

GUIDE TO GRADUATE PROGRAMS

in

AGRONOMY and SOIL SCIENCE

Updated July 2009

**THE DEPARTMENT OF CROP AND SOIL SCIENCES
THE PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY PARK, PA**

Guide to Graduate Programs in Agronomy and Soil Science

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Introduction

This guidebook describes the requirements for graduate admissions and for completion of Agronomy and Soil Science graduate degrees in the Department of Crop and Soil Sciences 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 the guidebook is maintained on the Department of Crop and Soil Sciences website (<http://www.cropsoil.psu.edu>). If you have suggestions for improving this guidebook, please complete the response form in the Appendix and return it to the Department of Crop and Soil Sciences at 116 ASI Bldg., University Park, PA 16802.

Section I. General Policies

A. 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 Crop and Soil Sciences as described in:

- Graduate Degree Programs Bulletin (<http://www.psu.edu/bulletins/whitebook/>);
- Guide to Graduate Programs in Agronomy and Soil Science (this publication);
- Other policies of the Department that are published in the departmental handbook (<http://cropsoil.psu.edu/Internal/Handbook.pdf>).

Before the end of the second semester of attendance, students should choose a thesis 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 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 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.

B. The Scholarship and Research Integrity (SARI) Program

Penn State offers training in the responsible conduct of research (<http://www.research.psu.edu/orp/sari/>). The SARI program has two parts: (i) an online program (<http://www.citiprogram.org/>) 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 and a College workshop on the topic offered in January prior to the start of spring semester.

C. Guiding Principles for Good Practice in Graduate Education

The Department endorses the Graduate School Guidelines for good practice in Graduate Education (<http://www.gradsch.psu.edu/policies/faculty/guiding.html>) 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.gradsch.psu.edu/current/documents/GraduateStudentResources.pdf>

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 the academic process. To this end an annual graduate student review is required of all students advised by faculty in the Department of Crop and Soil Sciences (see form on following page).

D. 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.

E. Responsibilities of the Graduate Program Head/Coordinator

- 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 Coordinator Meetings.
- Coordinate program reviews and learning outcomes assessments.

F. Annual Graduate Student Review Form

Department of Crop and Soil Sciences—Annual Graduate Student Review

Student Name: _____ Advisor: _____ Date: _____

Matriculation date: _____ Degree sought: _____ Cumulative GPA: _____ Expected date of graduation: _____

Committee Formed: Yes _____ No _____, Date of last committee meeting: _____

For Ph.D., date of completion of: Candidacy Exam _____ Comprehensive Exam _____

The Degree Checklist is up-to-date and the student is on track for completion of his/her program ___ Yes, ___ No

Advisors are required to evaluate the performance of graduate students at least once a year. Evaluations must be completed and returned to the Department Head by June 15 (students will not be reappointed for the next academic year until this form is completed). A copy of the evaluation will be placed in the student's departmental file.

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:

	Unsatisfactory	Needs Improvement	Satisfactory
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 and expectations for coming year (use additional sheets as necessary):

Advisor Signature Date

I agree _____; disagree _____ with this evaluation.

Comments:

Student Signature Date

Section II. Masters of Science Degree

A. Overview

This is a research-oriented degree for those who expect to terminate their education at graduation 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 Crop and Soil Sciences.

Whether terminal or doctoral-oriented, the objectives of 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., the students are expected to have developed the capacity for independent research.

B. Admission Requirements

1. Baccalaureate Degree

A baccalaureate degree from an undergraduate program in Agronomy or Soil Science, or having an emphasis in natural science, is preferred.

2. Expected Background

Background in basic and applied natural sciences, including minimum credits in the following areas:

- Communication skills (9 credits), including technical writing (3) and speech (3).

For Agronomy:

- Chemistry, mathematics, and physics (10 credits distributed among all categories).
- Biological science (8 credits), including botany.
- Agronomy, geology, and plant science (12 credits), including soil science and crop science.

For Soil Science:

- Chemistry, mathematics, and physics (14 credits), including chemistry (8), mathematics (3), and physics (3).
- Soil Science (3 credits).

3. Grade Point Average

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

4. Graduate Record Examination

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

5. 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 TOEFL (Test of English as a Foreign Language) or the IELTS (International English Language Testing System). 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 between 15 and 18 may be considered for provisional admission. The minimum composite score for the IELTS is 6.5.

C. 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 traditional agronomy or soil science backgrounds:

1. Deficiencies in Preparation

Students with deficiencies in agronomy or soil science 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.

2. 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.

3. 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.

D. Procedures for Admission

1. Contact Information

Inquiries about the Agronomy or Soil Science graduate programs should be sent to:

Graduate Program Head
116 Agricultural Sciences and Industries Building
Penn State University
University Park, PA 16802
<http://cropsoil.psu.edu/>

2. Application Packet

A complete application includes: completed Graduate School application form 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, 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 3**. International students should submit their applications at least nine months before the beginning of the semester for which they are applying. Information on the online application system is available at: <http://cropsoil.psu.edu/academic/gradapply.cfm>.

3. Evaluation by the Department Graduate Programs Committee

Applicants for graduate study in Agronomy or Soil Science are evaluated by the Department of Crop and Soil Sciences Graduate Programs Committee and potential advisors who consider (1) previous coursework, (2) academic performance (grade-point average), (3) GRE scores, (4) TOEFL/IELTS scores when appropriate, (5) appraisal of deficiencies, (6) personal goal statement, (8) information given on Graduate School application forms, and (9) letters of recommendation. Recommendation to the Graduate School for acceptance or rejection of an applicant is made by the Department Head in consultation with the proposed faculty advisors.

E. Advisory Committee

1. 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. Refer to <http://cropsoil.psu.edu/academic/gradfaclist.cfm> for a list of graduate faculty in department-associated programs.

2. Thesis Advisor/Chairperson

The thesis advisor will serve as chair of the committee.

3. 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 Head for confirmation and appointment. Proposed members can decline the opportunity to serve.

4. Establishing a Committee

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

5. Responsibilities of the Committee

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

6. Meetings of the Committee

- a. 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. Details of the thesis research are given in item II-H. The thesis advisor and student should ensure that committee members from other departments are informed of the M.S. requirements of the Department of Crop and Soil Sciences' graduate programs.
- b. On completion of the academic program and thesis, a final examination will be conducted by the committee.

7. M.S. Advisory Committee Appointment Form

- Appointment of new M.S. Advisory Committee
- Change of M.S. Advisory Committee

Student name (last, first, middle initial) PSU Student ID

Degree sought Major Minor

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

Chairperson of the Committee Confirmation signature

Other member from major program Confirmation signature

Other member from major program Confirmation signature

Member representing minor or general studies from another graduate program Confirmation signature

To be completed by student in consultation with Committee Chairperson and submitted to The Graduate Program Head for approval.

Name and Signature of Graduate Program Head verifying above information:

Printed Name Signature Date

F. 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 9-12 credits per semester to maintain fulltime status.

1. 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. For a student with a one-half time assistantship, approximately two years will be required to complete the M.S. degree.

a. 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 Crop and Soil Sciences and other departments 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 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 500-level coursework, excluding seminars and independent studies).

b. 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.

Six credits of 400 or 500-level formal courses in a minor or general studies area. Seminar or independent studies courses are excluded, except where such courses are specifically allowed by the minor department.

c. Statistical Methods

Three credits at the 500-level. 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.

d. Graduate Student Dialogue

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

e. Agronomy/Soils Seminar

One credit of Agronomy/Soils Seminar course (see Appendix A for seminar details).

f. Thesis Research

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

g. 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.

h. 500- and 600-Series Work Combined

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

2. Additional Courses

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

3. Seminar Attendance

The candidate is expected to regularly attend the Agronomy/Soils Seminar each semester of registration at the University Park Campus.

4. Teaching Experience

Teaching requirements are specified in section G.

5. Final Examination

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

6. Summary Checklist

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

G. Teaching Experience

1. General Requirement

A teaching experience is required of all M.S. students in the Department. This experience shall consist of one semester of assistance with one section of a course documented by at least one credit of Agro/Soils 602. (Note: Even though one credit of Agro/Soils 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 head, and department head.

2. 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.

3. English Test for Teaching

Graduate students whose native language is not English are required to take and pass the Penn State American English Oral Communicative Proficiency Test before they can teach at Penn State. The Program in English as a Second Language 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://aplng.la.psu.edu/academicPrograms/ita_whatIsAEOCPT.php.

H. Research and Thesis

1. 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 for a master's program will reflect the intended career and degree of experience of the candidate, and the time available for the program.

2. 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.

3. 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 or 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. No evaluation of performance in terms of pass or fail will be made. However, the student, thesis advisor, and the advisory committee must agree upon the disposition of all recommendations.

4. Written Progress Report for Annual Committee Meetings

Annual meetings of the advisory committee will be scheduled to review the progress of the 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.

5. Thesis Format

The finished research will be assembled in approved thesis form (refer to <http://www.gradsch.psu.edu/current/thesis.html>).

I. Final Examination

1. Purpose and Procedure

- a. The final examination will be administered by the M.S. advisory committee.
- b. This is an oral examination of the student's completed thesis. The student should be able to marshal a 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.
- c. The committee may also examine the student on academic studies and may recommend that a portion of the examination be written.

2. Scheduling

- a. 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 place of the examination.
- b. Student contacts each member of the committee and arranges a convenient date and time for the examination.
- c. Thesis advisor contacts the Graduate Program Head with date, time, place, and list of advisory committee members. The Graduate Program Head schedules the examination by letter and sends a copy to the student.
- d. Student delivers 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 essentially in compliance with the form required for the Graduate School.
- e. Student prepares a summary of his/her records indicating compliance with degree requirements (see sections J and K). Copies are supplied to advisory committee members and Graduate Program Head.
- f. Thesis advisor presents the results of the final examination in writing to the Graduate Program Head immediately following the examination.

3. Final Examination and Ph.D. Candidacy Examination

The final M.S. examination is not to be combined with the Candidacy Examination for the Ph.D.

4. Examination Request Form

Department of Crop and Soil Sciences, The Pennsylvania State University

Please schedule the M.S. final exam

Student name (last, first, middle initial) PSU Student ID

Degree Major Minor

Date of Examination Place Time

Chairperson of the Committee

Other member from major graduate program

Other member from major graduate program

Member representing minor or general studies from another area

Name and Signature of Graduate Program Head verifying above information:

Printed Name

Signature

Date

J. Checklist for the M.S. Degree

Name of Student _____ PSU Student ID _____

- | | <u>Date</u> | <u>Action</u> |
|---|-------------|---------------|
| 1. English Oral Proficiency Test (International only) | _____ | _____ |
| 2. Appointment of Advisory Committee by Program Head | _____ | _____ |

<u>Members of Advisory Committee:</u>	<u>Area*</u>	<u>Department</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- | | | |
|--|-------------|---------------|
| 3. Proposal of thesis presented to advisor. Title: | <u>Date</u> | <u>Action</u> |
| _____ | _____ | _____ |
| 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. Seminar | _____ | _____ |
| 9. Annual progress meetings | _____ | _____ |
| 10. Coursework completed (see form K) | _____ | _____ |
| 11. Notification to Graduate School of intent to graduate | _____ | _____ |
| 12. First draft of thesis due in advisor's hands | _____ | _____ |
| 13. Delivery of thesis to advisory committee | _____ | _____ |
| 14. Final examination | _____ | _____ |
| 15. Final thesis copy signed by Advisory Committee and Program Head | _____ | _____ |
| 16. Thesis accepted by the Graduate School | _____ | _____ |

Approvals:

_____	_____	_____	_____
Committee Chair	Date	Graduate Program Head	Date

NOTE: *Area = agronomy, soils, turf, minor, or general studies

K. Summary of Graduate Coursework for M.S. Degree

This summary accounts for graduate effort beyond the baccalaureate degree.

<u>Course Number and Title</u>	Credits	Grade
Major field, formal courses (minimum – 12 credits)		
500 level (minimum – 6 credits)		
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
400 level		
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
Minor or general studies courses (minimum – 6 credits)		
500 or 400 levels		
_____	_____	_____
_____	_____	_____
Graduate Student Dialogue (Agro 501)	_____	_____
Statistical Methods (minimum – 3 credits at the 500 level)		
_____	_____	_____
Seminar (minimum – 1 credit of Agro/Soils 590)		
_____	_____	_____

Teaching (minimum – 1 credit of Agro/Soils 602)

Thesis Research (minimum – 6 credits)

Supplementary Courses (as needed to give a total of 30)

NOTES:

1. Minimum - 30 graduate credits, 20 credits at University Park.
2. Minimum - 12 credits of 500-level.
3. Minimum - 18 credits at the 500- and 600-level.
4. Maximum - 6 credits of Agronomy/Soils 600 or 610 to meet the 30 graduate credits requirement.
5. One credit or equivalent of teaching experience is required, but does not count towards the 30 credit degree requirement.

Section III. Doctor of Philosophy Degrees

A. 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 (1) satisfy the Graduate School residence requirements, (2) complete the coursework approved by the advisory committee, (3) accomplish the required research and prepare a thesis embodying the research findings, and (4) pass the examinations and complete the requirements prescribed by the Graduate Program and Graduate School.

Full acceptance into the Ph.D. program requires that the Candidacy Examination be passed.

B. Admission Requirements

1. M.S. or Equivalent Degree

An M.S. or equivalent degree from a graduate program in natural science, but note exception in section C-4.

2. Expected Background

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

3. Grade Point Average

A cumulative grade point average of 3.25 for the master's program.

4. Graduate Record Examination

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

5. 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 TOEFL (Test of English as a Foreign Language) or the IELTS (International English Language Testing System). 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 between 15 and 18 may be considered for provisional admission, which requires an institutional test of English proficiency upon first enrollment and, if necessary, remedial coursework. The minimum composite score for the IELTS is 6.5.

6. 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.

C. 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 traditional agronomy or soil science backgrounds:

1. Deficiencies in Preparation

Students with deficiencies in agronomy or soil science 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

2. 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 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.

3. 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.

4. 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 and the Department Head.

D. Procedures for Admission

1. Contact Information

Graduate Program Head
Department of Crop and Soil Sciences
116 Agricultural Sciences and Industries Building
Penn State University, University Park, PA 16802-3504 USA
<http://cropsoil.psu.edu/>

2. Application Packet

A complete application includes: completed Graduate School application form 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, 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 application should be completed by **January 3**. International students should have their applications submitted at least nine months before the beginning of the semester for which they are applying.

Information on the online application system is available at:

<https://cropsoil.psu.edu/academic/gradapply.cfm>

3. Evaluation by the Department Graduate Programs Committee

Complete application packets for graduate study in Agronomy or Soil Science are evaluated by the Department of Crop and Soil Sciences Graduate Programs Committee and potential advisors who consider the applicant's (1) previous coursework, (2) academic performance (grade-point average), (3) GRE scores, (4) TOEFL/IELTS scores, when appropriate, (5) appraisal of deficiencies, (6) personal vita, (7) personal goal statement, (8) information given on Graduate School application forms, and (9) letters of recommendation. Recommendation for acceptance or rejection of an applicant is made by the Department Head in consultation with the proposed faculty advisors to the Graduate School.

4. Completing M.S. Degree and Continuing for the PhD Degree

A master's candidate who completes his/her degree or is near completion and wants to continue in the Crop and Soil Sciences Department as a candidate for the Ph.D. degree needs to complete a "Resume Study/Change of Graduate Degree or Major" form

(<http://forms.gradsch.psu.edu/ges/reschg2.pdf>) and submit it to the Office of Graduate Enrollment Services, 114 Kern Building, at least six months prior to expected admission to the PhD program. In addition, the candidate should prepare a new goal statement and arrange to have three letters of recommendation sent to the Graduate Program Head. The candidate's documents (some items can be secured from the applicant's M.S. file) will be reviewed by the Department's Graduate Programs Committee and a recommendation for admission will be submitted to the Department Head.

E. Advisory Committee for the Ph.D. Degree

1. Committee Membership for the Ph.D. Degree

The committee will consist of five or more active members of the graduate faculty, at least two members must be from the graduate major program. One or more members must be from outside the major graduate program that will be chosen to represent the minor or related area. Refer to <http://cropsoil.psu.edu/academic/gradfaclist.cfm> for a list of graduate faculty in department-associated programs.

2. Thesis Advisor/Chairperson

The thesis advisor will serve as chair of the committee.

3. 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 Head for confirmation and appointment. Proposed members may decline the opportunity to serve.

4. Establishing a Committee

The committee will be established soon after the student has passed the Candidacy Examination.

5. Responsibilities of the Committee

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

6. Meetings of the Committee

- a. Presentation and approval of thesis research proposal.
- b. Competency evaluation.
- c. Annual progress meetings.
- d. Comprehensive examination.
- e. Final examination.

7. Ph.D. Committee Appointment Worksheet

Department of Crop and Soil Sciences, The Pennsylvania State University

Appointment of new Ph.D. Committee

Change of Ph.D. Committee

Student name PSU Student ID

Major Minor (optional)

Chair of the Committee

Co-Chair (if necessary)

Major Program Member(s)

Major Program Member(s)

Major Program Member(s)

Outside Member(s)

Outside Member(s)

Minor Field Member(s)

Minor Field Member(s)

Special Member(s) (Attach Vitae)

Approved by Committee Chairperson Date

To be completed by student in consultation with Committee Chairperson, and submitted to The Graduate Program Head for approval prior to processing official University form.

F. Course and Credit Requirements

1. Coursework Program

The coursework program 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 thesis plans are considered tentative until approved by the advisory committee.

2. Minimum Graduate Credits

The Ph.D. program should include 55 to 60 credits of formal coursework earned beyond the baccalaureate. Additional seminar, teaching, and research credits are required. For students holding a 1/2 time assistantship, approximately three years beyond the M.S. will be necessary to complete the Ph.D.

3. 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.

a. Major Field, Formal Courses

The 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 Crop and Soil Sciences and other departments 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 BS degree are required. 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.

b. 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 thesis 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 Crop and Soil Sciences; and (2) seminar or independent study courses, except where such courses are specifically allowed by the minor departments.

c. Language or English Communications

Minimum of six credits as described in section G.

d. Statistical Methods

Six credits of statistical methods beyond the BS degree of which a minimum of three shall be 500 level. 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).

e. Graduate Student Dialogue

One credit of AGRO 501 during the first fall semester.

f. Agronomy/Soils Seminar

Two credits of Agronomy/Soils Seminar (see Appendix A for details of seminar).

g. Thesis Research

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

h. Supplemental Credits

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

4. Additional Courses

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

5. 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:

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

- b. Only one credit of seminar may be included.
- c. Special problem courses are excluded.
- d. The student's minor department must concur on the acceptability of courses in the minor.

6. Residence Requirements

Over some 12-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 as a registered full-time student engaged in academic work on campus.

7. Seminar Attendance

The candidate is expected to routinely attend Agronomy/Soils Seminar each semester of registration at the University Park Campus.

8. Communications Requirements and Examinations

Communications requirements and examinations for the Ph.D. are specified in section G.

9. Teaching Experience

Teaching requirements are specified in section H.

10. Summary Checklist

These requirements are summarized in the check lists (K and L). It is the responsibility of the student to maintain these checklists, and to have them approved by the Major Advisor and Graduate Program Head prior to graduation.

11. Doctoral Advisory Committee Participation

The doctoral advisory committee has the responsibility to review the courses and credits proposed by the student and the thesis 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.

G. Communications and Foreign Language Requirements for the Ph.D. Degree

1. English Competency

The Graduate School requires all candidates for the degree of Doctor of Philosophy to demonstrate competence in the use of the English language, including reading, writing, listening, and speaking. In compliance, the Department of Crop and Soil Sciences requires:

- a. English competency will be evaluated as part of the Candidacy Examination.
- b. 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.
- c. 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.
- d. Students with English deficiencies will repeat the English competency section of the Candidacy Examination and perform satisfactorily before scheduling the Comprehensive Examination.

2. Communication Skills Requirement

Candidates for the Ph.D. must meet the Communication Skills requirement prior to scheduling comprehensive examinations. Six credits in English communication skills and 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:

- (1) One 3-credit 400 or 500 series course of advanced English technical composition. English 418 (Advanced Technical Writing and English) is recommended.
- (2) Three credits of 400 or 500 courses chosen from a departmentally approved list of courses (see section (6) below).
- (3) Three credits of 400 or 500 writing intensive courses may be accepted in lieu of English courses or a selection from the departmental list with approval of the Graduate Programs Committee.
- (4) 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.

(5) Completion of at least six credits of university-level coursework in one foreign language with a grade point average of at least 2.5 as an undergraduate or graduate student. The G-series courses offered by some University language departments are preferred for graduate students.

(6) Acceptable courses for the English communication skills requirement include:

Ag. Ed. 440, Communications Methods and Media

Ag. Ed. 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

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

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

H. Teaching Experience

1. 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 Agro/Soils 602 with at least 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 thesis advisor, graduate program head, and department head.

2. 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.

3. English Test for Teaching

Graduate students whose native language is not English are required to take and pass the Penn State American English Oral Communicative Proficiency Test before they can teach at Penn State. The Program in English as a Second Language 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/academicPrograms/ita_whatIsAEOCPT.php.

I. Research and Thesis for the Ph.D. Degree

1. Attributes of Ph.D. Thesis 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.

a. 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.

b. Valid Research

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

c. 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. theses of the highest quality should result when students, thesis 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.

2. Thesis Problem

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

3. Thesis Research Proposal Presentation and Approval

Thesis 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 second 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.

The advisory committee will suggest changes to be considered by the student and the thesis 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.

4. 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 or 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 the student in consultation with the thesis 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 thesis research and graduate study program. The committee members will make recommendations to be addressed by the student and the thesis advisor. No evaluation of performance in terms of pass or fail will be made. However, the student, thesis advisor, and the advisory committee must agree upon the disposition of all recommendations.

5. Written Progress Report for Annual Meetings

Annual meetings of the advisory committee will be scheduled to review the progress of the 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.

6. Thesis Format

The finished research will be assembled in approved thesis form (refer to <http://www.gradsch.psu.edu/current/thesis.html>).

J. Examinations

1. General Scheduling Guidelines

- a. Student meets with the thesis advisor to ensure that all the requirements for the examination have been met, and to arrange possible dates and place of the examination.
- b. Student contacts each member of the committee and arranges a convenient date and time for the examination.
- c. Thesis advisor contacts Graduate Program Head with date, time, place, and list of committee members.
- d. Graduate Program Head confirms the scheduled examination by letter (through the Graduate School in the case of the comprehensive examination) and sends a copy to the student.
- e. Student prepares summary of his or her records and appropriate materials for the examination.
- f. The thesis advisor submits the examination results to the Graduate Program Head in writing immediately following the examination. In the case of the comprehensive examination, the thesis advisor also returns the completed Graduate School report form.

2. Assessment of English Competency

a. Objective:

To determine if the student can demonstrate a satisfactory level of competence in the use of the English language, including reading, writing, and speaking.

b. Scheduling:

This examination should be scheduled in conjunction with the Candidacy Examination.

c. Procedure of the examination:

- (1) A candidate will prepare a written summary of a journal article selected by the student's advisor. The summary will be submitted to the examining committee one week before the oral examination date.
- (2) The oral examination will occur during the Candidacy Examination.
- (3) The student makes a 15-minute oral presentation of the written summary during the examination period. Each member of the committee will be asked to rate the candidate's performance writing and speaking competency.
- (4) The outcome of the examination will be reported to the Graduate Program Head for transmission to the Graduate School.
- (5) Alternatively, a student in agreement with his/her advisor may elect to forego the examination and pursue a remedial work plan.

d. Evaluation of performance:

- (1) Satisfactory
- (2) Unsatisfactory (see items e and f, following)

e. Reporting results:

The thesis advisor submits the examination results to the Graduate Program Head in writing immediately following the examination.

f. Improvement of English competency:

- (1) Students 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 section G (English Communications Skills).
- (2) The choice of appropriate remedial and advanced courses will be made by the student's thesis advisor and advisory committee.

g. The Assessment of English Competency Examination must be satisfactorily completed before the Comprehensive Examination is scheduled.

3. Candidacy Examination

a. Objective: To determine if the student is qualified in terms of basic intellect, attitude, and previous training to successfully pursue a Ph.D. program.

b. Scheduling:

(1) The examination may be taken after at least 18 credits have been earned beyond the baccalaureate.

(2) 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.

c. Procedure of the examination:

(1) An oral examination will be administered by the prospective thesis committee. The thesis 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 procedure and content. Each committee member will have up to 30 minutes to question the student. At the end of the questioning period, each committee member will be asked to rate the candidate's performance.

(2) At the discretion of the committee or request of the student, a written examination may be given in addition to an oral examination.

(3) Candidates must be registered for the semester (excluding summer session) in which the candidacy examination is taken. 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 thesis advisor or the Chair of the Graduate Programs Committee.

d. Evaluation of performance:

(1) Pass without reservation.

(2) 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.

(3) Fail without reservation.

e. Reporting results:

The Graduate Programs Committee chair submits the examination results to the Graduate Program Head in writing immediately following the examination.

4. Examination Request Form

Department of Crop and Soil Sciences, The Pennsylvania State University

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

Student name (last, first, middle initial) PSU Student ID

Degree Major Minor

Date of Examination Place 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 place of the examination**
- B) Student contacts Graduate Program Head with date, time, and place**
- C) Graduate Program Head schedules examination by letter and sends copy to student**
- D) Student prepares and submits the appropriate materials to the examining panel**
- E) Thesis advisor submits results in writing to Graduate Program Head immediately following the examination**

5. Comprehensive Examination

a. Objective:

To determine if the candidate 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 thesis.

b. Scheduling:

The comprehensive will be given when, in the student's and the thesis 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 PhD program. Two weeks advance notice is required by the Graduate School for scheduling the comprehensive examination.

c. Procedure of the examination:

The examination will include written and oral parts.

- (1) 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. The thesis advisor will be responsible for direction and supervision of the written examination sessions. Each committee member will correct his or her part and return it to the student within one week after the examination.
- (2) Within 10 days after the date of the final written examination, the advisory committee will conduct an oral examination. The questions raised in the oral examination may be suggested by, but not be limited to, the student's performance on the written examination. Each advisory 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 parts.

d. Evaluation of performance on the examinations:

- (1) Pass without reservation.
- (2) Pass with reservations (to be defined by the committee).

- (3) Fail with option to retake the examination once at a date no later than one semester following the first examination.
 - (4) Failure without option for reexamination.
- e. Outcome of the examination will be reported by the thesis advisor to the Graduate Program Head and to the Graduate School on the forms provided by the Graduate School.

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

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

6. Comprehensive Examination Scheduling Worksheet
The Pennsylvania State University

Student name _____ PSU Student ID _____

Degree _____ Major _____ Minor _____

Date of examination _____ Place _____ 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 Head for approval and processing.

7. Final Oral Examination

a. Purpose:

The core of the examination is a defense of the thesis, with the following criteria:

- (1) Has the candidate demonstrated originality, creativity, and resourcefulness in the conduct of research?
- (2) Does the research utilize proper experimental designs, appropriate techniques, and is the research adequately described?
- (3) Is the candidate able to conduct a satisfactory defense of methods, findings, and conclusions of the research in the thesis?
- (4) Is the candidate sufficiently knowledgeable of the literature of the thesis subject, and can the candidate place his or her contribution in proper context with the literature?
- (5) Is the thesis research worthy of publication in a refereed scientific publication?
- (6) Is the thesis an adequate example of scholarly exposition?

b. 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. Two weeks advance notice is required by the Graduate School in scheduling the final examination.

c. Preparation:

Both the student and the thesis adviser are responsible for ensuring that a complete draft of the thesis has been prepared with adequate consultation with the members of the thesis committee well in advance of the oral examination. Major revisions to the thesis should be completed before this examination. The thesis should be in final form with all sections completed at the time of the examination. A copy of the completed thesis should be delivered to each committee member at least one week before the scheduled examination.

d. Examination procedure:

The examination consists of an oral presentation of the thesis by the candidate and a period of questions and responses. The questions will focus on the dissertation, but may cover the candidate's entire program of study. Little time during the examination should be spent on minor editorial comments that can be worked out in separate meetings with committee members. At least three members of the thesis committee must be physically present at the examination. Other committee members may join through distance communications linkages. These exceptions are limited and must be pre-approved by the Graduate School.

e. Outcome

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

8. Final Examination Scheduling Worksheet
The Pennsylvania State University

Student name _____ PSU Student ID _____

Degree _____ Major _____ Minor _____

Date of examination _____ Place _____ 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 Head for approval and processing.

K. Checklist for the Ph.D. Degree

Name of Student _____ PSU Student ID _____

- | | <u>Date</u> | <u>Action</u> |
|---|-------------|---------------|
| 1. English Oral Proficiency Test (International only) | _____ | _____ |
| 2. Assessment of English Competency and Candidacy examination | _____ | _____ |
| 3. Appointment of Advisory Committee | _____ | _____ |

<u>Members of Advisory Committee:</u>	<u>Area*</u>	<u>Department</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 | _____ | _____ |
| 10. Second teaching experience | _____ | _____ |
| 11. Annual progress meetings | _____ | _____ |
| | _____ | _____ |
| 12. Language requirement or communications courses completed | _____ | _____ |
| 13. Comprehensive exam | _____ | _____ |
| 14. First seminar | _____ | _____ |
| 15. Second seminar | _____ | _____ |
| 16. Coursework completed (see Form L) | _____ | _____ |
| 17. Final exam scheduled | _____ | _____ |
| 18. Notification to Graduate School of intent to graduate | _____ | _____ |
| 19. Thesis sent to advisory committee | _____ | _____ |
| 20. Final examination taken | _____ | _____ |
| 21. Final thesis copy signed by the advisory committee and
department head | _____ | _____ |
| 22. Thesis accepted by Graduate School | _____ | _____ |

Approvals:

_____	_____	_____	_____
Committee Chair	Date	Graduate Program Head	Date

NOTE: *Area = agronomy, soils, turf, minor, or general studies

L. Summary of Graduate Coursework for Ph.D. Degree

This summary accounts for graduate effort beyond the baccalaureate degree.

Course Number/Title	Credits	Grade	Part of M.S. Program (Sem., Yr.)	Part of PhD Program (Sem., Yr.)
Major field, formal courses (minimum – 12 credits of 500 level beyond the BS degree)				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
400 level				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Minor or general studies courses (minimum – 15 credits)				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Course Number/Title	Credits	Grade	Part of M.S.	Part of PhD
			Program (Sem., Yr.)	Program (Sem., Yr.)
Statistical Methods (6 credits of statistical methods beyond the BS degree of which a minimum of 3 shall be 500 level)				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Communication Skills Requirement (minimum – 6 credits)				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Graduate Student Dialogue				
_____	_____	_____	_____	_____
Seminar (minimum – 2 credits during Ph.D. program)				
<u>Agronomy/Soils 590</u>	_____	_____	_____	_____
<u>Agronomy/Soils 590</u>	_____	_____	_____	_____
Teaching (minimum – 2 credits during Ph.D. program)				
<u>Agronomy/Soils 602</u>	_____	_____	_____	_____
<u>Agronomy/Soils 602</u>	_____	_____	_____	_____
Thesis Research Credits (minimum – 12 credits during Ph.D. program)				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
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.

Section IV. Minor Study in Agronomy or Soil Science

A. M.S. Minor in Agronomy or Soil Science

1. Course requirements

The student will take at least 6 credits of 400 or 500-level formal courses in the Agronomy or Soil Science 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. Agronomy or Soil Science minor.

2. Seminar requirement

The student will register for 1 credit of an Agronomy/Soils Seminar course and present one seminar.

B. Ph.D. Minor in Agronomy or Soil Science

1. Course requirements

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

2. Seminar requirements

The student will register for 1 credit of Agronomy/Soils Seminar course, present one seminar, and participate in a second semester of the seminar course without being required to make a presentation.

APPENDIX A

Agronomy/Soils Seminar

1. Objectives

The Agronomy/Soils Seminar 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 Agronomy/Soils 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.

2. 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.

3. Attendance

All faculty and graduate students of the Department of Crop and Soil Sciences, including students in interdepartmental degree programs, have the responsibility to regularly attend the Agronomy/Soils 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.

4. Seminars Required for Graduate Degrees

- a. Master's degree students and interdepartmental degree program candidates will give one Agronomy/Soils Seminar (1 credit). Ph.D. candidates will give two seminars (2 credits) in addition to the seminar given for the M.S. degree.
- b. The seminar requirement will have equivalent status to every other requirement for a particular degree. The Graduate Program Head will not certify that the graduation requirements have been completed without evidence that the seminars have been given.

- c. 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.
- d. 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 Crop and Soil Sciences and the interdepartmental group to meet this requirement.

5. Student's Seminar Topics

a. Master's degree students

- (1) Report of thesis research is required.
- (2) Report will be scheduled when the thesis is complete or nearly so.
- (3) Seminar will be prepared and presented as a professional report. See stipulations for the Ph.D. program (see section b (2), following).

b. Ph.D. students

- (1) The first seminar may either be on a topic not related to the student's thesis subject matter, or it may be a presentation of proposed thesis research:
 - (a) The non-thesis seminar topic will be on a professional level. Except for the historical perspective, the student should focus on the recent scientific literature.
 - (b) 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.
 - (c) The seminar will be given during the first 18 months of the student's enrollment.

- (2) Report of thesis research will be the second seminar required for the Ph.D. program.
 - (a) Report will have the same degree of professionalism required for the first seminar and will be prepared for an audience representing a range of agronomic interests.
 - (b) Report will be scheduled when the thesis is complete or nearly so.

6. Duties of the Committee in Charge

- a. The Seminar Committee will be appointed by the Department Head about 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.
- b. Chairperson will be responsible for arranging the seminar schedule. Seminars on completed theses may be scheduled at times other than the regular seminar dates, if requested by the student and thesis advisor. Students must plan their seminar times well in advance so that the seminar chairperson can work out a satisfactory schedule.
- c. After the student seminars have been scheduled, the committee will arrange for the Department of Crop and Soil Sciences faculty and guest speakers to fill out the schedule of seminars.
- d. Grading for student seminars will be pass/fail and will be assigned by the chairperson in consultation with the rest of the committee.

7. 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.

APPENDIX B

Suggestions for Improving This Document

I suggest the following for consideration:

Page No.	Suggestion

Name (optional) _____

Please submit to the Graduate Program Head, Room 116 ASI Bldg.