

Unit Review

Graduate Program

What is the main purpose of the graduate program and how does it fit in the context of the discipline and compare to similar programs at institutions in the state, region, and or/nation?

Program Title: Agronomy
Department: Crop & Soil Sciences

Degrees Granted: Master of Crop & Soil Sciences (MCSS)
Master of Plant Protection and Pest Management (MPPPM)
Master of Science in Agronomy (M.S.)
Doctor of Philosophy in Agronomy (Ph.D.)

College: Agricultural and Environmental Sciences

The purpose of the program is to provide graduate students with an educational experience at the MCSS, MPPM, M.S., and Ph.D. levels to prepare them for positions in extension, academia, and industry. MPPM, MCSS, and M.S. students typically fill positions in the extension service as well as in agricultural, environmental, and regulatory industries. Ph.D. students commonly fill research and development positions in academia and industry. Following are descriptions for each of the degrees offered.

Master in Crop & Soil Sciences (MCSS)

The MCSS is a non-thesis degree. The objective of this graduate program is to provide students with strong communication and technical skills as well as in-depth knowledge in either Crop Science or Soil Science. The program of study must consist of a minimum of 33 semester hours of course work, including 3 hours of internship or special problems. Students must choose between two areas of concentration: Crop Science or Soil Science (Appendix J). All of the courses must be at the 6000 or higher level, and at least two of these courses (exclusive of the special problems, internship, and seminar courses) must be for graduate students only. In addition to the internship or special problems course, MCSS students are required to take one graduate course in technology, one graduate course in statistics, and a total of three graduate courses from two or more core-knowledge areas in soil or crop sciences. An example of a program of study for the MCSS degree can be found in Appendix J.

Master of Plant Protection and Pest Management (MPPPM).

The Master of Plant Protection and Pest Management (MPPPM) is an interdepartmental degree program between the departments of Crop and Soil Sciences, Entomology, and Plant Pathology. The objective of this program is to produce graduates with comprehensive, multidisciplinary training in entomology, plant pathology, and weed science so that they can solve pest management problems routinely encountered by growers and other agricultural professionals. Integrated pest management using pesticides, cultural operations, and biological solutions to pest problems is stressed. The program of study must consist of a minimum of 33 semester hours of

course work, including 1 hour of internship (Appendix J). An example of a program of study for the MPPM degree can be found in Appendix J.

M.S. in Agronomy (M.S)

The objective of the graduate program for the M.S. in Agronomy is to provide students with a fundamental understanding of the scientific method, to develop their ability for critical thinking, to provide them with strong communication and technical skills, and to give them in-depth knowledge in one of the following areas: plant breeding and genetics, biotechnology, weed control, crop production and management, forage production and utilization, soil chemistry, soil physics, atmospheric physics, soil classification and genesis, soil erosion and conservation, soil fertility and plant nutrition, or soil microbiology. This is a research degree that requires the successful completion of a research problem and submission of a written thesis that documents the research. In addition, M.S. students are provided with opportunities to participate in professional societies and activities in Crop and Soil Sciences (e.g. membership and activities in state, regional, and national/international organizations), and to win awards and recognition within the University and at regional and national levels. At the end of their program, M.S. students are expected to be able to conduct original research and be prepared to enter a Ph.D. program or a non-academic position.

The program of study for the M.S. degree must include at least 30 hours of courses at the graduate level, including 3 hours of CRSS 7300 (Master's Thesis) and a maximum of 6 hours of CRSS 7000 (Master's Research). At least 12 of the remaining 21 hours (or more) of course work must be made up of courses open only to graduate students (6000-no undergraduates, or 8000 level). Examples of programs of study for the M.S. degree in Agronomy for students emphasizing Crop Science and Soil Science can be found in Appendix J.

Doctor of Philosophy in Agronomy (Ph.D.)

The objective of the graduate program for the Ph.D. in Agronomy is to provide students with a fundamental understanding of the scientific method, to develop their ability for critical thinking, and to provide them with strong communication and technical skills as well as with in-depth knowledge in one of the following areas: plant breeding and genetics, biotechnology, weed control, crop production and management, forage production and utilization, soil chemistry, soil physics, atmospheric physics, soil classification and genesis, soil erosion and conservation, soil fertility and plant nutrition, or soil microbiology. This degree program train students to undertake original research with minimal supervision and requires the submission of a written dissertation documenting the successful completion of a research problem. In addition, Ph.D. students are provided with opportunities to participate in professional societies and activities in Crop and Soil Sciences and to win awards and recognition within the University, and at regional and national levels. At the end of their program, Ph.D. students are expected to be able to conduct original research and teach courses in their area of specialty.

The program of study for the Ph.D. degree must carry a minimum of 30 hours of course work, including 3 hours of CRSS 9300 (Doctoral Dissertation) and 16 or more hours of 8000- and 9000-level courses. Semester hours of CRSS 9000 (Doctoral Research), CRSS 9300 (Doctoral Dissertation), and independent study courses may not be counted in these 16 hours. The program

of study for a student who bypasses the Master's degree must contain 4 hours of University of Georgia courses open only to graduate students in addition to 16 semester hours of 8000 and 9000-level courses. Examples of programs of study for the Ph.D. degree in Agronomy for students emphasizing Crop Science and Soil Science can be found in Appendix J, respectively. The Advisory Committee administers both written and oral preliminary examinations upon the Ph.D. student completing the course work on the program of study.

While a formal assessment to compare our graduate program to that of other departments in the nation has not been conducted, our faculty members interact with colleagues throughout the nation and are frequently invited to participate in scientific conferences and to serve on national review panels. Our graduate students regularly secure important positions in academia and industry. These are clear indications of the stature of our faculty and the quality of the graduate program in our department.

How does the program contribute to or affect the Unit's mission and goals?

Graduate student education is an essential component of the research and education missions of the Department of Crop & Soil Sciences of the University of Georgia. Crop and soil sciences are the foundation for developing a productive and efficient agricultural system while maintaining or enhancing natural resources. Graduate students in M.S. and Ph.D. programs carry out research of local, national, and international relevance. Research of local relevance is aimed at addressing the agronomic and environmental needs of agricultural and urban clientele. Examples of research objectives of local relevance are developing forages and crops adapted to the state, improving the efficiency of agricultural and turf production systems, and developing management practices to minimize the environmental impact of urban and agricultural by-products generated in the state. An example of research of national and international relevance is biotechnology work aimed at developing genomic information for crops such as soybean and sorghum, and for forages such as alfalfa and white clover.

What are the program's main strengths and weaknesses?

Among the program's strengths are the excellent quality of our faculty who dedicate much effort to the development of up-to-date graduate courses, and who provide graduate students with the opportunity to participate and be exposed to advanced research projects in crop and soil sciences. Among the weaknesses in the Ph.D. program are limited teaching training as well as limited or non-existent professional training on responsibilities other than research after graduation (personnel management, project management, service on committees, etc.). Another weakness is that the number of Ph.D. students in some of the subdisciplines (for example, Soil Science) is close to or below the "critical mass" required to justify 8000-level course offerings.

What curricular and administrative changes have been made in the program since the last review and what are the reasons for those changes?

A description of the program's administration is provided first, followed by changes made since the last review. Ultimate responsibility for the graduate program rests with the Department Head, who delegates responsibility to the Graduate Committee, chaired by the Graduate Coordinator. The Graduate Committee consists of five members (including the chair) appointed by the Department Head for a three-year term. Three members are appointed from the Graduate Faculty

in Athens, one member from the Graduate Faculty in Griffin, and one member from the Graduate Faculty in Tifton. The Graduate Committee evaluates qualifications of graduate applications and recommends applicants for admission. Criteria considered for admission include GPA for courses taken in undergraduate and graduate work, basic science and math background, GRE (Verbal + Quantitative) scores, letters of reference, and statement of purpose. General guidelines for GPA and GRE scores are as follows.

For M.S. and MCSS Degree Programs

Overall GPA ≥ 2.8 and GRE ≥ 1000 ; or
overall GPA ≥ 3.1 and GRE ≥ 900 ; or
overall GPA ≥ 3.4 and GRE ≥ 800

For MPPM Degree Program

Overall GPA ≥ 3.0 and GRE ≥ 900

For Ph.D. Degree Program

Completion of an M.S. program or equivalent and GPA on M.S. program of 3.5 and GRE ≥ 1000 . Students are expected to have an M.S. degree or equivalent from a U.S. college for admission to the Ph.D. program. The M.S. degree or equivalent obtained from non-U.S. universities must be evaluated by the Graduate Committee for acceptance.

In addition to evaluating applications, the Graduate Committee also addresses course, curricula, and other program issues, and makes recommendations to the faculty. The Graduate Coordinator with the assistance of a Degree Program Specialist informs the faculty about applicants recommended for acceptance, handles communications with prospective and newly-admitted students, reviews programs of study for compliance with university and departmental requirements, reviews annual graduate student evaluations, and collects information for the Graduate Program Learning Assessment Plan.

Since the last departmental review, curricular changes include the requirement for graduate students to take a communications course (CRSS 8100 Advanced Agronomy Graduate Seminar) and to have at least one course in Statistics. Among administrative changes are the placement of the Degree Program Assistant under the supervision of the Graduate Coordinator to expedite communication and improve performance. Previously, the Degree Program Assistant was under the supervision of the Department Head. Also, in 2005 the department developed and approved a Graduate Learning Assessment Plan, which is currently being implemented.

What evidence can you provide that your students are attaining the program's learning outcomes and what changes are needed in the program to improve their performance?

In 2005, the department developed and approved a Graduate Learning Assessment Plan which uses the following measures to obtain data with which to assess achievement of the student learning objectives outlined in the plan (Appendix J).

1. Completion of a Student Performance Evaluation form by each member of a student's Advisory Committee at the Oral Preliminary Exam and at Dissertation/Thesis defense meetings (Form I).
2. Written record of Exit interviews with the Department Head (Forms II and III)
3. Annual report by the Graduate Coordinator to the Department faculty on number, GPA, and GRE scores of entering graduate students.
4. Survey of supervisors/administrators of graduates one year after graduation (Form IV).
5. Survey of graduate advisors for students in a Ph.D. program one year after receiving an M.S. degree from our department (Forms V).
6. Survey of graduate students one year after graduation (Form VI).

How are graduate students admitted, advised, mentored, and monitored for progress through the program?

Admission

The Graduate Coordinator, with the assistance of the Degree Program Specialist, sends the electronic dossiers of applicants recommended for acceptance by the Graduate Committee to the faculty. When a faculty member contacts the Graduate Coordinator to express interest in a student recommended for acceptance, any needed assistantship funds are identified (from the department, from the faculty member, or from a combination of both) and the Graduate Coordinator encourages the faculty member to contact the prospective student to discuss potential research projects. Once the prospective student expresses interest in working with a given faculty member, the student is formally recommended for acceptance to the Graduate School. After the Graduate School informs the student about his/her acceptance, the department sends a letter to the student to offer him/her a graduate assistantship (teaching or research - see draft letter in Appendix J). The student is expected to sign the letter and return it to the department to indicate acceptance of the offered assistantship. Once the student arrives, he/she is given a document containing Guidelines and a Checklist to ensure timely progress towards his/her graduate degree (Appendix J). In addition, the student is directed to our website (www.cropsoil.uga.edu), where Graduate Student Resources are available.

Advising

M.S., MPPPM, and MCSS students are expected to have their Advisory Committee formed by the end of the first semester of residence. The Advisory Committee for M.S. and MCSS students consists of the major professor and at least two other members, with the majority of the committee members having graduate faculty status. The Advisory Committee for MPPPM students consists of at least three faculty members, one from each of the departments involved in this interdepartmental degree (Crop & Soil Sciences, Entomology, and Plant Pathology). The Advisory Committee will approve the student's program of study, which should be submitted to the Graduate Coordinator by the end of the first semester. The Advisory Committee will also

approve the thesis proposal for M.S. students, which should be submitted to the Graduate Coordinator by the end of the second semester.

Ph.D. students are expected to have their Advisory Committee formed by the end of the second semester of residence. The Advisory Committee for a Ph.D. student consists of the major professor and at least four additional members, with the majority of the committee members having graduate faculty status. Also, one of the members has to be from another department. This committee will approve the student's program of study and dissertation proposal, which should be submitted to the Graduate Coordinator by the end of the second semester. The Advisory Committee will also conduct preliminary and final examinations.

Mentoring

Mentoring of graduate students is mainly done by the major professor with cooperation from members of the student's Advisory Committee.

Monitoring

Student's progress towards the degree is monitored by the Graduate Coordinator in cooperation with the student's major professor. For that purpose, the Graduate Coordinator provides the student's major professor with a checklist showing faculty responsibilities toward graduate students (See Appendix J). In addition, in May of each year, the Advisory Committee evaluates the student's progress towards the degree and submits an evaluation form signed by all committee members (see Appendix J).

How are graduate students trained to make oral presentations, write manuscripts or grant proposals, lecture, and/or provide laboratory instruction? Does the Unit have provisions for student's professional development beyond the discipline?

All graduate students are required to take CRSS 8100 (Advanced Agronomy Graduate Seminar), in which they receive training on preparing and delivering oral presentations. Also, although not required, most students are encouraged to take CRSS 8010 Research Methods, where they receive training on conducting literature reviews, writing proposals, and making oral presentations. In addition, Ph.D. students are required to have a guided teaching experience at least during one semester (for example take CRSS 7990/9990 Teaching Practicum, take an education course, or a combination thereof). M.S. students are encouraged (but not required) to have a similar guided teaching experience. The Advisory Committee is expected to provide guidance for the teaching experience, evaluate it, and provide feedback to the student.

To allow professional development beyond the discipline, the department provides funds to cost-share travel of graduate students to scientific meetings. Requests are made to the Graduate Coordinator and are assigned competitively, with priorities based on importance of the meeting and significance of the individual's participation. Priority is given to those who present research papers or exhibits.

How are departmental teaching/laboratory assistants chosen, how are duties assigned, what training and mentoring is provided for students in these assignments, and how is performance evaluated? What is the average instructional load for these students?

The department receives state funds for Graduate Research Assistantships (GRAs) and Graduate Teaching Assistantships (GTAs), which are awarded to help students support themselves while earning graduate degrees, and to help the university fulfill its responsibilities in teaching and research. Offers of assistantship are made by the Department Head at the request of the Major Professor, after approval of admission by the Graduate Committee and Graduate School. Once an assistantship is awarded, the student must make satisfactory progress toward completing degree requirements and must satisfactorily perform his/her assigned duties in order to be reappointed. Appointments are made for a one-year period, with reappointment for subsequent years. Normal duration of the assistantship is 2.5 years for the M.S. and 3.5 years for the Ph.D. Assistantships currently pay \$15,500 per year for M.S. students and \$16,500 per year for Ph.D. students.

Assistantships may be terminated following any semester during which the student does not maintain a GPA of at least 3.0 or does not perform satisfactorily in assigned duties. If the GPA of a student falls below 3.0 he/she is given a semester of grace in which to bring overall grades up to the 3.0 minimum.

Students on regular (0.40 time) graduate assistantships are expected to work an average of 16 hours per week, or the equivalent thereof, over and beyond the work required to earn credit for CRSS 7000/7300 and 9000/9300, or other courses for which they are registered. This work may or may not be in duties associated with the student's research problem, and may be entirely teaching or research, or a combination of teaching and research duties. Supervisors must provide a written evaluation of the performance of graduate students in their assistantship duties by May 30 of each year (see Appendix J).

The department employs two Graduate Teaching Assistants that are selected from the pool of applicants recommended for acceptance. These two GTA's are assigned to help with laboratory sections of CRSS 3060 Soils and Hydrology. A typical load consists of one laboratory section per Teaching Assistant. New GTA's in the Department are required to attend Orientation sessions given by the Center for Teaching and Learning (OISD) at the beginning of their first semester teaching. During the first week of classes GTA's working in the Introductory course (CRSS 3060) meet with the course instructors and discuss items such as course mechanics, GTA responsibilities, and course philosophy in a 1-2 hr session. Grading mechanics (including spreadsheets) are covered, as well as the University policies on academic honesty and how they should be enforced. Course instructors always attend at least the beginning of each of the individual lab sessions held by the GTA's. During the semester, course instructors commonly give GTA's feedback on their presentations to the class (in terms of presentation style and content) and attempt to provide suggestions for improving their performances. At the end of the semester the GTA's are formally evaluated by the instructors and by the students, and this information given to the GTA's. Depending on the individual GTA's interest in teaching,

informal discussion meetings are used to explore ideas in post-secondary education of interest to graduate students...

Funds available for graduate research assistantships are assigned by the Department Head, in consultation with the Graduate Committee, based on the following criteria:

1. Whenever possible, a full GRA is assigned to each Assistant Professor (with a research/teaching appointment) for a period of three years after the initial faculty appointment.
2. Whenever possible, priority for GRAs in excess of those needed for Assistant Professors is given to faculty members without state-funded technicians
3. GRAs in excess of those needed for Assistant Professors and for faculty members without state-funded technicians are assigned to other faculty members with research/teaching appointments. These GRAs are at least 50% cost-shared by the faculty members receiving them.

What information exists on the placement and success of your graduates?

Graduate enrollment, graduate degrees conferred, and graduate credit hours for the last seven years.

Degree	Variable	98-99	99-00	00-01	01-02	02-03	03-04	04-05
M.S	Graduate Enrollment	15	20	26	20	20	23	23
	Graduate Degrees Conferred	7	6	4	11	8	6	6
	Average Completion Time (yr)	2.8	2.6	2.5	2.5	2.5	2.9	3.2
MCSS	Graduate Enrollment	0	0	0	1	0	1	2
	Graduate Degrees Conferred	0	0	0	0	1	0	0
Ph.D.	Graduate Enrollment	21	14	13	17	13	16	17
	Graduate Degrees Conferred	3	7	2	4	4	2	1
	Average Completion Time (yr)	4.6	4.6	4.2	4.4	4.4	6.0	3.4
	Graduate Credit Hours	N/A	589	654	758	828	762	928