

GUIDE TO GRADUATE PROGRAM

IN

HORTICULTURE

2017

THE DEPARTMENT OF PLANT SCIENCE
THE PENNSYLVANIA STATE UNIVERSITY
TYSON BUILDING
UNIVERSITY PARK, PA

Guide to Horticulture Graduate Program

Table of Contents

INTRODUCTION.....	1
Educational Equity	1
Academic Information and Procedures	1
SECTION I: GENERAL POLICIES	1
Responsibilities of the Student, Thesis Advisor, and Advisory Committee	1
The Scholarship and Research Integrity (SARI) program	2
Guiding Principles for Good Practice in Graduate Education	2
Time Limitations	3
Responsibilities of the Graduate Programs Committee	3
Responsibilities of the Graduate Program Director	3
SECTION II. MASTERS OF SCIENCE DEGREE	4
Overview	4
Admission Requirements	4
Baccalaureate Degree.....	4
Expected Background.....	4
Grade Point Average.....	4
Graduate Record Examination (GRE).....	5
English Proficiency.....	5
Exceptions and Limitation of Admission	5
Deficiencies in Preparation.....	5
Minimum Grade Point Averages.....	6
Career Experience.....	6
Procedures for Admission	6
Contact Information.....	6
Application Packet.....	6
Evaluation by the Department Graduate Programs Committee.....	6
Advisory Committee	7
Committee Membership.....	7
Identifying Committee Members.....	7
Deadline for Establishing a Committee.....	7

Responsibilities of the Committee	7
Meetings of the Committee	7
Course and Credit Requirements	8
Minimum Graduate Credits	8
Major Field, Formal Courses	8
Minor or General Studies Courses	8
Statistical Methods	9
Graduate Student Dialogue.....	9
Horticulture Seminar Course (Department of Plant Science Seminar)	9
Effective Scientific Communications Course	9
Thesis Research	9
Supplemental Credits.....	9
500- ,600- and 800- Series Work Combined	10
Additional Courses	10
Seminar Attendance	10
Teaching Experience	10
Final Examination.....	10
Summary checklist	10
Teaching Experience	10
General Requirement	10
Additional Requirement for Departmental Assistantships	11
American English Oral Communicative Test for Teaching (AEOCPT)	11
Research and Thesis.....	11
Thesis Problem.....	11
Thesis Research Proposal Presentation and Approval.....	11
Competency Evaluation	12
Written Progress Report for Annual Committee Meetings	12
Thesis Format.....	12
Final Examination	12
Purpose and Procedure	12
Scheduling.....	13
SECTION III. DOCTOR OF PHILOSOPHY DEGREE.....	14
Overview	14
Admission Requirements	14
M.S. or Equivalent Degree	14
Expected Background	14
Grade Point Average	15
Graduate Record Examination (GRE)	15
English Proficiency	15
Candidacy Examination.....	15
Exceptions and Limitations of Admission.....	15
Deficiencies in Preparation	16
Minimum Grade Point Average	16
Career Experience	16

Baccalaureate to Ph.D.....	16
Procedures for Admission	16
Contact Information.....	16
Application Packet	17
Evaluation by the Department Graduate Programs Committee	17
Completing M.S. Degree and Continuing for the Ph.D. Degree.....	17
Advisory Committee for the Ph.D. Degree	17
Committee Membership for the Ph.D. Degree.....	17
Dissertation Advisor/Chairperson.....	18
Identifying Committee Members.....	19
Establishing a Committee	19
Responsibilities of the Committee.....	19
Meetings of the Committee.....	19
Course and Credit Requirements	19
Program Coursework	19
Required Courses and Credits beyond the M.S.	19
Major Field, Formal Courses	20
Minor or General Studies Courses	20
Language or English Communications	20
Statistical Methods	20
Graduate Student Dialogue.....	21
Horticulture Seminar (Department of Plant Science Seminar)	21
Effective Scientific Communications Course	21
Dissertation Research	21
Supplemental Credits.....	21
Communications Requirements and Examinations	21
Teaching Experience	21
Additional Courses	21
Credits Earned at Other Institutions	21
Residence Requirements	22
Summary Checklist.....	22
Doctoral Advisory Committee Participation	22
Communications and Language Requirements for the Ph.D. Degree	22
English Competency.....	22
Communication Skills Requirement	23
Teaching Experience	24
General Requirement	24
Additional Requirement for Departmental Assistantships	24
American English Oral Communicative Test for Teaching (AEOCPT).....	24
Research and Dissertation for the Ph.D. Degree	24
Attributes of Ph.D. Dissertation Research	24
Original Research	24
Valid Research.....	25
Important Research	25
Dissertation Problem	25
Dissertation Research Proposal Presentation and Approval	25
Competency Evaluation	26

Written Progress Report for Annual Meetings	26
Dissertation format.....	26
Examinations	26
General Scheduling Guidelines	26
Candidacy Examination and Assessment of English Competency	27
Objective	27
Scheduling	27
Procedure of the Candidacy Examination	28
Evaluation of performance.....	28
Reporting results	29
Improvement of English Competency	29
Comprehensive Examination	29
Objective	29
Scheduling.....	29
Procedure of the examination	30
Evaluation of performance on the examination	30
Reporting Results	31
Final Oral Examination	31
Objectives.....	31
Scheduling.....	32
Preparation	32
Examination procedure.....	32
Outcome	32
Dissertation Acceptance	33
SECTION IV. MINOR STUDY IN HORTICULTURE	33
M.S. Minor in Horticulture.....	34
Course requirements	34
Seminar requirement.....	34
Ph.D. Minor in Horticulture	34
Course requirements	34
Seminar requirement.....	34
SECTION V. DEPARTMENT OF PLANT SCIENCE (HORTICULTURE) SEMINAR.....	34
Objectives.....	34
Seminar Schedule	35
Attendance	35
Seminars Required for Graduate Degrees	35
Student's Seminar Topic	36
Master's Degree.....	36
Ph.D.....	36
Audience Participation.....	36

Duties of the Committee in Charge	37
APPENDIX A	38
Statistical Methods courses:	38
APPENDIX B	40
Acceptable courses for the English Communication Skills requirement	40
APPENDIX C	41
Horticulture Graduate Course Listing	41
APPENDIX D	42
FORMS	42
Plant Science Graduate Programs – Annual Student Evaluation	43
M.S. Advisory Committee Appointment Form.....	44
Horticulture Proposal Meeting Evaluation Form	45
Examination Request Form	46
Checklist for the M.S. degree.....	47
Summary of Graduate Coursework for M.S. Degree	49
Ph.D. Committee Appointment Worksheet.....	50
Candidacy Examination Request Form	51
Candidacy Exam Results.....	52
Comprehensive Examination Scheduling Worksheet	54
Final Examination Scheduling Worksheet.....	55
Checklist for the Ph. D. degree	56
Summary of Graduate Coursework for Ph.D. Degree.....	58

Introduction

This guide describes the requirements for graduate admissions and for completion of the Horticulture graduate degree in the Department of Plant Science at Penn State University. The purpose of this document is to help students become familiar with graduate education in the Department and to aid students in meeting the many deadlines and requirements on the way to achieving their degree.

An electronic copy of this guidebook is maintained on the Department of Plant Science website at www.plantscience.psu.edu/graduateprograms/horticulture.

Educational Equity

Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. Student Disability Resources (SDR) Web site provides contact information for every Penn State campus: <http://equity.psu.edu/sdr/disability-coordinator>. For further information, please visit Student Disability Resources Web site: <http://equity.psu.edu/sdr>.

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <http://equity.psu.edu/sdr/guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.

Academic Information and Procedures

This information can be found at the following website: <http://bulletins.psu.edu/graduate/academicprocedures/procedures1>

Section I: General Policies

Responsibilities of the Student, Thesis Advisor, and Advisory Committee

Students are expected to assume responsibility for knowing the regulations and requirements of the Graduate School and the Department of Plant Science as described in:

- Graduate Degree Programs Bulletin (<http://bulletins.psu.edu/graduate/programs>);
- Guide to the Graduate Program in Horticulture;

- Other policies of the Department that are published in the departmental handbook

Before the end of the second semester of attendance, students should choose a thesis or dissertation topic, draw up research and coursework plans, select an advisory committee, and schedule required examinations. Loss of time advancing to any of these goals may add semesters to a program and result in loss of funding. Leadership provided by thesis/dissertation advisors and committee members should help to balance the demands of coursework with the need to initiate the research program and avoid delays in program completion.

The various responsibilities of thesis/dissertation advisors and committee members are detailed in later sections of this guidebook and in the Graduate School publication. Specifically, the Code of Conduct and Resolution of Problems are described in the appendices of the Graduate Bulletin at <http://bulletins.psu.edu/graduate/appendices/appendix1>.

The Scholarship and Research Integrity (SARI) program

Penn State offers mandatory training at www.research.psu.edu/training/sari/ “The SARI@PSU program at Penn State is designed to offer Penn State researchers and scholar’s comprehensive, multilevel education in the responsible conduct of research, in a way that is tailored to address the issues faced by individual disciplines”. The SARI program has two parts: (i) a required online program <http://citi.psu.edu/> and (ii) five hours of discussion-based education. The online program is to be completed during the first semester of study, while the discussion requirement will be met by completion of AGRO 501 (1 hour) and a College workshop on the topic offered in January (4 hours), prior to the start of spring semester.

Guiding Principles for Good Practice in Graduate Education

The Department endorses the Graduate School Guidelines for Good Practice in Graduate Education <http://www.gradschool.psu.edu/faculty-and-staff/faculty/guiding/> that are summarized below. It is the joint responsibility of faculty and students to work together to nurture a positive learning environment. Additional valuable resources for graduate students are available at: <http://www.gradschool.psu.edu/current-students/>.

Understanding the work environment. Faculty and students must each take the initiative to learn the policies, rules, regulations, and practices that affect them, their work, and the units in which they work.

Academic honesty, professional integrity, and confidentiality. Each member of the graduate community must endeavor to adhere to the highest level of these ideas in all their personal and professional activities.

A clear course of study. The student and faculty advisor should develop early in a program a clear plan of academic study and the responsibilities associated with it.

An atmosphere of openness. Students and faculty must work to establish and maintain an environment that is open, sensitive, and encourages free discussion among members of the graduate community.

Acknowledgement of intellectual rights and property. Students and faculty should discuss issues associated with academic freedom, intellectual property, authorship, and publication as part of the student's academic plan.

Opportunities for evaluation. Evaluation, reflection, and feedback are integral parts of academic process. To this end, an annual graduate student review is required of all students advised by faculty in the Department of Plant Science.

Time Limitations

All requirements for a master's degree (including acceptance of a thesis, paper, or project report as may be specified), whether satisfied on the University Park campus or elsewhere, must be met within eight years of admission to degree status. Individual programs may set shorter time limits. Extensions may be granted by the Director of Graduate Enrollment Services in appropriate circumstances.

Responsibilities of the Graduate Programs Committee

- Serve as an admissions committee to make recommendations on applicants for departmental graduate programs.
- Ensure proper administration of Ph.D. Candidacy Examinations.
- Rule on special matters pertaining to graduate student programs.

Responsibilities of the Graduate Program Director

- Facilitate placement of prospective students and the orientation of new students.
- Oversee graduate student progress and certify program and graduation requirements.
- Serve as graduate student ombudsman.
- Serve as ex-officio member on Department Graduate Programs Committee.
- Represent the Department at the College Graduate Director Meetings.
- Coordinate program reviews and learning outcome assessments.

Section II. Masters of Science Degree

Overview

This is a research-oriented degree for those who expect to terminate their formal education with the M.S. degree or to proceed for the Ph.D. degree. The M.S. or equivalent degree is the normal prerequisite for the Ph.D. program in the Department of Plant Science.

Whether terminal or doctoral-oriented, the objectives of the M.S. studies are enhanced understanding of an area of science beyond the baccalaureate level and attainment of scientific research skills. The M.S. candidates are just beginning their research careers and are expected to require considerable guidance in choosing and executing their thesis research projects. However, upon completion of the M.S. degree, the students are expected to have developed the capacity for independent research.

Admission Requirements

Baccalaureate Degree

A baccalaureate degree from an undergraduate program in horticulture, biological sciences, plant science or a related field with strong academic performance is preferred.

Expected Background

Strong background in biological sciences, including courses in biology, chemistry, and mathematics. Physics, statistics, agriculture, soils, botany, or plant science courses are recommended.

- Communication skills (9 credits), including technical writing (3), and speech (3)
- Chemistry, mathematics, and physics (10 credits distributed among all categories).
- Biological science (8 credits), including botany.
- Horticulture and/or plant science (12 credits), including soils science, or crop science.

Grade Point Average

A minimum 3.20 grade-point average (4.0=A, 1.0=D) for the junior-senior years of the baccalaureate degree.

Graduate Record Examination (GRE)

Applicants must present scores obtained in Verbal, Quantitative, and Analytical Tests of the Graduate Record Examination (GRE). Scores in the 50th percentile or higher in the three areas is expected by the Department for admission.

English Proficiency

Students who come from nations where English is not the native language, or who have not received a baccalaureate or master's degree from an institution in which the language of instruction is English, must submit scores for the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). The minimum acceptable score for the TOEFL is 550 for the paper-based test, 213 for the computer-based test, or a total score of 80 with a 19 on the speaking section for the internet-based test (iBT). Applicants with iBT speaking scores of 15-18 may be considered for provisional admission. The minimum composite score for the IELTS is 6.5.

**Codes for submission of scores: University Code 2660
 Horticulture Code 0112

TOEFL/IELTS are not needed if you have a B.S. or M.S. from one of the following countries:

<i>Australia</i>	<i>Belize</i>	<i>British Caribbean</i>	<i>USA</i>
<i>British West Indies</i>	<i>Canada (except Quebec)</i>	<i>England</i>	<i>Wales</i>
<i>Guyana</i>	<i>Republic of Ireland</i>	<i>Liberia</i>	
<i>New Zealand</i>	<i>Northern Ireland</i>	<i>Scotland</i>	

Exceptions and Limitation of Admission

Since graduate studies require close student-professor working relationships and various facilities and equipment, there are limits to the total number of graduate students the Department may accept at a given time. Therefore, the Department will admit the most qualified applicants for its openings. We recognize, however, that all qualified students do not fit a common mold. The following statements are for the guidance of students without traditional horticulture background:

Deficiencies in Preparation

Students with deficiencies in horticulture-related coursework, but with qualifications in other areas, may be admitted and allowed to take a limited number of remedial undergraduate courses while proceeding with their graduate programs. Courses taken for this purpose do not apply toward the credit requirements of the advanced degree. An appropriate course plan will be developed in conjunction with the student's advisory committee.

Minimum Grade Point Averages

The minimum grade point averages stipulated for admission may be waived for students with special background, abilities, or interests. However, no student may be admitted for a master's program with less than a 3.00 grade point average (4.0=A, 1.0=D) obtained in the junior and senior undergraduate years.

Career Experience

A person with career experience having a bearing on graduate qualifications may request that it be considered along with the academic record for admission to graduate school.

Procedures for Admission

Contact Information

Inquiries about the Horticulture Graduate Program should be sent to:

Graduate Program Coordinator
Department of Plant Science
101 Tyson Building
Penn State University
University Park, PA 16802
<http://www.plscigrad@psu.edu>

Application Packet

A complete application includes: completed Graduate School application including two original sets of transcripts, an official version of the GRE score report, official TOEFL/IELTS scores for students who come from nations where English is not the native language or who have not received a baccalaureate or master's degree from an institution in which the language of instruction is English, a personal goal statement, personal vita, and three letters of reference. Applications may be submitted at any time, but competition for financial support of students starting in the Fall Semester is intense and applications should be completed by **January 15**. International students should submit their applications at least nine months before the beginning of the semester for which they are applying. Information regarding the online application system is available at: <http://plantscience.psu.edu/graduateprograms/horticulture/how-to-apply>.

Evaluation by the Department Graduate Programs Committee

Applicants for graduate study in Horticulture is evaluated by the Department of Plant Science Graduate Programs Committee and potential advisors who consider (i) previous coursework, (ii) academic performance (grade point average), (iii) GRE

scores, (iv) TOEFL/IELTS scores when appropriate, (v) appraisal of deficiencies, (vi) personal vita, (vii) personal goal statement, (viii) information given on Graduate School application, and (ix) letters of recommendation. Recommendation to the Graduate School for acceptance or rejection of an applicant is made by the Graduate Program Director, Graduate Programs Committee, and Department Head in consultation with the proposed faculty advisors.

Advisory Committee

Committee Membership

The committee will consist of at least three members of the Graduate Faculty. At least one member from outside the major graduate program will be included to represent the minor or general studies fields.

Identifying Committee Members

The student in consultation with the thesis advisor will propose members of the advisory committee. The proposed committee membership will be submitted to the Graduate Program Coordinator (101 Tyson Building) for confirmation and appointment. Proposed members can decline the opportunity to serve.

Deadline for Establishing a Committee

The committee will be established before the end of the student's second semester of residence and preferably earlier.

Responsibilities of the Committee

- ❖ To approve the student's research proposal and coursework plans.
- ❖ To be available for consultation with the student on an individual basis.
- ❖ To read and evaluate the thesis.
- ❖ To administer an examination on academic studies and thesis research upon completion of the student's program.

Meetings of the Committee

- ❖ The committee will meet for a report on the student's thesis research proposal and coursework plan before the end of the student's second semester of residence and at a minimum of 12-month intervals thereafter. The coursework plan and thesis research proposal may be approved at the initial meeting. The thesis advisor and student should ensure that committee members from other departments are informed of the M.S. requirements of the Department of Plant Science graduate programs.

- ❖ On completion of the academic program and thesis, a final examination will be conducted by the committee.

Course and Credit Requirements

The Graduate School requirements and specific Department requirements are as follows;

Students with a one-half time graduate assistantship must register for between 9 and 12 credits per semester to maintain full time status. For a student with a one-half time assistantship, approximately two years will be required to complete the M.S. degree.

Minimum Graduate Credits

A minimum of 30 graduate credits are required, of which at least 20 credits must be earned at the University Park Campus, and will include the minimum credits specified in the following items:

Major Field, Formal Courses

Coursework for the major field will be chosen to meet the student's primary educational objectives – accomplishment of thesis research, mastery of discipline subject matter, and preparation for a career. Courses in Horticulture and other programs may be designated as part of the major field if they conform to these objectives. The strength of the program should be maximized by choosing a related series of courses.

The student and thesis advisor, in consultation with the advisory committee, will make the choice of courses in the major field. The thesis advisor will be responsible for the semester-by-semester direction of the student's academic studies.

Students expecting to continue on for the Ph.D. after the M.S. should acquaint themselves with the admission and graduation requirements of the Ph.D. degree. Although certain courses taken at the M.S. level may be applied to the Ph.D. requirements, admission to the Ph.D. program may require preparation in several study areas beyond the minimum necessary for admission to the M.S. program.

Twelve credits of 400- or 500-level formal courses in the major field are required (at least 6 of the 12 credits must be at 500-level coursework, excluding seminars and independent studies).

Minor or General Studies Courses

A minor consists of integrated or articulated work in one field related to, but different from the major field. Other departments and discipline areas of the University govern minor requirements. A faculty member representing the minor

will serve on the student's committee. As an alternative to a minor, general studies coursework may be taken in a field or fields different from the major field when considered by the thesis advisor and the advisory committee to have significance and value for the student.

A minor in the master's degree program consists of no fewer than 6 credits of integrated or articulated work in one field related to, but different from, that of the major; however, at a minimum, 3 credits must be at the 500 level. An official request form to add a minor degree to a student's academic record must be submitted to Graduate Enrollment Services at least one semester prior to the semester the student intends to graduate. The form is located at http://www.gradschool.psu.edu/faculty-and-staff/forms/ges/#Student_Forms.

Seminar or independent studies courses are excluded, except where such courses are specifically allowed by the minor department.

Statistical Methods

Three credits at the 400- or 500-level (Appendix A). Courses taken during the M.S. program may be used toward the statistics minor, if approved by the Statistics Department, or the general studies formal course requirement.

Graduate Student Dialogue

One credit of AGRO 501 during the first fall semester of the program.

Horticulture Seminar Course (Department of Plant Science Seminar)

Two credits of Horticulture Seminar (HORT 590)

Effective Scientific Communications Course

Two credits of Effective Scientific Communications (AGRO 555)

Thesis Research

Six credits of 600 or 610 (thesis research). The student is required to write an original research thesis.

Supplemental Credits

Credits of 400- or 500-level courses as needed to give a total of 30 that supplement one or more of the areas: thesis, major, minor, and general studies. Credits for independent study courses may also be included.

500-, 600- and 800- Series Work Combined

At least 18 credits of the total M.S. program must consist of 500, 600, or 800-series work with a maximum of six credits of 600 or 610 being included in this total.

Additional Courses

Additional courses and requirements as required by the advisor and advisory committee.

Seminar Attendance

The candidate is expected to regularly attend the Department of Plant Science Seminar each semester of registration at the University Park Campus. **One of the seminars will consist of a mandatory ETHICS lecture.**

Teaching Experience

A teaching experience is required of all M.S. students in the Department of Plant Science.

Final Examination

A final examination based on the student's thesis and academic training is required.

Summary checklist

The M.S. requirements are summarized in the check lists in Appendix D. It is the responsibility of the student to maintain these checklists, and to have them approved by the Major Advisor and Graduate Program Coordinator prior to graduation.

Teaching Experience

General Requirement

A teaching experience is required of all M.S. students in the Department of Plant Science. This experience shall consist of one semester of assistance with one section of a course documented by at least one credit of HORT 602. *(NOTE: Even though one credit of HORT 602 is required, it cannot be counted towards fulfilling the credit requirement for the degree.)* Equivalent teaching experience completed outside of the Department may be substituted for this requirement. Students may waive this requirement only by written concurrence of the Thesis Advisor, Graduate Program Director, and Department Head.

Additional Requirement for Departmental Assistantships

Students on departmental assistantships (as opposed to grant or privately funded assistantships) have a maximum teaching responsibility of two sections of an introductory-level course in one semester of each academic year.

American English Oral Communicative Test for Teaching (AEOCPT)

Graduate students whose native language is not English are required to take and pass the American English Oral Communicative Proficiency Test before they can teach at Penn State. The Department of Linguistics administers this test. Scores on the test determine any remedial action and when a student can assume teaching responsibilities. This mandatory test is taken at the beginning of the first semester of attendance at Penn State University. Additional information on this test is available at: <http://aplng.la.psu.edu/programs/about-the-aeocpt>. This test will be scheduled by the Graduate Program Coordinator for the academic program and an email will be sent confirming a testing date and time to the student.

Research and Thesis

Thesis Problem

The thesis advisor and the student should begin to identify an appropriate problem early in the student's first semester of residence. An acceptable M.S. thesis problem is expected to have attributes of originality, validity, and importance, similar to doctoral research. However, the choice of a problem suitable to a master's program will reflect the intended career and degree of experience of the candidate, and the time available for the program.

Thesis Research Proposal Presentation and Approval

Thesis research will be conducted concurrently with coursework. A literature review should be initiated and a written research outline (including hypothesis, objectives, and procedures) be prepared for an advisory committee meeting to be held **before the end of the second semester of residence**. A copy of the proposal should be delivered to each member of the committee at least one week before the scheduled meeting. Recommendations for changes to the research plan from the members of the advisory committee will be discussed at the meeting. Changes agreed upon by the committee members, advisor, and student will be incorporated in a revised research plan. If a new draft is required, it will be completed within one month of the meeting. Subsequent revisions of the plan may be accomplished by consulting committee members individually. Copies of each revision will be distributed to committee members for their concurrence.

Competency Evaluation

A competency evaluation will determine the student's strengths and weaknesses in subject matter areas relevant to the proposed research and the professional goals of the candidate and provide a basis for guiding the student in planning his/her program. It will be conducted as part of the Thesis Research Presentation and Approval meeting of the advisory committee. In preparation for the evaluation, a preliminary plan of coursework will be assembled by the student in consultation with the thesis advisor. A copy of the coursework plan will be supplied to each committee member before the meeting date.

Committee members can ask specific questions to determine the student's preparation for the proposed thesis research and graduate study program. The committee members will make recommendations to be addressed by the student and the thesis advisor. The student, thesis advisor, and the advisory committee must agree upon the disposition of all recommendations. At the conclusion of the thesis proposal meeting, each committee member must rate the student's thesis proposal using a 1-4 scale based on criteria listed in the Horticulture Proposal Meeting Evaluation Form (Appendix D) Each committee member must sign the form and the thesis advisor will submit it to the Plant Science Graduate Program Coordinator.

Written Progress Report for Annual Committee Meetings

Annual meetings of the advisory committee will be scheduled to review the progress of thesis research. A written progress report will be prepared by the student, with the guidance of the thesis advisor for submission to the committee at the meetings. The Annual Student Evaluation form (Appendix D) is sent out via email from the Graduate Program Coordinator of the academic program each spring with a deadline for the form to be completed and returned.

Thesis Format

The finished research will be assembled in approved thesis format (refer to <http://www.gradschool.psu.edu/current-students/etd/>).

Final Examination

Purpose and Procedure

- ❖ The final examination will be administered by the M.S. advisory committee.

This is an oral examination of the student's completed thesis. The student should be able to marshal satisfactory defense of the methods, findings, and conclusions of the thesis, be able to relate the findings to the pertinent literature, and demonstrate an acceptable base of knowledge in the major and minor fields. Little time during the

examination should be spent on minor editorial comments that can be worked out in separate meetings with committee members.

- ❖ The committee may also examine the student on academic studies and may recommend that a portion of the examination be written. The final M.S. examination is not to be combined with the candidacy examination for the Ph.D.

Scheduling

- ❖ The student meets with the thesis advisor to ensure that all academic requirements for the degree have been met, to verify that the thesis is completed, and to arrange possible dates and locations of the examination.
- ❖ The student contacts each member of the committee and arranges a convenient date and time for the examination.
- ❖ The student contacts the Graduate Program Coordinator (101 Tyson Building) with the date, time, location and a list of all committee members. The Graduate Program Coordinator will then schedule the examination.
- ❖ The student will deliver the thesis (in final form approved by the thesis advisor) to the committee members at least one week before the examination. The thesis should represent the student's best effort at scholarly exposition and should be complete, clearly legible, neat in appearance, and be in compliance with the format required for the Graduate School.
- ❖ The student prepares a summary of his/her records indicating compliance with degree requirements (Appendix D). Copies are supplied to advisory committee and Graduate Program Coordinator.
- ❖ The Thesis Advisor presents the results of the final examination in writing to the Graduate Program Coordinator immediately following the examination.
- ❖ The student will then obtain original signatures for the Thesis Signatory Page. This form can be obtained from the following website: <http://www.gradschool.psu.edu/current-students/etd/> or by contacting the Graduate Program Coordinator in 101 Tyson Building. This form will then be turned in to the Graduate Program Coordinator once the committee members have signed. The signatures on this form indicate that the thesis is approved as a complete and final work requiring no further alteration. This page is **required** for approval of the thesis by the Office of Theses and Dissertations.

In addition to the committee members, the signatory page must be signed by either the Department Head or the Graduate Program Director of the student's major program. Do not list the same person more than once on the signatory page. If the sharing of

roles leaves you with less than the required number of signatures, an additional member must be added.

A minimum of three signatures is required for a **master's** thesis, and must be signed by the thesis advisor and/or committee members and the Department Head or Graduate Program Director.

Section III. Doctor of Philosophy Degree

Overview

The objective of the Ph.D. degree is to accomplish original, valid, and important research. Since the degree is the training ground for a career in academic teaching and scholarly research, the Ph.D. candidate must demonstrate the ability to do independent research.

To earn the Ph.D., the candidate will (i) satisfy the Graduate School residence requirements, (ii) complete the coursework approved by the advisory committee, (iii) accomplish the required research and prepare a thesis embodying the research findings, and (iv) pass the examinations and complete the requirements prescribed by the graduate program and Graduate School.

A student who has been admitted to the Graduate School and has been accepted by the department or committee in charge of a major program in which the doctorate is offered, may begin working toward a doctoral degree. However, the student has no official status as a doctoral student and no assurance of acceptance as a doctoral candidate until the candidacy examination has been passed. This examination is administered by the major department or graduate program and is given early in the student's program.

Admission Requirements

M.S. or Equivalent Degree

Applicants should have a M.S. degree in agriculture, biological sciences, or significant research experience with strong academic performance. Other applicants will be considered provided they have a strong biological science background, including courses in biology, chemistry, and mathematics. Physics, statistics, agriculture, soils, and botany or plant science courses are recommended.

Expected Background

Specific courses and credits as a minimum equivalent to those specified for the M.S. degree at Penn State.

Grade Point Average

Typically, a minimum cumulative grade point average of 3.25 for the master's program is required for acceptance.

Graduate Record Examination (GRE)

Applicants must present scores obtained in Verbal, Quantitative, and Analytical Tests portions of the Graduate Record Examination (GRE). Scores in the 50th percentile or higher in the three areas are required by the Department for admission.

English Proficiency

Students who come from nations where English is not the native language, or who have not received a baccalaureate or master's degree from an institution in which the language of instruction is English, must submit scores for the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). The minimum acceptable score for the TOEFL is 550 for the paper-based test, 213 for the computer-based test, or a total score of 80 with a 19 on the speaking section for the internet-based test (iBT). Applicants with iBT speaking scores of 15-18 may be considered for provisional admission. The minimum composite score for the IELTS is 6.5.

**Codes for submission of scores: University Code 2660
Horticulture Code 0104

TOEFL/IELTS are not needed if you have a B.S. or M.S. from one of the following countries:

<i>Australia</i>	<i>Belize</i>	<i>British Caribbean</i>	<i>USA</i>
<i>British West Indies</i>	<i>Canada (except Quebec)</i>	<i>England</i>	<i>Wales</i>
<i>Guyana</i>	<i>Republic of Ireland</i>	<i>Liberia</i>	
<i>New Zealand</i>	<i>Northern Ireland</i>	<i>Scotland</i>	

Candidacy Examination

All students wishing to pursue a doctoral program must pass a candidacy examination administered by the Department to attain full status as a doctoral candidate.

Exceptions and Limitations of Admission

Since graduate studies require close student-professor working relationships and various facilities and equipment, there are limits to the total number of graduate students the Department may accept at a given time. Therefore, the Department will admit the most qualified applicants for its openings. We recognize, however, that all qualified students do

not fit a common mold. The following statements are for the guidance of students without a traditional horticulture background.

Deficiencies in Preparation

Students with deficiencies in horticulture coursework, but qualifications in other areas, may be admitted and allowed to take a limited number of remedial undergraduate courses while proceeding with their graduate programs. Courses taken for this purpose do not apply toward the credit requirements of the advanced degree. An appropriate course plan will be developed in conjunction with the student's advisory committee.

Minimum Grade Point Average

The minimum grade point averages stipulated for admission may be waived for students with special background, abilities, or interests. However, no student may be admitted for a Ph.D. program with less than a 3.00 grade point average (4.0=A; 1.0=D) obtained in the junior and senior undergraduate years or 3.00 for the master's program.

Career Experience

A person with career experience that has a bearing on graduate qualifications may request that it be considered along with the academic record for admission to graduate school.

Baccalaureate to Ph.D.

An applicant may be admitted directly to a Ph.D. program following the baccalaureate degree based on their exceptional qualifications, the support of the prospective advisor, and concurrence of the Graduate Programs Committee, Graduate Program Director, and the Department Head.

Procedures for Admission

Contact Information

Inquiries about the Horticulture Graduate Program should be sent to:

Graduate Program Coordinator
Department of Plant Science
101 Tyson Building
Penn State University
University Park, PA 16802
<http://plscigrad@psu.edu>

Application Packet

A complete application includes: completed Graduate School application including two original sets of transcripts, an official version of the GRE score report, official TOEFL/IELTS scores for students who come from nations where English is not the native language or who have not received a baccalaureate or master's degree from an institution in which the language of instruction is English, a personal goal statement, personal vita, and three letters of reference. Applications may be submitted at any time, but competition for financial support of students starting in the Fall Semester is intense and applications should be completed by **January 15**. International students should submit their applications at least nine months before the beginning of the semester for which they are applying. Information regarding the online application system is available at: <http://plantscience.psu.edu/graduateprograms/horticulture/how-to-apply> for Horticulture.

Evaluation by the Department Graduate Programs Committee

Applicants for graduate study in Horticulture is evaluated by the Department of Plant Science Graduate Programs Committee and potential advisors who consider (i) previous coursework, (ii) academic performance (grade point average), (iii) GRE scores, (iv) TOEFL/IELTS scores when appropriate, (v) appraisal of deficiencies, (vi) personal vita, (vii) personal goal statement, (viii) information given on Graduate School application, and (ix) letters of recommendation. Recommendation to the Graduate School for acceptance or rejection of an applicant is made by the Graduate Program Director in consultation with the proposed faculty advisors.

Completing M.S. Degree and Continuing for the Ph.D. Degree

A master's candidate who completes his/her degree or is near completion and wants to continue in the Plant Science Department as a candidate for the Ph.D. degree needs to complete an electronic "Resume Study/Change of Graduate Degree or Major" form through LionPATH. This form should be completed at least six months prior to the expected admission to the Ph.D. program. In addition, the candidate should prepare a new goal statement and arrange to have three letters of recommendation sent to the Graduate Program Coordinator for the Department of Plant Science. The candidate's documents will be reviewed by the Department's Graduate Programs Committee and a recommendation for admission will be submitted to the Graduate Program Director.

Advisory Committee for the Ph.D. Degree

Committee Membership for the Ph.D. Degree

General guidance of a doctoral candidate is the responsibility of a doctoral committee consisting of four or more active members of the Graduate Faculty, which includes at least two faculty members in the major field. The dissertation/performance advisor

must be a member of the doctoral committee. The dissertation/performance advisor usually serves as chair, but this is not required. If the candidate is also pursuing a dual-title field of study, a co-chair representing the dual-title field must be appointed. In most cases, the same individual (e.g., dissertation/performance advisor) is a member of the Graduate Faculty in both the major and dual-title fields, and in such cases may serve as sole chair.

At least one regular member of the doctoral committee must represent a field outside the candidate's major field of study in order to provide a broader range of disciplinary perspectives and expertise. This committee member is referred to as the "Outside Field Member." In cases where the candidate is also pursuing a dual-title field of study, the dual-title representative to the committee may serve as the Outside Field Member.

Additionally, in order to avoid potential conflicts of interest, the primary appointment of at least one regular member of the doctoral committee must be in an administrative unit that is outside the unit in which the dissertation/performance advisor's primary appointment is held (i.e., the advisor's administrative home; in the case of tenure-line faculty, this is the individual's tenure home). This committee member is referred to as the "Outside Unit Member." In the case of co-advisors, the Outside Unit Member must be from outside the administrative home(s) of both co-advisors. In some cases, an individual may have a primary appointment outside the administrative home of the student's dissertation/performance advisor and also represent a field outside the student's major field of study; in such cases, the same individual may serve as both the Outside Field Member and the Outside Unit Member.

If the candidate has a minor, that field must be represented on the committee by a "Minor Field Member."

A person who is not a member of the Graduate Faculty (and may not be affiliated with Penn State) who is otherwise qualified and has particular expertise in the candidate's research area may be added as a "Special Member," upon recommendation by the Head of the program and approval of the Director of Graduate Enrollment Services). A Special Member is expected to participate fully in the functions of the doctoral committee. If the Special Member is asked only to read and approve the doctoral dissertation or to evaluate the final performance, that person is designated a Special Signatory. Occasionally, Special Signatories may be drawn from within the Penn State faculty in particular situations.

Dissertation Advisor/Chairperson

The chair or at least one co-chair must be a member of the graduate faculty of the doctoral program in which the candidate is enrolled. The primary duties of the chair are to: (1) maintain the academic standards of the doctoral program, Graduate Council, and the Graduate School and assure that all procedures are carried out fairly, (2) ensure that the comprehensive examination and final oral examination/final performance are conducted in a timely fashion, (3) arrange and conduct all meetings, and (4) ensure that

requirements set forth by the committee are implemented in the final version of the dissertation.

Identifying Committee Members

The student, in consultation with the dissertation advisor, will propose members of the advisory committee. The proposed committee membership will be submitted to the Graduate Program Coordinator in the Department of Plant Science for confirmation and appointment. Proposed members may decline the opportunity to serve.

Establishing a Committee

The committee will be established as soon as possible after the student has passed the candidacy examination.

Responsibilities of the Committee

- To approve the student's dissertation research proposal and coursework plans.
- To be available for consultation with the student on an individual basis.
- To read and evaluate the dissertation.
- To administer the student's comprehensive and final examinations.

Meetings of the Committee

- Presentation and approval of dissertation research proposal.
- Competency evaluation.
- Annual progress meetings.
- Comprehensive examination.
- Final examination.

Course and Credit Requirements

Program Coursework

The program coursework for the Ph.D. will generally include major and minor areas, although general studies may be substituted for the minor. The student's coursework and dissertation plans are considered tentative until approved by the advisory committee.

Required Courses and Credits beyond the M.S.

The courses and credits in the following specified study areas beyond the M.S. (except where specifically noted) **constitute a requirement for graduation**. They are the

nucleus of subject matter around which students, their advisors, and advisory committees will develop specific concentrations of study.

Major Field, Formal Courses

The coursework for the major field will be chosen to meet the student's primary educational objectives – accomplishment of dissertation research, mastery of discipline subject matter, and preparation for a career. Courses in Horticulture, Agronomy, and other programs may be designated as part of the major field if they conform to these objectives. The strength of the program should be maximized by choosing a related series of courses.

A minimum of 12 credits of 500 level formal courses beyond the master's degree are required. The student and dissertation advisor in consultation with the advisory committee will make the choice of courses in the major field. The dissertation advisor will be responsible for the semester-by-semester direction of the student's academic studies.

Minor or General Studies Courses

A minor consists of integrated or articulated work in one field related to, but different from the major field. Other departments and discipline areas of the University govern requirements for a minor. A faculty member representing the minor will serve on the student's committee.

As an alternative to a minor, general studies coursework may be undertaken in a field or fields different from the major field that are considered by the dissertation advisory and the advisory committee to have significance and value for the student. Courses meeting this requirement will include 400- or 500-level formal courses. Exclusions: (1) courses for the major field that are outside the Department of Plant Science; and (2) seminar or independent study courses, except where such courses are specifically allowed by the minor departments.

Language or English Communications

Minimum of three credits as described in the section listed "*Communication and Language Requirements for the Ph.D. Degree*".

Statistical Methods

Six credits of statistical methods beyond the baccalaureate degree are required (see Appendix A). Courses taken during the Ph.D. program may be used to meet the major, minor (if approved by the department offering the minor), or general studies requirement.

Graduate Student Dialogue

One credit of AGRO 501 during the first fall semester.

Horticulture Seminar (Department of Plant Science Seminar)

Three credits of Horticulture Seminar (HORT 590).

Effective Scientific Communications Course

Two credits of Effective Scientific Communications (AGRO 555). These credits can be applied towards the communication skills requirements.

Dissertation Research

Twelve credits of 600 or 610 (dissertation research). The student is required to write an original research dissertation.

Supplemental Credits

Credits of 400- or 500-level courses as required to fulfill program needs that supplement one or more of the areas: dissertation, major, minor, and general studies. Credits for independent study courses may be included.

Communications Requirements and Examinations

See section “*Communication and Language Requirements for the Ph.D. Degree*”.

Teaching Experience

See section “*Teaching Experience*”

Additional Courses

Additional courses and requirements specified by the advisor and/or advisory committee.

Credits Earned at Other Institutions

Credits for courses earned in graduate work at other institutions may be applied toward the major, minor, or general studies requirements of the degree program under the following conditions:

- ❖ The student’s advisory committee must concur that the courses are clearly equivalent to 400- or 500-level formal courses at Penn State.

- ❖ Only one credit of seminar may be included.
- ❖ Special problem courses are excluded.

The student's minor department (if applicable) must concur on the acceptability of courses in the minor.

A maximum of 10 credits of high-quality graduate work may be transferred toward any doctoral degree at Penn State.

Residence Requirements

There is no required minimum number of credits or semesters of study, but over some twelve-month period during the interval between admission to the Ph.D. program and completion of the Ph.D. program, the candidate must spend at least two semesters (summer sessions are not included) as a registered full-time student engaged in academic work at the University Park campus, the Penn State Milton S. Hershey Medical Center, or Penn State Harrisburg. Full-time University employees must be certified by the department as devoting half-time or more to graduate studies and/or thesis research to meet the degree requirements. Students should note that 601 cannot be used to meet the full-time residence requirement.

Summary Checklist

These requirements are summarized in the check lists (Appendix (D)). It is the responsibility of the student to maintain these checklists, and to have them approved by the dissertation advisor and Graduate Program Coordinator prior to graduation.

Doctoral Advisory Committee Participation

The doctoral advisory committee has the responsibility to review the courses and credits proposed by the student and the dissertation advisor and to suggest changes essential for the education and development of the candidate. The results of the competency evaluation will help to establish any subject matter deficiencies or special requirements. The committee helps ensure that the student is properly trained in a sub-field of the major field and has a perspective of the field in general.

Communications and Language Requirements for the Ph.D. Degree

English Competency

Candidates for all doctoral degrees are required to demonstrate high-level competence in the use of the English language, including reading, writing, and speaking, as part of the language and communication requirements for the doctorate. (Note: Passage of the minimal TOEFL or IELTS requirement does not demonstrate the level of competence

expected of a doctoral degree candidate and for conferral of a doctorate from Penn State.) In compliance, the Department of Plant Science requires:

- ❖ English competency will be evaluated as part of the candidacy examination.
- ❖ Students with English deficiencies should develop and implement a remediation plan as soon as possible after the original English competency examination. A remedial plan will typically consist of one or more undergraduate courses plus one or more advanced courses, 400- and 500-level, as recommended by the student's advisory committee. These courses do not count towards the 30-credit requirement.
- ❖ Progress in attaining English competency will be part of the annual research progress meetings. The need for continuing such coursework must be carefully assessed by assignments of written research reports and seminar speaking topics.
- ❖ Students with English deficiencies will repeat the English competency section of the Candidacy Examination and perform satisfactorily before scheduling the comprehensive examination.

Communication Skills Requirement

Candidates for the Ph.D. must meet the communication skills requirement prior to scheduling the comprehensive examination. Three credits in English communication skills or related studies are required. If a high level of competency is demonstrated in English communication skills, a foreign language may be substituted upon approval of the student's advisory committee. Course options include:

- ❖ One 3-credit 400 or 500 series course of advanced English technical composition. **English 418** (Advanced Technical Writing and English) is recommended.
- ❖ Three credits of 400 or 500 courses chosen from a departmentally approved list of courses (Appendix B)
- ❖ Three credits of 400 or 500 level writing intensive courses may be accepted in lieu of English courses or a selection from the Department list with approval of the Graduate Program Director.
- ❖ Clearly equivalent courses at the 400 or 500 series level taken before beginning the Ph.D. program for which grades of C or better have been earned will be accepted in partial or full satisfaction of the option.
- ❖ Completion of at least three credits of university-level coursework in one foreign language with a grade point average of at least 2.50 as an

undergraduate or graduate student. The G-series courses offered by some University language departments are preferred for graduate students.

Teaching Experience

General Requirement

A teaching experience is required of all Ph.D. students in the Department. This experience shall consist of **two** separate semesters of assistance with one section of a course documented by two separate completions of HORT 602 with one credit each time. The two semesters of assistance do not have to, but may, involve the same course and this requirement is independent of the requirement at the master's level. Equivalent teaching experience completed outside of the Department may be substituted for this requirement. Students may waive this requirement only by written concurrence of the dissertation advisor, Graduate Program Director, and the Department Head.

Additional Requirement for Departmental Assistantships

Students on departmental assistantships (as opposed to grant or privately funded assistantships) have a maximum teaching responsibility of two sections of an introductory level course in one semester of each academic year.

American English Oral Communicative Test for Teaching (AEOCPT)

Graduate students whose native language is not English are required to take and pass the American English Oral Communicative Proficiency Test before they can teach at Penn State. The Department of Linguistics administers this test. Scores on the test determine any remedial action and when a student can assume teaching responsibilities. Additional information on this test is available at: <http://aplmg.la.psu.edu/programs/about-the-aeocpt>.

Research and Dissertation for the Ph.D. Degree

Attributes of Ph.D. Dissertation Research

Research for the Ph.D. should aim to be original, valid, and important. The terms are variously interpreted, so the following statements are presented for clarity.

Original Research

This is the outcome of scholarly inquiry, investigation, or experimentation having as its objective the revision of existing concepts, development of new concepts, or development of new or improved techniques in some specialty area. Such research should be acceptable for publication in a refereed scientific journal. Therefore, original research makes a contribution to scientific knowledge.

Valid Research

Valid research is that which has proper experimental designs, utilizes appropriate techniques, and is adequately described.

Important Research

Important research contributes to a significant advance of scientific knowledge. Such research is designed to illuminate areas of controversy or areas that seem significant and lack information based on a thorough literature review and interpretation.

Ph.D. students may have to be satisfied with research of less importance than they would like. The short time span of their programs may limit the impact of their results. However, Ph.D. dissertations of the highest quality should result when students, dissertation advisors, and advisory committees collaborate in choosing suitable problems, reliable techniques, and appropriate experimental designs and when students apply high levels of originality, creativity, and resourcefulness to their research.

Dissertation Problem

The dissertation advisor and the student should begin to identify an appropriate problem early in the student's first semester of residence.

Dissertation Research Proposal Presentation and Approval

Dissertation research should be conducted concurrently with coursework. A literature review will be initiated and a written research outline (including hypothesis, objectives, and procedures) will be prepared for presentation and approval of an advisory committee meeting to be held **before the end of the third semester of residence, and after the student has passed the candidacy examination**. A copy of the proposal should be delivered to each member of the committee at least one week before the scheduled meeting. At the conclusion of the Dissertation Research Proposal Presentation and Approval meeting, each committee member must rate the student's dissertation proposal using a 1-4 scale based on criteria listed in the Horticulture Proposal Meeting Evaluation Form (Appendix D). Each committee member must sign the form and the dissertation advisor will submit the form to the Department of Plant Science Graduate Program Coordinator.

The advisory committee will suggest changes to be considered by the student and the dissertation advisor. If a new draft of the research proposal is required, it will be completed within one month of the original meeting. Subsequent revisions of the proposal may be made, by consulting committee members individually. Copies of each revision should be distributed to committee members for their concurrence.

Competency Evaluation

The competency evaluation will determine the student's strengths and weaknesses in subject matter areas relevant to the proposed research and the professional goals of the candidate and provide a basis for guiding the student in planning his/her program. It will be conducted as part of the dissertation research presentation and approval meeting of the advisory committee.

In preparation for the evaluation the student, in consultation with the dissertation advisor, will assemble a preliminary plan of coursework. A copy of the coursework plan will be supplied to each committee member before the meeting date. Committee members from other departments will be informed of the departmental Ph.D. requirements.

Committee members can ask specific questions to determine the student's preparation for the proposed dissertation research and graduate study program. The committee members will make recommendations to be addressed by the student and the dissertation advisor. No evaluation of performance in terms of pass or fail will be made. However, the student, dissertation advisor, and the advisory committee must agree upon the disposition of all recommendations.

Written Progress Report for Annual Meetings

Annual meetings of the advisory committee will be scheduled to review the progress of the dissertation research. A written progress report will be prepared by the student with the guidance of the dissertation advisor for submission to the committee at the meetings. The Annual Student Evaluation form is sent out via email from the Graduate Program Coordinator of the academic program each spring with a deadline for the form to be completed and returned.

Dissertation format

The finished research will be assembled in approved dissertation format. Refer to <http://www.gradschool.psu.edu/current-students/etd/thesisdissertationguidepdf/>.

Examinations

General Scheduling Guidelines

- ❖ The student meets with the dissertation advisor to ensure that all the requirements for the examination have been met, and to arrange possible dates and locations of the examination.
- ❖ The student then contacts each member of the committee and arranges a mutually agreeable date and time for the examination.

- ❖ The student will then contact the Graduate Program Coordinator with the date, time and location of the examination. The Graduate Program Coordinator will then file the necessary paperwork with The Graduate School. The Graduate School will verify that all requirements have been met, and will then forward the exam paperwork to the Graduate Program Coordinator. This paperwork will then be given to your committee chair for the date of the examination (comprehensive and final exams).
- ❖ The student prepares a summary of his/her records and appropriate materials for the examination.
- ❖ Immediately after completion of the examination, the dissertation advisor will submit the completed examination paperwork to the Graduate Program Coordinator.

Candidacy Examination and Assessment of English Competency

Objective

Every student who wishes to pursue a doctorate must take a candidacy examination administered by the Graduate Faculty in the graduate major program. The purpose of the candidacy examination should be to assess whether the student is capable of conducting doctoral research/scholarship based on evidence of critical thinking, basic intellect, attitude, and previous training to successfully pursue a Ph.D. program. It should be taken early in the student's program (third semester).

The graduate student must be in good academic standing and must be registered as a full-time or part-time graduate degree student for the semester in which the candidacy examination is taken.

An assessment of English competency is conducted in conjunction with the candidacy exam. The objective of this evaluation is to determine if the student can demonstrate a satisfactory level of competence in the use of the English language, including reading, writing, and speaking.

Scheduling

- The examination may be taken after at least 18 credits have been earned beyond the baccalaureate degree.
- The examination should be completed as soon as feasible, but must be taken within three semesters (summer sessions do not count) of entry into the doctoral program. Candidates must be registered for the semester (excluding summer session) in which the candidacy exam is taken.

Procedure of the Candidacy Examination

- An oral examination will be administered by the prospective dissertation committee. The dissertation advisor will be responsible for choosing the individual committee members for the exam. One member of the Graduate Program Committee will also attend each candidacy exam to monitor the procedure and content.
- The candidate will prepare a written summary of a journal article selected by the candidate's advisor. The summary will be submitted to the examining committee one week before the oral examination date (the oral examination will occur during the candidacy examination).
- Candidates should also prepare a packet consisting of undergraduate and graduate transcripts, GRE scores, abstracts of M.S. thesis and any publications, and goal statement from the admissions application. This packet should be distributed to the examining committee members one week before the exam date. Additional questions concerning the examination should be directed to the dissertation advisor or the Graduate Programs Committee.
- At the beginning of the exam, the candidate makes a 15-minute oral presentation summarizing the journal article. Each member of the committee will ask questions of the candidate during or after the presentation, and rate the candidate's performance, writing, and speaking competency.
- After the oral presentation, each committee member will have up to 30 minutes to question the candidate. At the end of the questioning period, the candidate will be asked to leave the room and the committee members will evaluate the candidate's performance. The candidate will then be asked to return to the exam room and be informed of the committee's decision.
- At the discretion of the committee or request of the candidate, a written examination may be given in addition to an oral examination.

Evaluation of performance

- ❖ Pass without reservation
- ❖ Fail, with an opportunity to retake the examination at a later date. No more than one retake, at a date no later than one month following the first examination, will be allowed.
- ❖ Fail without reservation

Reporting results

The dissertation advisor submits the examination results to the Graduate Program Coordinator in writing immediately following the examination. The outcome of the examination will be reported to the Graduate School by the Graduate Program Coordinator.

Improvement of English Competency

- Candidates with English deficiencies will schedule remedial undergraduate courses as soon as possible after the candidacy examination. Advanced 400- and 500-level courses may be taken when convenient, but must be completed before the comprehensive examination is scheduled. Suggested courses are listed in Appendix B.
- The choice of appropriate remedial and advanced courses will be made by the candidate's dissertation advisor and advisory committee.

Comprehensive Examination

The doctoral examinations (the comprehensive examination and the final oral examination) are administered/overseen and evaluated by the entire doctoral committee.

All students are required to have a minimum grade-point average of 3.00 for work done at the University at the time a doctoral examination is given, and may not have deferred or missing grades. The graduate student must be in good academic standing and must be registered as a full-time or part-time graduate degree student for the semester in which the doctoral examination(s) is taken. Two weeks' notice is required by the Office of Graduate Enrollment Services for scheduling any doctoral examination.

Objective

To determine if the student has attained a level of training in the major and minor fields with sufficient depth and breadth to be worthy of the Ph.D. degree upon submitting an acceptable dissertation.

Scheduling

The comprehensive will be given when, in the student's and the dissertation advisor's opinion, the student is ready for the examination and when the communications and English competency requirements and essentially all of the coursework (including at least 12 credits of 600/610) have been completed. The student should have no deferred grades and at least a 3.0 grade-point average. The examination must be scheduled within eight years of the date of the candidacy examination, but usually will be taken within 2.5 years after the beginning of the

Ph.D. program. At least two weeks advanced notice is required by the Graduate School for scheduling the comprehensive examination.

When a period of more than **six years** has elapsed between the passing of the comprehensive examination and the completion of the program, the student is required to pass a second comprehensive examination before the final oral examination will be scheduled.

Procedure of the examination

The examination will include written and oral segments.

- The committee members will prepare a written list of questions to be completed by the student. Not more than three hours will be allowed for each member's set of questions and not more than two sets may be completed per day. Each committee member shall be responsible for supervision of their written examination session. Each committee member shall correct their part and return it with an evaluation to the student within one week after the examination, and provide a copy to the committee chairman. The written examination and evaluation shall be completed at least one week but not more than four weeks prior to the date of the oral examination. All committee members having an appointment in the Department of Horticulture must give both written and oral examinations. Members of the committee not having an appointment in the Department of Plant Science may at their discretion omit the written examination and defer all questions to the oral examination
- An oral examination shall be administered by the Doctoral Advisory Committee with the committee chairman in charge. Each committee member will have approximately 30 minutes to question the student. At the end of the examination each committee member will be asked to rate the candidate's performance on both the written and oral portions of the exam.

Evaluation of performance on the examination

A favorable vote of at least two-thirds of the members of the committee is required for passing a comprehensive or final oral examination. If a student fails an examination, it is the responsibility of the doctoral committee to determine whether the student will be granted a second opportunity to take the examination.

- ❖ Pass without reservation.
- ❖ Pass with reservations (to be defined by the committee). A favorable vote of two-thirds of the members of the committee is required for passing.
- ❖ Fail with option to retake the examination once at a date no later than 90 days following the first examination.

- ❖ Failure without option for reexamination. This decision results in the termination of the student's graduate program in the Department of Plant Science.

Reporting Results

Outcome of the examination will be reported by the dissertation advisor to the Graduate Program Coordinator. The Graduate Program Coordinator will file the necessary paperwork with The Graduate School.

NOTE: Ph.D students must register continuously for each fall and spring semester until the Ph.D. dissertation is accepted and approved by the doctoral committee. Students with a ½ time graduate assistantship must register for between 9 and 12 credits per semester to maintain full time status.

Post-comprehensive Ph.D. students should register for **601 or 611**, depending upon whether they are devoting full time or part time status to their dissertation preparation, because tuition and fees are greatly reduced compared to full-time registration.

Final Oral Examination

Objectives

The main objective of the final oral examination is to determine if the student demonstrates the degree of scholarship worthy of the Ph.D. in Horticulture. Since the major evidence of scholarship is the dissertation, the major part of the examination is a dissertation defense. The following points are used as guidelines for evaluation:

- Has the student demonstrated originality, creativity, and resourcefulness in the conduct of research?
- Does the research utilize proper experimental designs, appropriate techniques, and is the research adequately described?
- Is the student able to conduct a satisfactory, defense of methods, findings, and conclusions of the research in the thesis?
- Is the student sufficiently knowledgeable of the literature of the dissertation subject, and can the student place his/her contribution in proper context with the literature?

- Is the dissertation research worthy of publication in a refereed scientific publication?
- Is the dissertation an adequate example of scholarly exposition?

Scheduling

The final oral examination will be scheduled no sooner than three months after the comprehensive examination was passed. The student should have no deferred grades and at least a 3.0 grade-point average. The examination must be scheduled within six years of passing the comprehensive examination and all Ph.D. requirements must be met within eight years of the date of the candidacy examination. At least two weeks advanced notice is required by the Graduate School to schedule the final examination.

Preparation

Early drafts of the dissertation should be reviewed by the advisor and be revised by the student until the advisor determines that the dissertation is ready for review by the whole doctoral advisory committee. Copies of the complete dissertation, including the abstract and vita in approved Graduate School format, should then be submitted to all committee members. This must occur two weeks before the final exam. Committee members must return the dissertation with comments and corrections to the student at the defense.

Examination procedure

During the final exam, the student will make a presentation summarizing the dissertation, followed by a period of questions and responses. The questions will relate primarily to the dissertation, but may cover the student's whole program of study, since one purpose of the exam is to assess the scholarly attainments of the student. The committee members evaluate the student's performance during the exam and the quality of the dissertation on forms provided by the Graduate School, and determine whether the student passes the final exam. A favorable vote by two-thirds of the committee members is required for passing. In the event of failure, the committee may determine whether another examination may be taken.

Outcome

A favorable vote of at least two-thirds of the dissertation committee is required for passing. If a candidate fails, it is the responsibility of the dissertation committee to determine if another examination may be taken. Outcome of the examination will be reported by the dissertation advisor to the Graduate Program Director and Graduate Program Coordinator on the forms provided. The Graduate Program Coordinator will report the results to the Graduate School.

Dissertation Acceptance

During the final exam, the committee may decide that changes to the dissertation are required. In this case, the student must revise the dissertation to the committee's satisfaction and obtain the signatures before the final due date from the Graduate School. Doctoral advisory committee members will indicate their acceptance of the dissertation in its final form by signing the signatory page either immediately after the final exam or after satisfactory revisions have been made.

Completion of the requirements of a Ph.D. degree program entails acceptance of the dissertation, as indicated by the signatures of at least two-thirds of the doctoral committee, as well as the Head of the graduate program, on the doctoral signatory page, and by its acceptance as meeting the editorial standards of the Graduate School, so that it constitutes a suitable archival document for inclusion in the University libraries. Thus, it is to be noted that passage of the final oral examination is necessary but not sufficient for award of the degree. The dissertation must be accepted as the ultimate step for the Ph.D. and is to be made available to the public through inclusion in the University libraries.

Section IV. Minor Study in Horticulture

A graduate minor may be taken in one of the approved graduate degree programs offered at Penn State. However, some formal graduate minors have been approved by the Graduate Council, such as the minors listed on the next page. A minor at the graduate level must represent curriculum and study that reflect graduate-level concepts and scholarship, with a preponderance of courses at the 500 level.

A student seeking a minor must have the approval of the student's major program of study, the minor program, and the Graduate School. A student may not pursue more than three minors at one time. If a student pursues more than one minor, each minor must have a separate group of courses to support it (i.e., none of the courses may be used concurrently).

A doctoral minor consists of no fewer than 15 graduate credits of integrated or articulated work in one field related to, but different from, that of the major with a preponderance of courses at the 500 level; however, at a minimum, 6 credits must be at the 500 level. Official requests to add a minor to a doctoral candidate's academic record must be submitted to Graduate Enrollment Services prior to establishing the doctoral committee and prior to scheduling the comprehensive examination. For more information regarding minors, please see the following web pages.

--For doctoral students:

http://bulletins.psu.edu/bulletins/whitebook/degree_requirements.cfm

---For Ph.D. candidates:

http://bulletins.psu.edu/bulletins/whitebook/degree_requirements.cfm?section=degreeReq2

M.S. Minor in Horticulture

A master's minor consists of no fewer than 6 credits of integrated or articulated work in one field related to, but different from, that of the major; however, at a minimum, 3 credits must be at the 500 level. Official requests to add a master's minor to a student's academic record must be submitted to Graduate Enrollment Services at least one semester prior to the semester the student intends to graduate.

Course requirements

The student will take at least 6 credits of 400- or 500-level formal courses in the Horticulture subject areas that meet a specific educational objective approved by the minor-field committee member. Credits in independent studies are excluded from the M.S. Horticulture minor.

Seminar requirement

The student will register for 1 credit of Department of Plant Science (Horticulture) Seminar course and present one seminar

Ph.D. Minor in Horticulture

Course requirements

The student will take at least 15 credits beyond the baccalaureate degree in 400- or 500-level formal Horticulture courses and at least one 500-level course in the Horticulture subject areas that meet a specific educational objective approved by the minor field committee member. Credits in independent studies are excluded.

Seminar requirement

The student will register for 1 credit of Department of Plant Science (Horticulture) Seminar course, present one seminar, and participate in a second semester of the seminar course without being required to make a presentation.

Section V. Department of Plant Science (Horticulture) Seminar

Objectives

The Department of Plant Science Seminar (HORT 590) is an opportunity for students, faculty, and guest speakers to present the results of their research projects and topics of special interest.

By giving seminars, the student is expected to become skilled in organizing and presenting technical matter in a professional manner.

Developing a quality abstract of a scientific presentation is a challenging task. As part of the Horticulture Seminar experience, each speaker will submit an approximately 250 word abstract plus a short bibliography at least one week before the seminar. The abstract and bibliography will be distributed with the announcement of the seminar.

Seminar Schedule

Regular weekly sessions of 50 minutes are provided in the fall and spring semesters. Special seminars are scheduled throughout the year (including summer sessions) as the need arises.

Attendance

All faculty and graduate students of the Department of Plant Science, including students in interdepartmental degree programs, have the responsibility to regularly attend the Department of Plant Science Seminars.

Conflicts of course schedules or illness are the only satisfactory excuses for resident graduate students who fail to attend seminars. Whenever possible, students should avoid scheduling courses which conflict with seminars.

Seminars Required for Graduate Degrees

- ❖ Master's degree students and interdepartmental degree program students will give one Department of Plant Science seminar (2 credits of HORT 590). Ph.D. candidates will give two Department of Plant Science seminars (HORT 590) in addition to the seminar given for the M.S. degree (3 credits in total).
- ❖ The seminar requirement will have equivalent status to every other requirement for a particular degree. The Graduate Program Coordinator will not certify that the graduation requirements have been met without evidence that the seminars have been given.
- ❖ Several specialty area seminar groups are organized from time to time in the Department. Thesis advisors and advisory committees may require participation in any seminar appropriate for the student's education. Students and faculty are urged to organize seminars that may contribute to graduate education in specialty areas.
- ❖ Students enrolled in an interdepartmental program will fulfill any separate seminar requirements of their interdepartmental programs. A joint seminar may be scheduled for the Department of Plant Science and the interdepartmental group to meet this requirement.

Student's Seminar Topic

Master's Degree

- Report of thesis research is required
- Report will be scheduled when the thesis is complete or nearly so
- Seminar will be prepared and presented as a professional report. See stipulations for the Ph.D. program (section

Ph.D

The first seminar may either be on a topic not related to the student's dissertation subject matter, or it may be a presentation of proposed dissertation research:

- The non-dissertation seminar topic will be on a professional level. Except for the historical perspective, the student should focus on the recent scientific literature.
- The research proposal seminar will consist of a critical review of historic and current scientific literature related to the thesis topic, identification of aspects of the subject area that are poorly understood and merit additional research, presentation of the student's proposed research objectives and plans, and explanation of how the proposed research will contribute new knowledge to the subject area. The research proposal seminar must be given before substantial research is undertaken.
- The seminar will be given during the first 18 months of the student's enrollment.

Report of dissertation research will be the second seminar required for the Ph.D. program.

- Report will have the same degree of professionalism required for the first seminar and will be prepared for an audience representing a range of horticultural interests.
- Report will be scheduled when the dissertation is complete or nearly so.

Audience Participation

The purpose of most seminars is to elucidate a scientific subject. This is never an easy matter, and more or less, controversy will generate discussion. It is the best scientific

practice for a speaker to encourage constructive criticism of the seminar subject matter. It is also the responsibility of the listeners to explore questionable ideas to the fullest.

Seminar evaluation forms will be completed by all in attendance. These forms will be given to the seminar presenter.

Duties of the Committee in Charge

The Seminar Committee will be appointed by the Department Head around June 1st of each year. A progression to chairs is suggested by a plan in which one new faculty member is appointed each year and the senior member becomes the chairperson. The chairperson assumes responsibilities beginning with spring semester and continues for the following fall semester.

The chairperson will be responsible for arranging the seminar schedule. Seminars on completed dissertations may be scheduled at times other than the regular seminar dates, if requested by the student and dissertation advisor. Students must plan their seminar times well in advance so that the seminar chairperson can work out a satisfactory schedule.

After the student seminars have been scheduled, the committee will arrange for the Department of Plant Science faculty and guest speakers to complete the schedule of seminars.

Grading for student seminars will be pass/fail and will be assigned by the chairperson in consultation with the rest of the committee.

Appendix A

Statistical Methods courses:

AG 400	<u>Biometry/Statistics in the Life Sciences</u>
STATISTICAL METHODS	
<u>401</u>	<u>Experimental Methods</u>
<u>(414)</u>	<u>Introduction to Probability Theory</u> <u>** available as of 08/31/2017</u>
<u>414</u>	<u>Introduction to Probability Theory</u>
<u>415</u>	<u>Introduction to Mathematical Statistics</u>
<u>416</u>	<u>Stochastic Modeling</u>
<u>418</u>	<u>Introduction to Probability and Stochastic Processes for Engineering</u>
<u>418H</u>	<u>Probability</u>
<u>440</u>	<u>Computational Statistics</u>
<u>460</u>	<u>Intermediate Applied Statistics</u>
<u>461</u>	<u>Analysis of Variance</u>
<u>462</u>	<u>Applied Regression Analysis</u>
<u>463</u>	<u>Applied Time Series Analysis</u>
<u>464</u>	<u>Applied Nonparametric Statistics</u>
<u>466</u>	<u>Survey Sampling</u>
<u>(470)</u>	<u>Problem Solving and Communication in Applied Statistics** available as of 08/31/2017</u>
<u>470</u>	<u>Problem Solving and Communication in Applied Statistics</u>
<u>480</u>	<u>Introduction to SAS</u>
<u>481</u>	<u>Intermediate SAS for Data Management</u>
<u>482</u>	<u>Advanced Topics in SAS</u>
<u>(483)</u>	<u>Statistical Programming in SAS</u> <u>** available as of 12/17/2017</u>
<u>483</u>	<u>Statistical Analysis System Programming</u>
<u>484</u>	<u>The R Statistical Programming Language</u>
<u>485</u>	<u>Intermediate R Statistical Programming Language</u>
<u>500</u>	<u>Applied Statistics</u>
<u>501</u>	<u>Regression Methods</u>

<u>502</u>	<u>Analysis of Variance and Design of Experiments</u>
<u>503</u>	<u>Design of Experiments</u>
<u>504</u>	<u>Analysis of Discrete Data</u>
<u>505</u>	<u>Applied Multivariate Statistical Analysis</u>
<u>506</u>	<u>Sampling Theory and Methods</u>
<u>507</u>	<u>Epidemiologic Research Methods</u>
<u>509</u>	<u>Design and Analysis of Clinical Trials</u>
<u>510</u>	<u>Applied Time Series Analysis</u>
<u>511</u>	<u>Regression Analysis and Modeling</u>
<u>512</u>	<u>Design and Analysis of Experiments</u>
<u>513</u>	<u>Theory of Statistics I</u>
<u>514</u>	<u>Theory of Statistics II</u>
<u>515</u>	<u>Stochastic Processes and Monte Carlo Methods</u>
<u>517</u>	<u>Probability Theory</u>
<u>518</u>	<u>Probability Theory</u>
<u>519</u>	<u>Topics in Stochastic Processes</u>
<u>525</u>	<u>Survival Analysis I</u>
<u>540</u>	<u>Statistical Computing</u>
<u>544</u>	<u>Categorical Data Analysis I</u>
<u>551</u>	<u>Linear Models I</u>
<u>552</u>	<u>Linear Models II</u>
<u>553</u>	<u>Asymptotic Tools</u>
<u>555</u>	<u>Statistical Analysis of Genomics Data</u>
<u>557</u>	<u>Data Mining I</u>
<u>558</u>	<u>Data Mining II</u>
<u>561</u>	<u>Statistical Inference I</u>
<u>562</u>	<u>Statistical Inference II</u>
<u>565</u>	<u>Multivariate Analysis</u>

APPENDIX B

Acceptable courses for the English Communication Skills requirement

AgEd 400 - Communication Methods and Media

AgEd 530v - Agricultural College Teaching

Agro 501 - Graduate Student Dialogue

Agro 555 - Effective Scientific Communications

English 415 - Advanced Nonfiction Writing

English 416 – Scientific Writing

English 418 – Advanced Technical Writing and English

ESL 114G – American Oral English for Academic Purposes (English as a Second Language-ESL)

ESL 116G – Composition for Academic Disciplines (English as a Second Language-ESL)

Communications 460 - Reporting Methods

Leisure Studies 439 - Environmental Education Methods and Media

Philosophy 421 – Philosophy of Science

Philosophy 449 - Philosophical Logic

Speech Comm. 412 - Speech Criticism

Substitute courses acceptable to the Graduate Advisory Committee may be elected in satisfaction of the Communication Skills requirement.

APPENDIX C

Horticulture Graduate Course Listing

<u>Course Number and Title</u>	<u>Semester Offered</u>
514 Modern Techniques and Concepts in Plant Ecophysiology	Spring Only
517 Ecology of Plant Roots	Fall Only (odd years)
573 Interpreting Data from Experiments with Quantitative Treatments	
590 Colloquium	Fall & Spring
596 Individual Studies	All Semesters
596A **SPECIAL TOPICS**	
597 Special Topics	
600 Thesis Research	All Semesters
601 Ph.D. Dissertation Full-Time	All Semesters
602 Supervised Experience in College Teaching	Fall & Spring
603 Foreign Academic Experience	Fall & Spring
610 Thesis Research Off Campus	Fall & Spring
611 Ph.D. Dissertation Part-Time	Fall & Spring

APPENDIX D

FORMS

Plant Science Graduate Programs – Annual Student Evaluation

Student Name: _____ Advisor: _____ Date: _____

Sem & Yr began program _____ Last Committee meeting: _____ Expected Grad Date _____

M S or Ph D

Progress Toward Degree

Program _____

Progress to date	Ideal timing	Date Completed	Result (pass/fail, or committee member names)	Comments
Candidacy Exam (Ph D only)	2 nd or 3 rd semester			
Committee Appointment	By end of 2 nd (M S) or 3 rd /4 th (PhD) semester			
Proposal Meeting	By end of 2 nd (M S) or 4 th (PhD) semester			
Comprehensive exam(Ph D only)	By end of 5 th semester			
Thesis/Dissertation Defense	By end of 2.5(MS) or 5 (PhD) years			

Please give the anticipated date for your next accomplishment towards completing your degree:

Advisors are required to evaluate performance of graduate students at least once a year. Evaluations must be completed by December 1 and returned, signed by both the graduate student and advisor, to Stacy Smith, Graduate Programs Coordinator, in 101 Tyson.

The evaluation should be based on the performance of the graduate student in relation to their academic and professional qualities. The advisor is to complete the form and share the results with the graduate student. The graduate student may write a comment/statement, if desired, in the last section. Signature of the graduate student is required.

Evaluation of Student Performance

Check the box that indicates your judgment of performance for each of the items below:

	Needs Improvement	Satisfactory	Superior
Overall Academic Progress			
Overall Research Progress			
Exhibits initiative and commitment to program			
Accepts and fulfills responsibilities			
Works effectively with fellow students, staff, faculty, and other clientele			
Demonstrates integrity in data collection and reporting of research findings			
Accepts suggestions and constructive criticism			
Produces an adequate amount of work within time allotted			
Demonstrates ability to produce and report research results			
Takes advantage of opportunities for professional improvement			

Comments, concerns and/or expectations for coming year.

*Advisor Signature

Date:

*Student Signature

Date:

FORM MUST BE SIGNED BY BOTH THE STUDENT AND HIS/HER ADVISOR

M.S. Advisory Committee Appointment Form

Appointment of new M.S. Advisory Committee

Change of M.S. Advisory Committee

PRINT: Student name (last, first, middle initial)

PSU ID#

Major

Minor (if applicable)

The following faculty are recommended as committee members to direct the candidate's M.S. program:

PRINT: Chairperson of Committee

Signature

Date

PRINT: Major Member

Signature

Date

PRINT: Major Member

Signature

Date

PRINT: Outside Member (minor/
Gen studies)

Signature

Date

To be completed by student in consultation with committee Chairperson and submitted to the Graduate Program Coordinator or verification.

Approved by Graduate Program Director:

PRINT:

Signature

Date

Horticulture Proposal Meeting Evaluation Form

Student Name: _____

Date: _____

Committee Member Name: _____

Rating Scale:

1 – Not acceptable: 2 – Improvement needed: 3 – Acceptable: 4 – High quality

Description of rating factors:

1. Not acceptable: Serious shortcomings in rigor or logic of proposal; proposal poorly written; poor presentation (lack of preparation, poor command of background literature, and weak justification for proposed research).
2. Improvement needed: Serious, but correctable shortcomings in organization and logic of proposal; proposal poorly written, but can be re-written; poor presentation skills.
3. Acceptable: Some flaws in writing, approach to research or presentation; but fundamentals of proposal are good and should lead to an acceptable thesis without major change in direction of research after assistance from advisor and/or committee members.
4. High quality: Addresses significant research issue or problem in the plant sciences. Proposal well written and presentation demonstrates good preparation, command of background literature, and good justification for proposed research.

Overall rating score: _____

Comments: _____

Horticulture Program, Department of Plant Science

Please schedule the M.S. Final Exam

Student name: **Please PRINT** PSU ID#

Degree Major Minor (if applicable)

Date of Examination Location Time

Chairperson of the Committee

Major Committee Member

Major Committee Member

Member representing minor or general studies from
Another area

Name and Signature of Graduate Program Director verifying above information:

Printed Name Signature Date

Checklist for the M.S. degree

Name of Student: _____

PSU ID# _____

- | | <u>DATE</u> | <u>ACTION</u> |
|--|-------------|---------------|
| 1. English Oral Proficiency Test (AEOCPT – International only) | _____ | _____ |
| 2. Appointment of Advisory Committee | _____ | _____ |

Members of Advisory Committee	<u>AREA*</u>	<u>DEPT</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- | | <u>DATE</u> | <u>ACTION</u> |
|--|-------------|---------------|
| 3. Proposal of thesis presented to advisor. Title: | _____ | _____ |
| _____ | _____ | _____ |

- | | | |
|--|-------|-------|
| 4. Establishment and approval by advisory committee of Program of study and research | _____ | _____ |
| 5. Graduate Student Dialogue (AGRO 501) | _____ | _____ |
| 6. Scholarship and Research Integrity (SARI) Program | _____ | _____ |
| 7. Teaching Experience | _____ | _____ |
| 8. Department of Plant Science Seminar (HORT 590) | _____ | _____ |
| | _____ | _____ |
| 9. Effective Scientific Communication Course (AGRO 555) | _____ | _____ |
| 10. Annual Progress Meetings | _____ | _____ |
| | _____ | _____ |
| 11. Coursework completed | _____ | _____ |
| 12. Apply for Graduation in LionPATH | _____ | _____ |
| 13. First draft of thesis to advisory committee | _____ | _____ |
| 14. Delivery of thesis to advisory committee | _____ | _____ |
| 15. Final examination (defense) | _____ | _____ |
| 16. Final thesis copy signed by Advisory Committee and Graduate Program Director | _____ | _____ |
| 17. Thesis uploaded and accepted by the Graduate School | _____ | _____ |

****TURN OVER FOR PAGE 2 – SIGNATURES****

Approvals:

Committee Chair

Date

Graduate Program Director

Date

NOTE: *AREA = horticulture, soils, turf, minor, or general studies

Summary of Graduate Coursework for M.S. Degree

This summary accounts for graduate effort beyond the baccalaureate degree.

<u>Course Number and Title</u>	<u>Credits</u>	<u>Grade</u>
Major field, formal courses (minimum 12 credits- with 6 credits at 500-level)		
_____	_____	_____
_____	_____	_____
_____	_____	_____
400-level		
_____	_____	_____
_____	_____	_____
Minor or general studies courses (minimum of 6 credits at 400- or 500-level)		
_____	_____	_____
_____	_____	_____
Graduate Student Dialogue (AGRO 501)	_____	_____
Statistics (minimum 3 credits)		
_____	_____	_____
Department of Plant Science Seminar (minimum 2 credits – HORT 590)	_____	_____
Effective Scientific Communications Course (AGRO 555)	_____	_____
Teaching (minimum 1 credit – HORT 602)	_____	_____
Thesis Research (minimum – 6 credits)		
_____	_____	_____
_____	_____	_____
Supplementary Courses (as needed to reach minimum of 30 credits)		
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

NOTES:

1. Minimum – 30 graduate credits, 20 must be received at University Park Campus
2. Minimum – 12 credits from major courses at 500-level
3. Minimum – 18 credits at 500, 600-, 800- level
4. AGRO 602 does not count towards the 30 credit requirement, however 1 credit teaching experience is required.

Ph.D. Committee Appointment Worksheet

Appointment of new Ph.D. Committee Change of Ph.D. Committee

PRINT: Student name (last, first, middle initial)

PSU ID#

Major

Minor (if applicable)

PRINT: Chair of Committee

PRINT: Co-Chair (if applicable)

PRINT: Major Program Member

PRINT: Major Program Member

PRINT: Major Program Member

PRINT: Outside Member

PRINT: Outside Unit Member

PRINT: Minor Field Member (if applicable)

PRINT: Minor Field Member (if applicable)

PRINT: Minor Field Member (if applicable)

PRINT: Special Member(s) (Attach Vitae)

To be completed by student in consultation with committee Chairperson and submitted to the Graduate Program Coordinator or verification.

Approved by Graduate Program Director:

PRINT:

Signature

Date

Candidacy Examination Request Form

Department of Plant Science

Please schedule the English Competency and Ph.D. Candidacy Exams

PRINT: Student Name (last, first, middle initial)

PSU ID#

Major

Minor (if applicable)

Date of Examination

Location

Time

Thesis Advisor

Graduate Programs Committee Member

Examining Panel Member

Examining Panel Member

Examining Panel Member

Examining Panel Member

Procedure for an Examination

- a) Student meets with thesis advisor and members of the examining panel to arrange possible dates and location of examination
- b) Student contacts Graduate Programs Coordinator with date, time and location
- c) Student prepares and submits the appropriate materials to the examining panel
- d) Thesis advisor submits results in writing to the Graduate Programs Coordinator immediately following examination

Candidacy Exam Results

Department of Plant Science Ph.D. Candidacy Exam Evaluation Form

Student's Name: _____ Program: _____

Committee Member's Name: _____ Date of Exam: _____

Please evaluate the candidate's performance in the candidacy exam using the following 1 to 4 rating scale:

1. Not acceptable: Serious shortcomings in presentation portion of the exam (lack of organization and/or insufficient preparation; lack of rigor in explaining justification for research, methods, or results of the research paper; poor command of background science and/or logic needed to interpret results of paper; and/or unable to critique experimental design/methods/conclusions of authors of research paper). Poor verbal and/or written communication skills involving the exam. Did not demonstrate fundamental scientific knowledge, application of logic in problem solving, or communication skills needed to continue Ph.D. program.
2. Improvement needed: Serious, but correctable shortcomings in presentation portion of the exam (insufficient organization and/or preparation, rigor used in presentation; critique of experimental design/methods/conclusions of authors of research paper). Poor, but correctable, verbal and/or written communication skills. Adequate fundamental scientific knowledge, application of logic in problem solving, and communication skills; but improvement needed to continue Ph.D. program (perhaps extra course work).
3. Acceptable: Some flaws in in presentation portion of the exam, but generally well organized, appropriate level of rigor in explaining justification for research, methods, or results of the research paper; good command of background science and/or logic needed to interpret results of paper; and good critique of experimental design/methods/conclusions of authors of research paper. Good verbal and/or written communication skills. Good fundamental scientific knowledge and application of logic in problem solving.
4. High quality: Excellent presentation of research paper in candidacy exam. Well organized, appropriate level of rigor in explaining justification for research, methods, or results of the research paper; very good command of background science and/or logic needed to interpret results of paper; and very good critique of experimental design/methods/conclusions of authors of research paper. Excellent verbal and/or written communication skills. Very good fundamental scientific knowledge and application of logic in problem solving.

Overall rating score: _____

Comments:

Recommendation:

- Pass without reservation Fail without reservation
 Fail with opportunity to retake

Conditions for retake: _____

Signature of Evaluator

****Once completed, please return to Stacy Smith, Graduate Programs Coordinator, in 101 Tyson Building****

Comprehensive Examination Scheduling Worksheet

Department of Plant Science

Student Name _____ PSU ID# _____

Major _____ Minor (if applicable) _____

Date of Examination _____ Location _____ Time _____

Has student met the English competency requirement Yes No

Has student met departmental communication skills requirements Yes No

List communication courses _____, _____

The Committee is changed same as previously submitted

Chair of the committee: _____

Co-Chair (if necessary): _____

Major Field Member(s): _____

Outside Member(s): _____

Minor Field Member(s): _____

Special Member(s): _____

Approval of Committee Chair _____

Date _____

To be completed by student in consultation with Committee Chairperson, and submitted to Graduate Program Coordinator for approval and processing.

Department of Plant Science

Student Name _____ PSU ID# _____

Major _____ Minor (if applicable) _____

Date of Examination _____ Location _____ Time _____

The Committee is changed same as previously submitted

Chair of the committee: _____

Co-Chair (if necessary): _____

Major Field Member(s): _____

Outside Member(s): _____

Minor Field Member(s): _____

Special Member(s): _____

Approval of Committee Chair _____

Date _____

To be completed by student in consultation with Committee Chairperson, and submitted to Graduate Program Coordinator for approval and processing.

Checklist for the Ph. D. degree

Name of Student: _____

PSU ID# _____

	<u>DATE</u>	<u>ACTION</u>
1. English Oral Proficiency Test (AEOCPT – International only)	_____	_____
2. Assessment of English Competency and Candidacy Examination	_____	_____
3. Appointment of Advisory Committee	_____	_____
Members of Advisory Committee		
_____	<u>AREA*</u>	<u>DEPT</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
	<u>DATE</u>	<u>ACTION</u>
4. Competency evaluation	_____	_____
5. Proposal of thesis presented to advisor. Title:		
_____	_____	_____
_____	_____	_____
6. Approval by committee of study and research programs	_____	_____
7. Graduate Student Dialogue (AGRO 501)	_____	_____
8. Scholarship and Research Integrity (SARI) Program	_____	_____
9. First Teaching Experience (HORT 602)	_____	_____
10. Second Teaching Experience (HORT 602)	_____	_____
11. Annual Progress Meetings (list dates met) _____	_____	_____
12. Effective Scientific Communications Course (AGRO 555)	_____	_____
13. Comprehensive Exam	_____	_____
14. First Department of Plant Science Seminar (HORT 590)	_____	_____
15. Second Department of Plant Science Seminar (HORT 590)	_____	_____
16. Third Department of Plant Science Seminar (HORT 590)	_____	_____
17. Statistics Course	_____	_____
18. Statistics Course	_____	_____
19. Communications Course	_____	_____
20. Coursework completed	_____	_____
21. Final Exam scheduled	_____	_____
22. Apply for Graduation in LionPATH	_____	_____
23. Thesis sent to advisory committee	_____	_____
24. Final Exam taken	_____	_____
25. Final thesis copy signed by advisory committee and Department head	_____	_____

26. Thesis uploaded and accepted by Graduate School

Approvals:

Committee Chair

Date

Graduate Program Director

Date

NOTE: *AREA = horticulture, soils, turf, minor, or general studies

Summary of Graduate Coursework for Ph.D. Degree

This summary accounts for graduate effort beyond the baccalaureate degree.

<u>Course Number and Title</u>	<u>Credits</u>	<u>Grade</u>	<u>Part of M.S. Program (Sem/Yr)</u>	<u>Part of Ph.d. Program (Sem/Yr)</u>
Major field, formal courses (minimum 12 credits- at 500-level beyond the B.S. degree)				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
400-level				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Minor or general studies courses (minimum of 15 credits at 400- or 500-level)				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Statistics (6 credits of statistical methods beyond the B.S. degree of which a minimum of 3 credits shall be 500-level)				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Communication Skills Requirement (minimum – 3 credits)				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Graduate Student Dialogue (AGRO 501)				
_____	_____	_____	_____	_____
Effective Scientific Communications Course (AGRO 555)				
_____	_____	_____	_____	_____
Department of Plant Science Seminar (minimum 3 credits during Ph.D. program)				
<u>HORT 590</u>	_____	_____	_____	_____
<u>HORT 590</u>	_____	_____	_____	_____
<u>HORT 590</u>	_____	_____	_____	_____
Teaching (minimum 2 credits during Ph.D. program)				
<u>AGRO 602</u>	_____	_____	_____	_____
<u>AGRO 602</u>	_____	_____	_____	_____

Thesis Research (minimum – 12 credits)

Supplementary Courses (as required to fulfill program needs)

NOTES:

- 1) Total Ph.D. coursework is not specified by the Department, but is normally 55 to 60 credits of courses (excluding seminar, teaching, and research credits) beyond the baccalaureate.
- 2) Credits may be applied in more than one category.