

Plant and Soil Sciences

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Graduate study offered in the Department of Plant and Soil Sciences leads to the Master of Science in Plant and Soil Sciences degree with concentrations in Agronomy, Horticulture, or Weed Science and also to the Doctor of Philosophy degree in Plant and Soil Sciences with a concentration in Agronomy, Horticulture, or Weed Science. The Horticulture concentration within the Plant and Soil Sciences degrees also offers a minor in Floral Management. The department has an extensive research program which provides a diversity of problems for thesis and dissertation research under the supervision of experienced and highly trained scientists. The Department of Plant and Soil Sciences offers graduate programs in Plant Breeding and Genetics, Molecular Biology, Crop Modeling, Agronomy, Soil Science, Crop Physiology, Weed Science, Turfgrass Science, Remote Sensing, and Horticulture. A Precision Agriculture Certificate is also offered.

Graduate programs are designed to develop skills in research techniques in reference to the individual needs of each student. This program is developed and administered by a departmental committee within the student's area of specialization and may include courses in mathematics and statistics, biology, chemistry, biochemistry, remote sensing, etc., as well as agronomic, horticultural, and weed science courses. Graduate assistantships are provided, subject to availability of funds. An undergraduate grade average of B or better is required to be eligible for an assistantship.

Requests for additional information should be addressed to:

Department Head

Plant and Soil Sciences

Box 9555

Mississippi State, MS 39762

Highly qualified undergraduates at Mississippi State University are encouraged to consider applying to the Accelerated Program. This program permits enrollment in graduate courses in Agronomy, Horticulture, or Weed Science during the student's final year of undergraduate studies. Enrollment of up to 9 hours of graduate courses is approved for students admitted to the Accelerated Program. Upon completion of the graduate course(s), undergraduate credit is also awarded for the course. Students need to consult with a potential graduate advisor to ensure graduate credit could be applied to a program of study for the M.S. degree. Application to this program may be made as early as the end of the junior year (i.e., after completion of 90 or more hours of graded undergraduate courses). This option is only available for students pursuing a thesis-based Master of Science degree in Plant and Soil Sciences with a concentration in Agronomy, Horticulture, or Weed Science.

Precision Agriculture Certificate

There is a need to train students in the broad array of precision agriculture technologies. This certificate program complements majors taught across College of Agriculture and Life Sciences (CALs) departments. This certificate features emerging technologies in decision-based agricultural planning and implementation. The certificate requires a minimum of 16 hours with at least 10 credit hours specific to Precision Agriculture coursework and 6 additional hours of electives or optional courses. Graduate requirements: PSS/ABE 2543 may be required as a leveling course and graduates may need a combination of Option 1 and Option 3 (below) to meet graduate credit requirements.

To obtain a Precision Agriculture Certificate, students are required to complete the following 16 hours.

Option 1: Choose from the following.

6-8

ABE 6483/4483 Introduction to Remote Sensing Technologies

or PSS Introduction to Remote Sensing Technologies

4483/6483 or ECE 4423/64

ABE 3513 The Global Positional System and Geographic Information Systems in Agriculture and Engineering

FO 4471/6471 GIS for Natural Resource Management Lab

AND

FO 4472/6472 GIS for Natural Resource Management

PSS 4373/6373 Geospatial Agronomic Management

GR 4303/6303 Principles of GIS

GR 3303 Survey of Geospatial Technologies

Option 2 (Community/Junior College AGT courses) : Any TWO transfer courses from the following in a Precision Agriculture Technology Concentration with the Postsecondary Agriculture Business and Management Technology program

6-8

AGT 1163 Introduction to Spatial Information Systems

AGT 2154 Geographic Information Systems I

AGT 1254 GPS Data Collection

AGT 2164 Variable Rate Technology

AGT 1354 Remote Sensing

AGT 2474 Site Specific Pest Management

AGT 2154 Geographic Information Systems I

AGT 1254 GPS Date Collection

AGT 2164 Variable Rate Technology

AGT 1354 Remote Sensing

OR Completion of the UAV Training Program courseork at Hinds Community College

Option 3: Discipline Specific Electives

6-8

ABE 3413 Bioinstrumentation I

ABE 6163 Machinery Management for Agro-Ecosystems

ABE 4263/6263 Soil and Water Management

ABE 4844/6844 Sustainable Communities

ABE 6423 Bioinstrumentation II

AEC 3413 Introduction to Food Marketing

AEC 3513 Economics of Food and Fiber Production

AEC 4113/6113 Agribusiness Firm Management

AEC 4133/6133 Analysis of Food Markets and Prices

AEC 4343/6343 Advanced Farm Management

BIO 4214 General Plant Physiology

EPP 3124 Forest Pest Management

EPP 4163/6163 Plant Disease Management

EPP 4214/6214 Diseases of Crops

EPP 4234/6234 Field Crop Insects

EPP 4263/6263 Principles of Insect Pest Management

FIN 3123 Financial Management

PSS 3301 Soils Laboratory

PSS 3303 Soils

PSS 3133 Introduction to Weed Science

PSS 4113/6113 Agricultural Crop Physiology

PSS 4313/6313 Soil Fertility and Fertilizers

PSS 4333/6333 Soil Conservation and Land Use

PSS 4343/6343 Controlled Environment Agriculture

PSS 4813/6813 Herbicide Technology

PSS 4823/6823 Turfgrass Weed Management

Departmental Admission Criteria

M.S. and **Ph.D.** in Plant and Soil Sciences with concentrations in Agronomy, Horticulture, or Weed Science:

- GPA—
For Master of Science: 2.75
For Doctor of Philosophy: 3.00 on graduate work
- TOEFL (Test of English as a Foreign Language) or IELTS (International English Language Testing Systems) score—
Agronomy: TOEFL score of 500 PBT (61 iBT) or IELTS score of 5.5
Horticulture: TOEFL score of 500 PBT (61 iBT) or IELTS score of 5.5
Weed Science: TOEFL score of 550 PBT (79 iBT) or IELTS score of 6.5
- GRE—All graduate programs require submission of GRE scores.
- A non-thesis M.S. does not qualify toward admission to a Ph.D. program in the Department of Plant and Soil Sciences at Mississippi State University.

Requirements for entrance into the Accelerated Program in Agronomy, Horticulture, or Weed Science for undergraduates are:

1. a GPA of 3.50 or higher for all undergraduate work;
2. submission of a standard application for graduate studies in the Department of Plant and Soil Sciences;
3. three letters of recommendation from individuals familiar with the applicant's academic performance;
4. submission of scores from the Graduate Record Examination (GRE) General Test prior to enrolling in graduate courses, and
5. a statement of professional interests and goals from the applicant, including specification of one or more potential major professors.

For students enrolled in Accelerated Program, the MSU Graduate Council has established these guidelines in cooperation with the Registrar's Office:

Once the student is accepted into the combined program, the student and the advisor may select up to 9 hours that will satisfy both undergraduate and graduate requirements. These courses may be split-level (i.e., 4000-6000 level) or 8000 level classes, and the student should take the courses for graduate credit (i.e., 6000-level or higher). To do so, he/she must submit a completed form to the Office of the Graduate School requesting such permission: <http://www.grad.msstate.edu/forms/pdf/accel.pdf> . The OGS will notify the student by MSU email when the request is approved. The combination of undergraduate and graduate credit hours may not exceed 16 hours within a semester. After successfully completing the graduate-level classes, the student and undergraduate advisor will submit a request to the Registrar's Office to grant credit for the course also at the undergraduate level with the same grade awarded as received for the graduate course. In the case of a split-level class, the transcript will show credit for both the 4000- and 6000-level on the transcript. In the case of an 8000-level class, a special topics undergraduate course of the same title will be entered on the transcript to allow dual credit.

Students are permitted to opt out of the combined program at any time, at which point they could complete only the undergraduate portion of the program. No additional dual counting of courses would occur after the student leaves the combined program.

Students will receive the bachelor's degree once the requirements for that degree are met. Students will be required to complete all of the requirements for both the bachelor's and master's degrees in order to receive both degrees, and those requirements will be identical to the requirements for students enrolled in the traditional B.S. and M.S. programs. Students will be classified as undergraduates until they fulfill at the requirements for the undergraduate degree. At that time they will be classified as graduate students and will be subject to the guidelines pertaining to the M.S. degree. Students admitted to this program should read and understand the guidelines in the Department of Plant and Soil Sciences Graduate Student Handbook before registering for any courses for graduate credit.

Provisional Admission

A student who has not fully met the GPA or other requirements stipulated by the University may be admitted on a provisional basis. The provisionally-admitted student is eligible for a change to regular status after receiving a 3.00 GPA on the first 9 hours of graduate courses at Mississippi State University (with no grade lower than a C). The first 9 hours of graduate courses must be within the student's program of study. Courses with an S grade, transfer credits, or credits earned while in Unclassified status cannot be used to satisfy this requirement. If a 3.00 is not attained, the provisional student **shall** be dismissed from the graduate program. Academic departments may set higher standards for students to fulfill provisional requirements; a student admitted with provisional status should contact the graduate coordinator for the program's specific requirements. **While in the provisional status, a student is not eligible to hold a graduate assistantship.**

Leveling Courses

The Department of Plant and Soil sciences recognizes that many students who hold bachelor degrees from other educational areas may wish to study toward an advanced degree within the department. These students may come from areas with different requirements than those normally associated with Agronomy, Horticulture, or Weed Science. To increase the possibility of success in attaining the advanced degree, the department requires all graduate students to have a fundamental understanding of soil and plant science. To this end, all graduate students must have had at least one course in soil science equivalent to Soils (PSS 3303), a plant science course covering basic plant physiology, college mathematics, college chemistry, and college-level biology. Graduate students who do not possess these courses upon acceptance will be required to complete these courses during the first or second semester of their attendance at Mississippi State University.

General Department Completion Requirements

M.S.-- A thesis and an oral thesis defense are required. The graduate committee must approved the thesis topic, research proposal, program of study, and final thesis. A thesis defense is required.

M.S. Non-Thesis -- A research paper approved by the student's graduate committee and an oral comprehensive exam are required.

Ph.D. -- The dissertation is required of all candidates for the doctorate degree. Original research, a written examination, an oral preliminary examination, and an oral dissertation defense and examination are required. At least one semester of teaching experience is strongly encouraged. The graduate committee must approved the dissertation topic, research proposal, program of study, and final dissertation.

Academic Performance

Students in the M.S. and Ph.D. degree programs must maintain a 3.00 GPA after admission to the program. No grade below C will be accepted for graduate credit. More than two grades of C or below not exceeding 8 credit hours constitute grounds for dismissal. Note: A C grade for a course that is

retaken and in which the student earns a grade of B or higher will not be included in the 8 total hours. However, the original grade is included as part of the calculation of the GPA. At any time, the student will lose any departmental assistantship should his/her cumulative drop below a 3.00. Students with alternative sources of funding (scholarships, fellowships, etc.) must follow the rules and regulations of the funding source.

Master of Science in Plant and Soil Sciences with Agronomy Concentration - Thesis

Prerequisites - as stipulated by the major professor, the departmental graduate coordinator, and the dean.

| | | |
|------------------------------------|--|-----------|
| Graduate-level coursework | | 12 |
| PSS 8811 | Seminar ¹ | 1 |
| ST 8114 | Statistical Methods (or other graduate-level statistics course) ² | 4 |
| 8000-level coursework ³ | | 7 |
| Research/thesis ⁴ | | 6 |
| Total Hours | | 30 |

¹ An exit seminar describing the thesis research is required as part of the credit hours.

² A graduate-level statistics course is required as part of the credit hours.

³ The total 8000-level coursework credits must equal a minimum of 12 hours.

⁴ A thesis defense is required.

Master of Science in Plant and Soil Sciences with Agronomy Concentration - Non-Thesis

Prerequisites - as stipulated by the major professor, the departmental graduate coordinator, and the dean.

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|---|--|-----------|
| Graduate-level coursework | | 12 |
| PSS 7000 | Directed Individual Study in Plant and Soil Sciences ¹ | 3 |
| PSS 8811 | Seminar ² | 1 |
| ST 8114 | Statistical Methods (or other graduate-level statistics course) ³ | 4 |
| Additional 8000-level coursework ⁴ | | 10 |
| Total Hours | | 30 |

¹ The student must develop a research paper approved by the student's graduate committee. In addition, a comprehensive examination over coursework is required.

² An exit seminar describing the thesis research is required as part of the credit hours.

³ A graduate-level statistics course is required as part of the credit hours.

⁴ The total 8000-level coursework must equal a minimum of 15 hours.

Doctor of Philosophy in Plant and Soil Sciences with Agronomy Concentration

Prerequisites - as stipulated by the major professor, the departmental graduate coordinator, and the dean.

| | | |
|---|--|-----------|
| PSS 8821 | Seminar ¹ | 1 |
| PSS 8831 | Seminar ² | 1 |
| ST 8114 | Statistical Methods (or other graduate-level statistics course) ³ | 4 |
| Additional graduate-level coursework ^{4,5} | | 14 |
| PSS 9000 | Dissertation Research /Dissertation in Plant and Soil Sciences | 20 |
| Total Hours | | 40 |

¹ The first seminar should be done within the first year of the student's program and should present the research proposal and include a review of relevant literature.

² An exit seminar will describe the results of the student's dissertation research.

³ A graduate-level statistics course is required as part of the credit hours.

⁴ The minimum coursework required for a PhD in Plant and Soil Sciences is 20 hours beyond the Master's degree requirements.

⁵ Mississippi State University requires all students earn at least 53 hours graduate credit beyond the bachelor's level to include a minimum of 20 dissertation credits.

A qualifying examination may be administered at the beginning of the student's program. The student must successfully complete a program of study as approved by the major advisor and graduate committee. The student must pass a preliminary examination, a written and oral preliminary examination

will be administered by the graduate committee after completion or within 6 hours of completing coursework. Original research and a dissertation are required of all candidates for the doctoral degree.

Master of Science in Plant and Soil Sciences with Horticulture Concentration - Thesis

Prerequisites - as stipulated by the major professor, the departmental graduate coordinator, and the dean. In addition, graduate students accepted into the Horticulture concentration are expected to have complete a course in General Plant Physiology or will be required to include this course on their graduate program of study.

| | | |
|---|--|-----------|
| Graduate-level coursework | | 12 |
| PSS 8811 | Seminar ¹ | 1 |
| ST 8114 | Statistical Methods (or other graduate-level statistics course) ² | 4 |
| Additional 8000-level coursework ³ | | 7 |
| Research/thesis ⁴ | | 6 |
| Total Hours | | 30 |

¹ An exit seminar describing the thesis research is required as part of the credit hours.

² A graduate-level statistics course is required as part of the credit hours.

³ The total 8000-level coursework must equal a minimum of 12 hours.

⁴ A thesis defense is required.

Master of Science in Plant and Soil Sciences with Horticulture Concentration - Non-Thesis

Prerequisites - as stipulated by the major professor, the departmental graduate coordinator, and the dean. In addition, graduate students accepted into the Horticulture concentration are expected to have complete a course in General Plant Physiology or will be required to include this course on their graduate program of study.

| | | |
|---|---|-----------|
| Graduate-level coursework | | 7 |
| PSS 7000 | Directed Individual Study in Plant and Soil Sciences ¹ | 3 |
| PSS 8811 | Seminar ² | 1 |
| ST 8114 | Statistical Methods ³ | 4 |
| Additional 8000-level coursework ⁴ | | 15 |
| Total Hours | | 30 |

¹ The student must develop a research paper approved by the student's graduate committee. An oral comprehensive examination is required.

² An exit seminar describing the thesis research is required as part of the credit hours.

³ A graduate-level statistics course is required as part of the credit hours.

⁴ The total 9000-level coursework must equal a minimum of 15 hours.

Doctor of Philosophy in Plant and Soil Sciences with Horticulture Concentration

Prerequisites - as stipulated by the major professor, the departmental graduate coordinator, and the dean. In addition, graduate students accepted into the Horticulture concentration are expected to have complete a course in General Plant Physiology or will be required to include this course on their graduate program of study.

| | | |
|---|---|-----------|
| BCH 6013 | Principles of Biochemistry | 3 |
| PSS 8821 | Seminar ¹ | 1 |
| PSS 8831 | Seminar ² | 1 |
| ST 8214 | Design and Analysis of Experiments (or other graduate-level statistics course) ³ | 4 |
| Additional graduate-level coursework ^{4,5} | | 15 |
| PSS 9000 | Dissertation Research /Dissertation in Plant and Soil Sciences | 20 |
| Total Hours | | 44 |

¹ The first seminar should be done within the first year of the student's program and should present the research proposal and include a review of relevant literature.

² An exit seminar will describe the results of the student's dissertation research.

- ³ A graduate-level statistics course is required as part of the credit hours; two graduate-level statistics courses beyond the B.S. degree are required for the Ph.D. in the Horticulture concentration.
- ⁴ The minimum coursework required for a PhD in Plant and Soil Sciences with a Horticulture concentration is 24 hours beyond the master's degree requirements.
- ⁵ Mississippi State University requires all students earn at least 53 graduate credit hours beyond the bachelor's level to include a minimum of 20 hours dissertation credits.

A qualifying examination may be administered at the beginning of the student's program. The student must successfully complete a program of study as approved by the major advisor and graduate committee. The student must pass a preliminary examination. A written and oral preliminary examination will be administered by the graduate committee after completion or within 6 hours of completing coursework. Original research and a dissertation are required of all candidates for the doctoral degree.

Horticulture (Floral Management) Graduate Minor

| | | |
|--------------------|-----------------------------------|-----------|
| PSS 6013 | Principles of Floral Design | 3 |
| PSS 6023 | Floral Management | 3 |
| PSS 6033 | Case Studies in Floral Management | 3 |
| PSS 6043 | International Horticulture | 3 |
| Total Hours | | 12 |

The Horticulture concentration within the Plant and Soil Sciences degrees also offers a minor in Floral Management. The minor is available for graduate students seeking training in this field to complement their graduate degree. Students seeking the minor are required to complete the 12-hour program. The student's graduate committee must include a minor committee member from the Department of Plant and Soil Sciences.

Master of Science in Plant and Soil Sciences with Weed Science Concentration - Thesis

Prerequisites - as stipulated by the major professor, the departmental graduate coordinator, and the dean.

| | | |
|---|--|-----------|
| Graduate-level coursework | | 12 |
| PSS 8811 | Seminar ¹ | 1 |
| ST 8114 | Statistical Methods (or other graduate-level statistics course) ² | 4 |
| Additional 8000-level coursework ³ | | 7 |
| Research/thesis ⁴ | | 6 |
| Total Hours | | 30 |

- ¹ An exit seminar describing the thesis research is required as part of the credit hours.
- ² A graduate-level statistics course is required as part of the credit hours.
- ³ The total 8000-level coursework must equal a minimum of 12 hours. Up to 9 hours of PSS 8701-8771. Current Topics in Weed Science may be included to meet these requirements.
- ⁴ A thesis defense is required.

Master of Science in Plant and Soil Sciences with Weed Science Concentration - Non-Thesis

Prerequisites - as stipulated by the major professor, the departmental graduate coordinator, and the dean.

| | | |
|---|---|-----------|
| Graduate-level coursework | | 12 |
| PSS 7000 | Directed Individual Study in Plant and Soil Sciences ¹ | 3 |
| PSS 8811 | Seminar ² | 1 |
| ST 8114 | Statistical Methods ³ | 4 |
| Additional 8000-level coursework ⁴ | | 10 |
| Total Hours | | 30 |

- ¹ The student must develop a research paper approved by the student's graduate committee. A comprehensive examination is required.
- ² An exit seminar describing the thesis research is required as part of the credit hours.
- ³ A graduate-level statistics course is required as part of the credit hours.
- ⁴ The total 8000-level coursework must equal a minimum of 15 hours.

Doctor of Philosophy in Plant and Soil Sciences with Weed Science Concentration

Prerequisites - as stipulated by the major professor, the departmental graduate coordinator, and the dean.

| | | |
|--|--|-----------|
| PSS 8821 | Seminar ¹ | 1 |
| PSS 8831 | Seminar ² | 1 |
| ST 8114 | Statistical Methods (or other graduate-level statistics course) ³ | 4 |
| Additional graduate-level coursework ^{4, 5} | | 14 |
| PSS 9000 | Dissertation Research /Dissertation in Plant and Soil Sciences | 20 |
| Total Hours | | 40 |

¹ To be done in the early stages will present the research proposal and include a review of relevant literature.

² Exit seminar will describe the dissertation research.

³ A graduate-level statistics course is required as part of the credit hours.

⁴ The minimum coursework required for a PhD in Plant and Soil Sciences is 20 hours beyond the master's degree requirements. Up to 9 hours of PSS 8701-8771. Current Topics in Weed Science may be included to meet these requirements.

⁵ Mississippi State University requires all students earn at least 53 hours graduate credit beyond the bachelor's level to include a minimum of 20 hours dissertation credits.

A qualifying examination may be administered at the beginning of the student's program. The student must successfully complete a program of study as approved by the major advisor and graduate committee. The student must pass a preliminary examination. a written and oral preliminary exam will be administered by the graduate committee after completion or within 6 hours of completing coursework. Original research and a dissertation are required of all candidates for the doctoral degree.

Weed Science Concentration Prerequisite and Core Courses

As specified by the student's major professor and graduate committee.