semester; and an annual pre-fall semester MSU Horticulture Field Station and Industry Orientation Tour for new graduate students (as department budgets permit)
- h. Coordinate with the department’s social committee on a Fall Picnic at which to introduce new graduate students to faculty, staff, and current graduate students
- i. Initiate appropriate and timely updates of the Graduate Handbook and Horticulture Graduate Program website

GPC PROGRAM ASSISTANT RESPONSIBILITIES

The Graduate Programs Assistant shall serve the Horticulture faculty and students as the primary resource for Graduate Program paperwork relevant to the successful completion of graduate degree programs in Horticulture. Some of the specific responsibilities of the GPC Programs Assistant are as follows:

- a. Attend all GPC meetings, record minutes of the meeting, circulate (electronically and in a timely fashion) a draft of the minutes for revision and approval by the GPC members, and upon approval of the minutes (as confirmed by the GPD), circulate the approved minutes to Horticulture faculty and graduate students.
- b. Provide administrative assistance to the Graduate Program Director, the GPC Recruitment & Fellowship Subcommittee, and the GPC Curriculum Subcommittee as needed, except for decision-making.
- c. Handle all departmental, college, and university administrative paperwork pertaining to the Graduate Program, including forwarding of departmental/college/university information relevant to graduate issues (e.g. fellowships, workshops, etc.).
- d. Request and collage Semester Progress Reports from every Horticulture graduate student each semester for timely review by the Graduate Program Director
- e. Notify graduate students of noncompliance issues (such as missing Semester Progress Reports) on a timely basis; should noncompliance continue, notify the Graduate Program Director and upon the Director’s authorization, enact a “Hold” on the student’s registration until compliance is satisfactory.
- f. Implement appropriate and timely updates of the Graduate Handbook, including a checklist of due dates for various forms; request and follow-up on requisite changes to be made to the Horticulture Graduate Program website by the departmental webmaster.

- g. Maintain dual documentation of GPC policies and forms, the current Graduate Handbook, committee member and subcommittee responsibilities lists, meeting minutes, etc. in both the GPC office and the Horticulture main office.
 - h. Maintain and update the Horticulture graduate program's electronic applications file and review system on at least a weekly basis, for timely posting of new applicant documents for GPC and Horticulture faculty access. Assist in training new faculty in appropriate use of the system.
2. For 2026-2027, the GPC members are: Randy Beaudry (Graduate Programs Chair and GPC Chair); Erik Runkle, Ryan Warner, Zack Hayden, Debalina Saha, Simone Valle de Souza, and Graduate Student Representative Rose Elbert.

UNIVERSITY/COMMUNITY RESOURCES

1. [Relationship Violence and Sexual Misconduct \(RVSM\) policy and training](#)
2. [Academic Programs Catalog](#)
3. [Academic Calendar](#)
4. [Spartan Life](#)
5. [MSU CAPS](#) (non-academic student counseling services)
6. [MSU COGS](#)
7. [MSU Resource Center for Persons with Disabilities](#)
8. [MSU Graduate Employees Union](#)
9. [The Graduate School](#)
10. [Graduate Student Rights and Responsibilities](#)
11. [Travel Funding](#)
12. [Office of the University Ombudsperson](#)
13. [MSU Guidelines for Graduate Student Mentoring & Advising](#)
14. [Department of Horticulture](#)
15. [Department of Horticulture Graduate Program](#)
16. [HOGS](#)
17. [Directory – Human Research Protection Program](#)
18. [Tech Transfer & Commercialization – MSU Innovation Center](#)
19. [MSU OISS](#)
20. [Environmental Health & Safety \(EHS\)](#)
21. [Research Integrity](#)
22. [Scholarships](#)
23. [MSU Writing Center](#)
24. [MSU Anti-Discrimination Policy](#)

APPENDICES & BYLAWS

1. Minimum Academic Standards for Continued Enrollment

Graduate program academic standards include grade point average (GPA); demonstrated ability for designing, conducting, and analyzing research; competency in major field of study; and rate of progress toward the degree. The minimum academic standard for course work (excluding research credits) is an overall GPA of 3.0. Courses in which a grade below 2.0 is earned must be repeated. A graduate student whose GPA falls below a cumulative 3.0 for more than one semester may not hold an assistantship; students with a cumulative GPA below 3.0 for two consecutive semesters may be terminated (see next paragraph). For graduation, a GPA of at least 3.0 in prescribed courses (the Program of Study), exclusive of collateral courses and research, is required.

Continued enrollment in a graduate degree program without suitable and necessary academic progress for retention is an expensive disservice to a student and the faculty. Judgment regarding semester progress (see below) is made by the faculty advisor, with additional input by the Advisory Committee, and is reported to the Graduate Programs Committee. If minimum standards are not met, the GPC may recommend termination (in writing, with a copy to the student and the student's faculty advisor) to the Department Chair, who will meet with the student and their faculty advisor to discuss circumstances and appropriate options. Such a recommendation from the GPC will serve as a written warning to the student prior to any formal dismissal actions, as required by MSU Graduate Student Rights and Responsibilities (GSRR 2.4.9). As warranted, the Department Chair may terminate the student or request their withdrawal (similarly subject to the appropriate procedures in accordance with the [GSRR document](#)).

The student's departmental graduate file can be reviewed at any time by the student in the presence of the Graduate Programs Assistant but may not be removed from the Horticulture Main Office. Each student's file typically contains their admissions paperwork, their semester progress reports, their Program of Study and other forms relating their graduate program requirements including comprehensive and defense examinations, their semester grades, paperwork relating to assistantships and/or fellowships, awards, and all other communications pertinent to their graduate program and progress. Students have the right to challenge the accuracy of any materials held within the file by submitting a letter of challenge to be included in their file.

2. Integrity and Safety in Academic and Research Activities

Academic Integrity

The consequences of plagiarism, data fabrication and/or manipulation, and other forms of academic dishonesty are severe, ranging from failure of courses to termination of enrollment to revocation of degrees already issued (for further examples, see the [Ombudsperson's website](#) on Research Integrity). Vigilance regarding academic integrity is ever more critical with the ubiquitous use of personal computers and the internet for information searches, file scanning, word processing, data entry and analysis, etc. While citation of sources of information remains essential, it is also critical for students to interpret and re-state all cited information in their own words; "blocking and pasting" in word processing programs and/or the changing of a few words in an otherwise original sentence constitute common, yet serious, forms of plagiarism. Research ideas often evolve from readings of literature that can be cited and/or discussions with faculty and graduate colleagues that can be acknowledged. It is better to err on the side of magnanimously including other peers in the scientific evolution of your ideas and research approaches, which will likely lead to increased recognition of your own intellectual collegiality and innovativeness, rather than risk omitting a peer scientist or colleague who has influenced your thoughts and experiments.

As noted earlier, maintaining a detailed and up-to-date bound research notebook provides an important component of the scientific method. Such notebooks are invaluable for documenting the evolution of ideas and hypotheses, the design of experiments, the acquisition of raw data, and the interpretation of analyzed data. Students are advised to back-up their electronic data files regularly and must discuss archiving of their data with faculty advisor by end of each semester (required on the Semester Progress evaluation form). If research notebooks are not retained at all times in the laboratory, students must be ready to present and review their notebooks with their faculty advisors at all times. Failure to do so can result in an unacceptable semester evaluation, with the due consequences outlined previously.

Reaffirmation of Commitment to Intellectual Honesty and Integrity

Below is an action taken by the University Graduate Council which appears in the minutes of the Council dated March 3, 1980. In order to make it more visible, it was requested by the MSU Council of Graduate Students (COGS) that this be distributed to deans and department chairs: WHEREAS academic excellence requires intellectual honesty; and

WHEREAS the publication of someone else's intellectual efforts including that of graduate research assistants as one's own is intellectual dishonesty; and

WHEREAS the Academic Freedom Report, Section 2.1.2. states in part that the instructor "should avoid exploitation of students for private advantage and should acknowledge significant assistance from them. He/she should protect students' rights as defined herein";

BE IT RESOLVED that graduate students be recognized in material published by members of the University community according to the significance of their contributions;

BE IT FURTHER RESOLVED that the University Graduate Council urges those students who believe their rights to have been violated by intellectual dishonesty, to make use of existing University procedures including the existing grievance procedure;

BE IT FURTHER RESOLVED that members of the University community who are aware of intellectual dishonesty see that the evidence is presented to the appropriate department chairperson and, if necessary for the protection of the student, to the college dean;

BE IT FURTHER RESOLVED that the University Graduate Council urges the president to direct deans, directors and chairpersons to give complaints of intellectual dishonesty their most immediate attention so that they may be resolved quickly and fairly.

In 2010, the Academic Council and Academic Senate revised the [Integrity of Scholarship and Grades Policy](#):

Research Involving Human Subjects

Any research that involves asking individuals questions in a systematic manner (including not only surveys but such activities as panels for tasting or rating of horticultural products, etc.) requires prior approval by the University Institutional Review Board (IRB). Examples include asking a group of growers the same questions, asking students questions, or asking other individuals the same questions as might be found on a survey. The process requires the completion of some university

approval forms, and the review process can take from 2 to 4 weeks. The instructions and forms are found at the [Human Research Protection Program website](#). Approval must be made prior to any data collection. If, in the planning of the project, there are no techniques developed to identify the individual respondents or tie respondents to particular answers (e.g., resulting in anonymous data collection), the expected data can be classified as “de-identified”. This is important since data analysis is considered to be part of the research process. Approval enables the research applicant to conduct activities for one year before termination paperwork or extension paperwork must be submitted. However, analysis and publication writing can be conducted on de-identified data once the termination paperwork has been submitted.

Research Involving Radiation, Chemicals, or Biological Agents

Nearly all graduate research studies in horticulture frequently involve some use of chemical, and less frequently biological or radioactive, agents in the course of laboratory, greenhouse, or field studies. The MSU Office of Environment Health and Safety ([EHS](#)) oversees appropriate and required programs for training and certification of all individuals involved in the safe use and disposal of such agents, many of which are regulated at the federal level. The consequences to the individual, faculty advisor, department, and university for improper use, storage, and disposal of such agents can be severe. All students are introduced to the departmental safety officer(s) and briefed on the processes for interacting with EHS during the new graduate student orientation prior to Fall semester.

Research Involving Animals

Any ownership or use of animals for research, teaching, testing, or public outreach by or for MSU must first be approved by the Institutional Animal Care and Use Committee (IACUC). This process takes from 2 to 4 weeks. The instructions and forms are found at the [Animal Care Program website](#).

Research Involving Travel or Transportation of Materials or Data

[MSU Innovation Center](#) and the Copyright Licensing Office facilitate the commercial development and public use of technologies and copyrightable materials developed by MSU faculty and staff, as well as process and track [Confidential Disclosure Agreements](#), [Material Transfer Agreements](#), and other documents relating to collaborative arrangements with non-MSU entities. Any research-related travel may require development of Material Transfer Agreements and/or [Confidentiality Agreements](#); these may apply to MSU research materials, software, biological materials, or data sets that are involved in movement to or from campus. If in doubt about upcoming travel, check with MSU Innovation Center to obtain assurance or the appropriate paperwork that may be needed for any transport of MSU materials subject to inspection by the Transportation Security Administration in checked or carry-on luggage. Graduate students have been detained by airport TSA agents and

denied boarding when research materials were found that lacked appropriate authorization paperwork.

When students appointed as RAs travel abroad for research or to collaborate with foreign investigators, the department or research grant supporting the work is required to pay for all needed vaccinations and or medications (e.g., anti-malarials) as determined by the MSU Travel Clinic. Students may include those costs in applications for funds from the Research Enhancement or Travel Grant programs administered by the Graduate School.

3. Graduate Student Academic Grievance Hearing Procedures

Each right of an individual places a reciprocal duty upon others: the duty to permit the individual to exercise the right. The student, as a member of the academic community, has both rights and duties. Within that community, the student's most essential right is the right to learn. The University has a duty to provide for the student those privileges, opportunities, and protections which best promote the learning process in all its aspects. The student also has duties to other members of the academic community, the most important of which is to refrain from interference with those rights of others which are equally essential to the purposes and processes of the University. (GSRR Article 1.2)

The Michigan State University [Student Rights and Responsibilities](#) (SRR) and the [Graduate Student Rights and Responsibilities](#) (GSRR) documents establish the rights and responsibilities of MSU students and prescribe procedures to resolve allegations of violations of those rights through formal grievance hearings. In accordance with the SRR and the GSRR, the Department of Horticulture Graduate Program has established the following Hearing Board procedures for adjudicating graduate student *academic* grievances and complaints (See GSRR 5.4.)

Procedures and rules can be found in the [GSRR Article 5](#).

4. [Requesting fixed-term MSU faculty, academic specialists, support staff, and non-MSU individuals as committee members.](#)
5. Work in Absentia

Courses taken at MSU affiliated programs are of equal value to on-campus courses. Courses taken should have prior approval of the academic advisor, Department Chair and CANR Associate Dean. Courses taken without approval may or may not be accepted for credit. Work in absentia may be done with Advisory Committee approval.

Research may be performed at off-campus sites as well, ranging from affiliated sites such as experimental stations and farms to arrangements with private horticultural producers to research conducted in foreign countries. For graduate students traveling abroad for research or attendance at conferences, several travel-related MSU resources should be consulted for issues related to safety, health risks, immunizations, transport of university materials, etc. These include:

- [MSU Travel Clinic](#)
- [MSU International Studies and Programs](#)

6. Deferred Grades (DF)

The required work must be completed and a grade reported within 6 months, with the option of a single six-month extension. If the required work is not completed within the time limit, the DF will become U (Unfinished) and will be changed to DF/U under the numerical and Pass-No Grade (P-N)

grading systems, and to DF/NC under the Credit-No Credit (CR-NC) system. This rule does not apply to graduate thesis or dissertation work.

7. Financial Aid, Assistantships, and Fellowships

a. Sources of Financial Assistance

Financial aid is available through a wide variety of sources. Research assistantships may be supported by funds from the University, Michigan AgBioResearch, or national and international research projects. Students on assistantships receive a tuition waiver equivalent to nine credits in Fall and Spring semesters and five credits in Summer semester and are entitled to pay tuition at in-state resident rates for any additional credits.

College and University fellowships are available (see the Graduate School's [Funding Opportunities](#) website. The MSU Distinguished Fellowship Program is a University-wide, competitive Ph.D. fellowship program open to entering graduate students with bachelor's or master's degrees who plan to pursue a Ph.D.

For additional fellowship and scholarship opportunities, see the [Financial Aid](#) search engine on the MSU website and/or the Horticulture Graduate Program's [Financial Aid](#) website. Several national agencies, such as the [National Science Foundation](#), also award fellowships for graduate studies.

b. Graduate Research Assistantships

Selection Procedure

All candidates for research assistantships must satisfy the requirements for admission to regular or provisional status. Additional criteria includes courses taken, performance as reflected in transcripts, practical experience in the specific area to be investigated, and strength of recommendations.

Research Assistantship Appointments

Graduate research assistantship appointments are for periods of one to three semesters per academic year. The stipend, activities, and course load are proportional to the percent of time designated by the assistantship. Assistantships established by use of university or research contract funds are at three levels:

Level 1: Assistants beginning a M.S. program with a B.S. (or equivalent degree) and no graduate experience

Level 2: Assistants beginning a Ph.D program with a M.S. (or equivalent degree), or a graduate assistant in a M.S/Ph.D. program having completed one full year appointment at a level 1.

Level 3: Ph.D students, having passed the comprehensive exam.

Each student supported by an assistantship is granted nine credits for fall and spring semesters and five credits for summer semester at no charge.

Course Loads for Graduate Assistants

In order to be considered full-time for academic purposes, students must carry the minimum number of credits per semester or summer session as defined below:

<i>Master's level</i>	<i>9 credits</i>
<i>Doctoral level (pre-comps)</i>	<i>6 credits</i>
<i>Doctoral level (post-comps)</i>	<i>1 credit</i>

For a half-time assistantships the minimum enrollment is 6 credits for master's degree students and 3 credits for doctoral students (including credits in courses numbered 899 or

999); maximum enrollment is 12 credits (excluding credits in courses numbered 899 or 999).

Graduate Assistants' Responsibilities

Each graduate research assistant is responsible to his/her faculty advisor and will have responsibilities for at least one research project. Therefore, expectations and responsibilities for assistantships, including hourly structuring of weekly work activities and annual leave/vacation periods, will vary by project and by faculty advisor, though in general a ½-time assistantship equates to about 20 hours per week. Due to the seasonal nature of certain types of horticultural research, periods of research assistantship activity can vary dramatically. Enrollment in courses, credit load per semester, training activity, etc., should be approved by the faculty advisor before registering. Likewise, plans to cover assistantship duties during participation in professional meetings should be developed jointly between the student and faculty advisor.

A student must meet the requirements for Academic Standards and Guidelines for Retention to retain financial assistance. The faculty advisor is responsible for seeing that the assistantship appointment forms are filed in the Main Office in order for them to be ready upon arrival of the student. Late filing may result in the student having to pay out-of-state registration fees for one semester.

All issues related to outside (non-assistantship) work for pay should be discussed with the faculty advisor. International students should be aware that most visas have limitations on such work.

c. **Graduate Research Fellowships and Grants**

Receipt of externally funded fellowships by students who have written their own grant applications and are worth at least \$20,000 (direct costs) now makes the student eligible for the in-state tuition rate. The in-state tuition rate applies only to the semesters during which the student is supported by the fellowship. This policy applies only to grants funded through a competitive process by a US institution/agency/foundation. Funds obtained through non-competitive processes (e.g., need-based fellowships) or from international sources do not qualify the students for in-state tuition rates. For more information, contact the Graduate School.

Dissertation Completion Fellowships (DCF): Each semester (Spring, Summer, Fall), single semester fellowships are available to allow doctoral students to devote full time to completing the writing and revision of their dissertation. The goal is for the dissertation to be completed during the semester of the fellowship without having the distraction of assistantship duties, part-time jobs, etc. Other MSU financial support, held simultaneously with the fellowship, cannot exceed a one-half time assistantship or the equivalent.

Application information and guidelines for writing a high impact application are available from the Horticulture GPA. Selection of DCF awardees will be made by the College of Agriculture and Natural Resources. The Fellowship awards will be dispensed by the Graduate School. For a list of Graduate School and University fellowships see their [website](#).

FORMS

1. [New Student Expectations Forms](#)
2. [Committee Form](#)
3. [Program of Study Form](#)
4. [Progress Reports](#)

Semester Progress Reports are to document progress made toward the degree. A request for these reports and a template provided will be sent out at the end of each semester (Fall and Spring, not required for Summer). These reports will be uploaded into Grad Plan via Campus Solutions/SIS.

5. [Change in Academic Program Form \(Major Change Form\)](#)
6. [Research Proposal Form](#)
7. Comprehensive Exam
 - a. [Announcement](#)
 - b. [Result Form](#)
8. Thesis Defense
 - a. [Announcement – MS](#)
 - b. [Announcement – PhD](#)
 - c. [Result Form – MS](#)
 - d. [Result Form – PhD](#)
9. [Graduate Student Exit Form](#)