Environmental, Soil and Water Sciences, M.S.

Degree Offered

• Master of Science

Nature of the Program

M.S. in Environmental, Soil, & Water Sciences provides students the opportunity to take courses and conduct original, master's-level research in their areas of specialization. The educational experience obtained through courses and research is expected to provide students with the background and expertise to enter doctoral programs or professional careers as agronomists, entomologists, microbiologists, horticulturists, and plant pathologists or soil scientists. These disciplines are critical to maintaining agriculture and forest productivity, solving environmental problems, and promoting economic development in the state.

Admissions

In order for a student to be admitted to the program, the following admission criteria will be considered. The applicant normally must:

• The student must possess a baccalaureate degree from a college or university, have at least a grade point average of 2.75 on a 4.0 scale (or an average of 3.0 or higher for the last 60 credit hours),
• The student must have an adequate academic aptitude at the graduate level as measured by the Graduate Record Examination (GRE).
• The student must provide three letters of reference from persons acquainted with the applicant's professional work, experience, or academic background.
• The student must submit a written statement of 500 words or more indicating the applicant’s goals and objectives relative to receiving a graduate degree.
• International students have the additional requirement to submit a minimum score of 550 on the paper TOEFL examination or 213 on the electronic TOEFL examination if their native language is not English.

Major Code: 0782

A candidate for the M.S. degree in Environmental, Soil, and Water Sciences must meet all University, College, Division, and Program requirements as outlined in the WVU Graduate Catalog.

Program Requirements

All M.S. degree candidates are required to follow a planned program of study. The student develops the plan of study during their first year in the program in conjunction with the graduate committee. The plan must be approved by the Director of the Division and the Associate Dean for Academic Affairs of the Davis College.

Thesis Option:

A minimum cumulative GPA of 3.0 is required in all courses applied toward degree requirements.

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<tr>
<th>Select one of the following:</th>
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<tbody>
<tr>
<td>STAT 511</td>
<td>Statistical Methods 1</td>
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<tr>
<td>BIOS 601</td>
<td>Applied Biostatistics 1</td>
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<tr>
<td>&amp; BIOS 602</td>
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<tr>
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<td>Statistical Methods 2</td>
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<td>BIOS 603</td>
<td>Applied Biostatistics 2</td>
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<td>&amp; BIOS 604</td>
<td>and Applied Biostatistics 3</td>
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<tr>
<th>Seminar</th>
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<tbody>
<tr>
<td>AGRN 796</td>
<td>Graduate Seminar</td>
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<th>Research</th>
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<tr>
<td>AGRN 797</td>
<td>Research</td>
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<thead>
<tr>
<th>Discipline-Oriented Coursework</th>
<th>15</th>
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<tbody>
<tr>
<td>(AGRN, AEM, BIOL, ENV, GEOG, GEOL, PLSC, RESM, ENGR, CE, FHYD, FMAN, FOR, MINE, GEN)</td>
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Total Hours 30

Non-Thesis Option:

A minimum cumulative GPA of 3.0 is required in all courses applied toward degree requirements.
Select one of the following:  

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<tr>
<td>STAT 511</td>
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<td>Applied Biostatistics 2 and Applied Biostatistics 3</td>
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Graduate Chemistry/Biochemistry Course  

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<th>Course Code</th>
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<tbody>
<tr>
<td>AGBI 610</td>
<td>General Biochemistry</td>
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<tr>
<td>AGBI 612</td>
<td>General Biochemistry</td>
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<tr>
<td>AGRN 516</td>
<td>Soil Chemistry</td>
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Seminar  

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<tr>
<td>AGRN 796</td>
<td>Graduate Seminar</td>
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Teaching Practicum  

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<td>Teaching Practicum</td>
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Discipline-Oriented Coursework  

(AGRN, AEM, BIOL, ENVP, GEOG, GEOL, PLSC, RESM, ENGR, CE, FHYD, FMAN, FOR, MINE, GEN)

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<tr>
<td>AGRN 502</td>
<td>Soil Science: Principles and Practices. 3 Hours. PR: Graduate standing. Cannot receive credit for AGRN 502 and AGRN 202 or the equivalent. An in-depth examination of the microscopic and macroscopic properties of soils and how these interact to produce a fragile, non-renewable natural body on the landscape. Discussion of soils as an ecological resource and learn how the physical, chemical, and biological properties of soils impact plant growth, land use and management, and environmental protection.</td>
</tr>
<tr>
<td>AGRN 516</td>
<td>Soil Chemistry. 3 Hours. PR: AGRN 410. An analysis of the important reactions that occur in soils; thermodynamic and kinetic aspects of these reactions and application to modern problems in soil chemistry. (3 hr. lec.).</td>
</tr>
<tr>
<td>AGRN 525</td>
<td>Forage Harvesting and Storage. 3 Hours. PR: AGRN 454 or Consent. Advanced study of processes associated with harvesting and storage of forages. (3 hr. lec.).</td>
</tr>
<tr>
<td>AGRN 552</td>
<td>Pedology. 3 Hours. PR: AGRN 417 or Consent. Genesis and evolution of soils considered as natural bodies; including both macro-and micromorphological properties. Week-long field trip required at student's expense. (2 hr. lec., 1 hr. lab.).</td>
</tr>
<tr>
<td>AGRN 554</td>
<td>Pasture Management and Utilization. 3 Hours. PR: AGRN 454 and ANNU 260 or consent. Advanced study of pastures and their management and utilization with emphasis on temperate species. (3 hr. lec.).</td>
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Students must complete a minimum of 30 total hours, of which at least 24 hours must be coursework other than research, thesis, project, internship, etc. credits.

**Major Learning Outcomes**

**ENVIRONMENTAL, SOIL AND WATER SCIENCES**

Students will demonstrate detailed knowledge of their particular research area and fundamental knowledge of other areas relevant to environmental soil and water sciences.

Students will demonstrate the ability to read and understand, peer-reviewed scientific literature relevant to their work.

Students will employ technical skills in the laboratory, greenhouse, and/or field to acquire novel, high-quality data, and analytical skills to interpret the data to draw conclusions that are valid and meaningful.

Students will communicate effectively in writing and orally about scientific concepts and the results of their research.

Graduates of the program will gain skills that will help them be employed in a relevant professional position.

**AGRONOMY COURSES**

**AGRN 502. Soil Science: Principles and Practices. 3 Hours.**
PR: Graduate standing. Cannot receive credit for AGRN 502 and AGRN 202 or the equivalent. An in-depth examination of the microscopic and macroscopic properties of soils and how these interact to produce a fragile, non-renewable natural body on the landscape. Discussion of soils as an ecological resource and learn how the physical, chemical, and biological properties of soils impact plant growth, land use and management, and environmental protection.

**AGRN 516. Soil Chemistry. 3 Hours.**
PR: AGRN 410. An analysis of the important reactions that occur in soils; thermodynamic and kinetic aspects of these reactions and application to modern problems in soil chemistry. (3 hr. lec.).

**AGRN 525. Forage Harvesting and Storage. 3 Hours.**
PR: AGRN 454 or Consent. Advanced study of processes associated with harvesting and storage of forages. (3 hr. lec.).

**AGRN 552. Pedology. 3 Hours.**
PR: AGRN 417 or Consent. Genesis and evolution of soils considered as natural bodies; including both macro-and micromorphological properties. Week-long field trip required at student's expense. (2 hr. lec., 1 hr. lab.).

**AGRN 554. Pasture Management and Utilization. 3 Hours.**
PR: AGRN 454 and ANNU 260 or consent. Advanced study of pastures and their management and utilization with emphasis on temperate species. (3 hr. lec.).
AGRN 591. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

AGRN 592. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

AGRN 593. 1-6 Hours.

AGRN 594. Seminar. 1-6 Hours.
Special seminars arranged for advanced graduate students.

AGRN 595. Independent Study. 1-9 Hours.
Faculty-supervised study of topics not available through regular course offerings.

AGRN 596. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

AGRN 691. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

AGRN 692. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

AGRN 693. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

AGRN 694. Seminar. 1-6 Hours.
Special seminars arranged for advanced graduate students.

AGRN 695. Independent Study. 1-9 Hours.
Faculty-supervised study of topics not available through regular course offerings.

AGRN 696. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

AGRN 697. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U).

AGRN 698. Thesis or Dissertation. 1-6 Hours.
PR: Consent. This is an optional course for programs that wish to provide formal supervision is needed during the writing of student reports (698), theses (698), or dissertations (798). (Grading is Normal).

AGRN 699. Graduate Colloquium. 1-6 Hours.
PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium, to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is Normal; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

AGRN 710. Soil Testing and Plant Analysis. 3 Hours.
PR: AGRN 210 and BIOL 350, or Consent. Influence of soil chemical and physical properties on availability of plant nutrients; intensive study of individual plant nutrients and interactions of nutrients in soils and crops; and intensive study of methods used to test soils and analyze plants for nutrients and other metals. (2 hr. lec., 1 hr. lab).

AGRN 790. Teaching Practicum. 1-3 Hours.
PR: Consent. Supervised practice in college teaching of agronomy. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U).

AGRN 791. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

AGRN 792. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

AGRN 793. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

AGRN 795. Independent Study. 1-9 Hours.
Faculty-supervised study of topics not available through regular course offerings.

AGRN 796. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.
AGRN 797. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U).

**PLANT SCIENCE COURSES**

**PLSC 547. Applied Wetlands Ecology and Management. 3 Hours.**
The management and ecology of wetland vegetation, soils, hydrology, and wildlife. (Cross listed as WMAN 547 and CE 547.)

**PLSC 550. Grants and Grantsmanship. 2 Hours.**
A course covering all steps of grant preparation, application, submission and review process.

**PLSC 553. Organic Crop Production. 3 Hours.**
PR: PLSC 206 and AGRN 202 and AGRN 203 or consent. Principles, practices, history, philosophy and economics of organic farming and gardening. Crop/livestock systems, national and international research on organic production. (Students may not receive credit for both PLSC 453 and PLSC 553).

**PLSC 560. Plant Biochemistry. 3 Hours.**
PR: (CHEM 231 or (CHEM 233 and CHEM 234)) and BIOL 219 or consent. Study of the biochemical processes and biosynthetic pathways leading to the formation of desirable plant products such as those used in food, feed, fiber, fuel and medicinal applications. (Credit cannot be received for both PLSC 460 and PLSC 560).

**PLSC 591. Advanced Topics. 1-6 Hours.**
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**PLSC 592. Directed Study. 1-6 Hours.**
Directed study, reading, and/or research.

**PLSC 593. Special Topics. 1-6 Hours.**
A study of contemporary topics selected from recent developments in the field.

**PLSC 595. Independent Study. 1-9 Hours.**
Faculty supervised study of topics not available through regular course offerings.

**PLSC 692. Directed Study. 1-6 Hours.**
Directed study, reading, and/or research.

**PLSC 693. Special Topics. 1-6 Hours.**
A study of contemporary topics selected from recent developments in the field.

**PLSC 697. Research. 1-9 Hours.**
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading will be S/U).

**PLSC 790. Teaching Practicum. 1-3 Hours.**
PR: Consent. Supervised practice in college teaching of plant science. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**PLSC 791. Advanced Topics. 1-6 Hours.**
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**PLSC 792. Directed Study. 1-6 Hours.**
Directed study, reading, and/or research.

**PLSC 793. Special Topics. 1-6 Hours.**
A study of contemporary topics selected from recent developments in the field.

**PLSC 795. Independent Study. 1-9 Hours.**
Faculty supervised study of topics not available through regular course offerings.

**PLSC 796. Graduate Seminar. 1-3 Hours.**
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

**PLSC 797. Research. 1-9 Hours.**
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U).