



## Guidelines for graduate students in Soil and Crop Sciences, Cornell University

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### **Graduate Program Overview**

The Graduate School at Cornell is organized into over 90 disciplinary fields, which are voluntary groupings of faculty members and scientists with similar areas of interest. Fields at Cornell are subdivided into subject areas and concentrations.

About 33 faculty have been drawn together into the field of Soil and Crop Sciences by mutual professional interests in the concentrations of Environmental Information Science, Environmental Management, Field Crop Science, Soil Science, and Agronomy. The field of Soil and Crop Sciences is closely linked with the Section of Crop and Soil Sciences, an administrative unit within the School of Integrative Plant Science and the College of Agriculture and Life Sciences at Cornell. Most members of the field are also faculty members in the Section. As recognized fiscal units of the college, the department administers teaching, extension programs, and salaries, as well as all research funds and the graduate student financial support derived from research funds. The field of Soil and Crop Sciences is responsible for determining admissions of new graduate students to the field, maintaining records of graduate student progress, nominating students for awards and fellowships, and setting guidelines for requirements within the field.

The Director of Graduate Studies (DGS) is the representative of the field to the Graduate School. This faculty member organizes the review and evaluation of application materials, recommends the admission of students, coordinates financial assistance, organizes the annual review of graduate students, and serves as a liaison between students and faculty members.

[Dr. Olena Vatamaniuk](#) is currently serving as the DGS for Soil and Crop Sciences.

Students admitted to the field may choose emphasis in any of the five concentrations. Examples of areas of specialization within these concentrations include: crop production and physiology, forest soils, plant stress, seed reproduction and physiology, soil fertility, soil genesis, soil

microbiology, soil morphology, soil physics, soil and water chemistry, and weed science. Students may apply for admission to the M.P.S. (Agriculture and Life Sciences), M.S., M.S./Ph.D., or Ph.D. programs. Students at the Bachelor of Science (B.S.) level may apply to either an M.S. program or an M.S./Ph.D. program. In the latter program, they can go through an integrated program that includes both degrees.

All Soil and Crop Sciences degree programs offer students the opportunity to supplement intensive coursework in the section with coursework from related disciplines. All graduate degree programs in the field of Soil and Crop Sciences are individualized to suit students' interests, backgrounds, and goals. Students must, however, satisfy minimum university and field requirements, either through prior work at another institution or through work at Cornell. Each student works closely with a major professor and a graduate special committee. This group of faculty members determines Field requirements based on the student's training and career goals, and on each committee's composition.

**Students must earn two units of residence credit for an M.S. degree and six units for a Ph.D. degree (2+4 for M.S./Ph.D.). One unit can be granted for each semester of full-time study, as explained in the section entitled "Requirements for Degrees." Oral or oral/written examinations are also required for all graduate degrees, according to schedules organized by the student's special committee.**



### **The Special Committee**

The Cornell University board of trustees awards degrees, acting on the recommendations of the graduate faculty, which, in turn, acts on the recommendations it receives from the special committees. These special committees, which are unique in composition for each graduate student, supervise and evaluate the performance of students during the graduate program.

Each special committee is chaired by a major professor, who is a member of the Field of Soil and Crop Sciences, and also is affiliated with the Major Concentration chosen by the student. Each committee has at least one additional (minor) member if it is supervising a student accepted for an M.S. program. Special committees supervising students accepted for a Ph.D. program have at least two additional (minor) members, with at least one representing a Concentration outside of Soil and Crop Sciences.

The special committees determine coursework programs for students, evaluate progress by recommending a suitable number of residence credits at the end of each semester, and conduct examinations required by the graduate faculty. Students are free to select members of their special committees. For students accepted by the Field of Soil and Crop Sciences, each committee can include only one voting member from any single area of concentration. Students can, however, include additional nonvoting members on their committees if they wish.

The graduate faculty has delegated to the Fields the authority to establish general coursework requirements and criteria for evaluating performance in courses. The Field of Soil and Crop Sciences, which does not have coursework requirements, usually defers to the judgment of students' special committees regarding this matter. An exception is the M.P.S. degree, which has specific requirements. Evaluation of overall performance and progress of students is determined annually by the Field.

At the end of each semester, chairs of special committees evaluate academic performance and/or progress on thesis research and report to the graduate faculty. Each student's performance is reported either as satisfactory, with the recommendation that the maximum appropriate residence credit be awarded; as partially satisfactory, with recommendation that less than the maximum residence credit be awarded; or as unsatisfactory, with the recommendation that no residence credit be awarded. These recommendations take into account reports that other members of the special committees forward to the chairs.

The graduate faculty requires students to pass certain examinations conducted by the special committee. Ph.D. students are required to take an admission to candidacy exam ("A" exam) and a defense of thesis dissertation exam ("B" exam). The "A" exam is open to all Field faculty who desire to participate. The Field of Soil and Crop Sciences may establish its own policies with respect to examinations or defer to the judgment of the special committee, whose members may require that at least part of the examination be written. (Most examinations are entirely oral.)

It is seldom appropriate to change the chair of the special committee. Sometimes a change may be necessary; the chair may go on sabbatical leave at a crucial time or leave the university entirely. Occasionally, the student's evolving interests converge with those of another professor, and everyone concerned may agree that a change is appropriate. Approval of the change may depend on whether funds are available to provide support for the student after the change is made. This decision necessarily involves the Director of Graduate Studies, the present chair, the proposed chair, and the department chair if a change in funding source is involved. Students should not seek a change simply because they believe another professor would have different expectations with respect to coursework or research requirements.

The major professor (chair), the Director of Graduate Studies, or the Graduate Field Assistant will be able to answer questions and discuss special circumstances regarding the special committee, the chair of the special committee, and residence requirements.

## Major Professors

Major professors are responsible for graduate students' academic programs. Most students will know which faculty members will serve as their major professors before they begin their graduate work. Normally the major professor will also be the thesis director, although there are circumstances when that may not be the case. Both the major professor and the thesis director, however, will be members of the student's



Research on Arabidopsis root uptake of heavy metals; Vatamaniuk lab

special committee, and the major professor will serve as its chair.

Selecting a major advisor represents a commitment on the part of the graduate student and the faculty member to working together intensively for a number of years. The faculty member should share with the new graduate student their perspective and expectations.

Graduate students are encouraged to meet with current members of the faculty member's program and discuss the realities of working with the faculty member. Do not ignore the role of personalities in the working relationship between faculty and student. Working with someone who you get along with can have major benefits, and trying to work with someone who you do not get along with can produce major problems.

## **Course Guidelines for Degree Programs**

The following are course guidelines for graduate students majoring or minoring in one of the concentrations in the Field of Soil and Crop Sciences. These guidelines were developed to promote a minimum level of knowledge and experience in the major and minor field. They are not intended to restrict students' options in pursuing independent and diverse course programs, but students are expected to adhere to these guidelines except under extenuating circumstances. The course guidelines may be met by equivalent courses taken at other institutions as part of earlier degree programs. In some cases, courses may be substituted for those in closely-related subjects offered in SCS or other departments. The seminar requirement is firm and must be met by all students. Satisfactory seminar attendance involves attending at least seven presentations for each semester. Sign in for seminar at [sips.cals.cornell.edu/news-events/seminar-check](https://sips.cals.cornell.edu/news-events/seminar-check).

Please note that in addition to the course requirements listed below all Masters and Doctoral students should register each semester for 12 credits of Graduate Research Credits. Graduate students are expected to be engaged in graduate research full time and this effort is reported by registering for research credits. Students *in absentia* or on leave of absence do not register for research credits. Note, students can register for a maximum of 22 total credits per semester (including research credits and course credits). Course codes for masters/doctoral level research credits are: 8200/9200, 8600/9600, 8800/9800 for crop sciences, environmental information sciences, and soil sciences and respectively.

### **Concentration of SOIL SCIENCE**

Major Degrees MS and MPS (Agriculture and Life Sciences) degrees: 12 credits of soil science courses, of which at least 8 credits are at the 4000 level or above, and 3 are at the 6000 or 7000 level (research credits are excluded). Two semesters of a seminar course of which at least one is PLSCS 6970, and one graduate course in Statistical Methods.

Ph.D. degree. Same as for MS plus 12 additional credits from major or minor fields, of which 6 are at the 6000 or 7000 level (research credits are excluded), and two additional semesters of a seminar course, of which at least one is PLSCS 6970.

Minor Degrees All degrees: 6 credits of courses in soil science.

### **Concentration of CROP SCIENCE**

Major Degrees MS and MPS (Agriculture and Life Sciences) degrees: 4 credits of plant physiology, 8 credits of crop science of which at least 3 credits are at the 6000 or 7000-level (research credits are excluded), two semesters of a seminar course of which at least one is PLSCS 6970, and one graduate course in Statistical Methods.

Ph.D. Degree: same as for MS plus 12 additional credits from major or minor fields, of which 6 are at the 6000 or 7000 level (research credits are excluded), and two additional semesters of a seminar course, of which at least one is PLSCS 6970.

Minor Degrees: all degrees: 6 credits of courses in crop science.

### **Concentration of AGRONOMY**

Major Degrees MS and MPS (Agriculture and Life Sciences) degrees: 4 credits of crop science, 4 credits of soil science, 3 credits of 6000- or 7000-level crop or soil science (research credits are excluded), two semesters of a seminar course of which at least one is PLSCS 6970, and one graduate course in Statistical Methods.

Ph.D. degree: 6 credits of applied crop science, 6 credits of soil science, plus 9 credits of 6000 or 7000-level courses from the major or minor fields (research credits are excluded), and two additional semesters of a seminar course, of which at least one is PLSCS 6970.

Minor degrees: all degrees: 6 credits of courses in crop science or soil science.

### **Concentration of ENVIRONMENTAL INFORMATION SCIENCE (EIS)**

Major Degrees MS and MPS (Agriculture and Life Sciences) degrees: 15 credits of EIS and related courses (as listed below), of which at least 3 are at 6000 or 7000 level (research credits are excluded). Two semesters of a seminar course of which at least one is PLSCS 6970, and one graduate course in Statistical Methods.

Ph.D. degree. same as above plus 12 additional credits from major or minor fields, of which 6 are at the 6000 or 7000 level (research credits are excluded), and two additional semesters of a seminar course, of which at least one is PLSCS 6970.

Minor degrees: all degrees: 6 credits of courses in EIS.

EIS Courses (not exhaustive): Geographic Information Systems and Technology including: Geographic Information Systems; Spatial Modeling and Analysis Statistical/Mathematical Modeling including: Statistical Methods; Spatial Statistics; Quantitative Statistics; Space-Time Statistics; and Data Mining Earth Measurement including: Resource Inventory Methods; Remote Sensing and Digital Image Processing; Environmental Biophysics; Global Positioning System Environment including: Soil and Water Sciences; Ecology; Natural Resources; Biological and Environmental Engineering; Ecology and Evolutionary Biology; and Environmental and

Resource Economics. Computing including: Programming; Modeling; Database Management; and Computational Methodologies.

## **Responsibilities of Graduate Students**

All graduate students are provided with field, laboratory and/or greenhouse space and materials to accomplish the research required for their degrees. Depending on their funding source, students may be expected to participate in other projects their major professors consider appropriate, even though projects may not be directly related to their own degree programs or research. Participation in such projects should enhance each student's graduate training, but it will not be so extensive and demanding that it prolongs the graduate program beyond the time normally required for completion of M.S. and Ph.D. degrees.

Students are responsible for initiating discussions with major professors concerning thesis research, coursework, and special committee appointments and meetings. They should also let their major professors know about any financial or personal problems that threaten their progress toward the completion of degree requirements. This kind of communication enables the major professors and the Field, through the Director of Graduate Studies, to be of maximum assistance in ensuring that each student's experience at Cornell is intellectually rewarding and personally satisfying.

## **Responsibilities of Major Professors and Sponsors**

### **Major professors (or supervisors) have the following obligations to graduate students:**

Have a general knowledge of the student's ability to handle personal financial affairs.

Make arrangements for office space and facilities for the student.

Consult with the student regarding a special committee and see that the student proposes names to the Director of Graduate Studies and the Graduate School for approval.

Ensure that the special committee has approved the course of study by the end of the first semester of residence.

Ensure that the special committee has approved the thesis research proposal for an M.S. degree by the end of the second semester and the dissertation proposal for a Ph.D. degree by the end of the second semester of residence.

Approve the student's annual report before it is submitted to the Field.

Approve the thesis draft before it is presented to other committee members.

Involve the special committee in the early stages of the student's proposed course of study and research project.

Assume major responsibility for the intellectual, scientific, and technical guidance of the student.

## **Performance Guidelines and Requirements**

### **A. Course Performance**

Course guidelines have been developed to promote a minimum level of knowledge and experience in the major field and concentration (see Course Guidelines). Students are expected to adhere to these guidelines except under extenuating circumstances, in agreement with the special committee and the graduate field. Any course grade of C+ or lower, a grade of "incomplete", or an overall GPA below 3.0, does not constitute satisfactory course performance. Students whose overall GPA drops below 3.0 are considered to be "on probation" and will receive a notice from the Director of Graduate Studies (DGS). Research credits are assigned S/U grades only, and are excluded from the overall GPA. A student on probation has one semester to improve his or her course performance, or the field may elect to discontinue the student's field membership. Extenuating circumstances will be discussed in the annual review meeting (see below). The above criteria are minimum performance criteria, and do not exclude special committees from setting more stringent criteria for individual students.

### **B. Research Performance**

Research performance is evaluated by the special committee. The field expects the research to be original and substantive, and meet the requirements of the special committee. Students are required to develop research proposals that are presented to the special committee and are filed with the Graduate Field Assistant (GFA) (see Review Process below).

### **C. Teaching Experience**

For the Ph.D. degree, the field requires that all students gain experience in teaching. This requirement can be satisfied by assisting in the teaching of an entire course (as a TA), or by assisting a faculty member in other projects associated with teaching that meet the approval of the special committee chair and the DGS. Examples of such teaching experience are the development and offering of lab exercises, a module of several lectures to improve a course, or by assisting in the development of an extension workshop or teleconference. Exceptions to this requirement may be granted to students who have extensive prior university-level teaching experience.

### **D. Seminar**

The field requires that each M.S. and M.P.S. (Agriculture and Life Sciences) student present a half-hour seminar presentation on their research prior to degree completion. Ph.D. students are required to give a half-hour seminar presentation on their research proposal prior to the A exam, and one full-hour seminar presentation on findings of research prior to the B exam. Seminar presentations are expected to be given in the Section of Crop and Soil Sciences seminar series during fall or spring semesters (other series will be considered upon request). Planning ahead for this is important.

## Review Process

### *New Students*

1. Faculty chair nomination should be done by the end of the third week of the first semester. Special committee selection should be completed before the end of the second semester of graduate study for MS, and by the end of the third semester for PhD.
2. New students must meet with their special committee, develop a course work plan, and file it with the GFA before the end of the first semester of residence. The course plan and course grades from the first semester of residence will be evaluated by the Field of Soil and Crop Sciences prior to the start of the second semester of residence.
3. New students must file an approved thesis research proposal with the GFA before the end of the second semester of residence. The thesis research proposal is developed in consultation with, and must meet the approval of, the student's special committee.

### *Other Students*

Course guidelines have been developed to promote a minimum level of knowledge and experience in the major field and concentration (see Appendix). Students are expected to adhere to these guidelines except under extenuating circumstances, in agreement with the special committee and the graduate field.

Progress reports and grades on file with the GFA are available for review by all field members. Each student's progress will be evaluated at the annual meeting of the Soil and Crop Sciences faculty held in the early fall of each year. Upon request of the DGS, the Chair of the Special Committee (or another member of the Special committee, in the absence of the Chair) will present a brief evaluation of the student, to precede discussion of students who have indications of unsatisfactory progress. If overall progress is considered unsatisfactory by the graduate field, it may instruct the DGS to put the student on probation or require remedial work.

## Guidelines for Graduate Students doing Research Abroad

*(While these are not strict requirements, justification of any deviations from these guidelines should be described fully as part of the student's annual Soil and Crop Sciences review.)*

1. A research program should be well developed before the student goes abroad. This includes: a) demonstrating a good understanding of the system they are working in. b) a literature review of the type of research that has been done in their area of interest. c) developing clear, testable hypotheses that will likely make significant contributions to the field of Soil and Crop Sciences.
2. The student should satisfactorily complete their A-exam before leaving to embark on research abroad.



### **Graduate Student Spotlight!**

Ann-Bybee-Finley, SCS graduate student, in a wheat field in Bangladesh

3. Graduate student research should be conducted at an established regional, national or international center or university. Arrangements for funding, housing, field and laboratory facilities (including accessibility to email) and personnel support should be fully arranged in advance and agreed to in writing by the potential advisor, her/his unit head, and funding agencies supporting the research and the student. Cornell commitments also should be expressed in writing and communicated to the overseas advisor and unit head.



Johannes Lehmann and graduate students visiting an Ethiopian farm.

4. At least one person at the institute who is willing to act in an advisory role to the student should be identified before student departure. This person should have qualifications or expertise similar or equal to those of a graduate field member at Cornell and must be approved by the chair of the student's graduate committee.

5. If possible, a member of the student's special committee should visit the student and inspect their work at least once while the student is abroad. On completion of their international research, the student should return to Cornell and complete their dissertation before embarking on new international projects.



## Summary of Guidelines for Graduate Students

1. Be thoroughly familiar with the Graduate School's requirements.
2. Register for at least three credits each semester while at the university. During periods away from the university, a student may register in absentia, paying a small fee for each semester and maintaining full student status and insurance. Students who have passed the admission to candidacy exam (A-exam) for a Ph.D. degree may take a leave of absence if conditions described by the graduate school are met. A leave of absence terminates all student benefits, including graduate research assistantships. If the A-exam has not been passed, a student may take a leave of absence by special petition. Graduate students absent for more than one year must follow a special re-entry procedure to resume their work on campus. The Graduate School, major professors, and the Director of Graduate Studies can provide more information about special cases of registration.
3. Select a major professor (mutually agreeable to both parties) by the end of the first semester of residence.
4. Select a special committee (thus establishing minor areas of concentration) before the end of the second (MS) or third (PhD) semester of residence and ensure that the forms appointing this committee are signed, submitted, and approved.

5. Outline a course program and meet with the special committee to discuss and approve the program by the end of the second semester of residence.
6. Prepare a thesis research proposal for an M.S. degree by the end of the second semester or a dissertation proposal for a Ph.D. degree by the end of the second semester of residence. (The special committee may require this information at a time earlier than those specified.)
7. Maintain a 3.0 grade point average.
8. For the Ph.D. degree, complete the admission to candidacy exam (A-exam) in a timely manner. Note that two residence units must be obtained before the A-exam can be taken as well as between the A-exam and the final exam.
9. For the A-exam and the final exam (M.S. or Ph.D. degrees), submit an approved schedule form to the Graduate School no later than one week before the examination.
10. Know in detail the Graduate School's format requirements for thesis writing.
11. Consult frequently with the major professor while writing the thesis or dissertation for assistance and guidance in general arrangement, presentation of data, and writing style. The thesis should not be presented to the special committee until it has been approved by the major professor and prepared in the proper format.
12. Anticipate time requirements. Allow at least two weeks for reading the thesis and give ample notice for meetings and examinations.
13. Plan to complete the degree requirements in a reasonable time. For example, students with B.S. degrees should complete the requirements for the M.S. degree within two years. Those with M.S. degrees should complete requirements for the Ph.D. degree within three years.
14. Be aware of deadlines associated with graduation.
15. Consult with special committee members often and keep them informed. It is particularly important to confer regularly with minor members of the committee concerning research results, thesis content, and progress toward the degree. For maximum effectiveness, the committee should meet at least annually.
16. Obtain the major professor's permission before borrowing equipment or supplies or soliciting any substantial help from staff members who are not on the supervisory committee. Students should also consult their major professors before planning absences from campus.
17. Obtain authorization from the major professor before entering into a contract with any university service (for example, the Nutrient Analysis Laboratory or Media Services) and before purchasing supplies or materials.

18. After completing research work, clean facilities and work areas, dispose of soil or plant samples, and return borrowed equipment.
19. Learn and practice safety procedures for the type of research being conducted; and report accidents immediately.
20. Prepare an annual student report, unless the student is on leave of absence.
21. Present a departmental exit seminar prior to completion of the degree. Prepare to schedule this during the SCS Seminar Series. These usually need to be scheduled a semester in advance.
22. Know in detail all requirements of graduate students by the Field of Soil and Crop Sciences.