

PLANT AND SOIL SCIENCE

<http://www.uvm.edu/cals/pss> (<http://www.uvm.edu/~pss/>)

OVERVIEW

The mission of the Department of Plant and Soil Science is to expand, integrate, and extend the knowledge of agricultural systems and environmental quality in plant/soil ecosystems affecting the people of Vermont, the region, and the world. The department will provide excellence in education, research, and extension that will foster environmentally, economically, and socially sound practices.

The department offers a Master of Science (M.S.) degree in all fields in plant science and soil science and a Doctor of Philosophy (Ph.D.) degree in plant science and soil science. A thesis, based on original research, is required for the M.S. degree, and completion of the requirements normally takes 2.5 years. A dissertation, based on original research, is required for the Ph.D. degree, and completion of the requirements typically takes 3 to 4 years.

The department is comprised of faculty representing the disciplines of agroecology, agronomy, entomology, horticulture, landscape design, plant pathology, and soil science. Research faculty are involved in studying plant, soil or insect interactions within environments managed for food, fiber, waste utilization, or for landscape purposes. The objectives of these studies are: (1) to develop fundamental knowledge of environmental impacts and interactions and (2) to apply knowledge to better manage systems and promote environmental health. Specifically, departmental projects have included:

- Biological control of insect pests – entomopathogenic fungi
- Integrated pest management (IPM) in greenhouse and field situations
- Agro-ecological practices in Vermont and international communities
- Ecological landscape design
- Green stormwater infrastructure for improving water quality
- Design and analysis of experiments and surveys
- Field and forage crop management and utilization, forage quality, pasture and grazing management, and pest/weed management
- Analytical procedures for testing soils and environmental samples
- Effects of nitrogen (from acid rain) on forest soils and bog ecosystems
- Interaction between soil manganese oxides and heavy metals
- Nutrient dynamics and management in agricultural systems
- Invasive earthworms
- Nematodes and microarthropods as environmental indicators for terrestrial and wetland soils
- Development of sustainable apple production systems
- Evaluation and identification of woody and herbaceous landscape plants adapted to environmental conditions in Vermont/New England

- Diversified horticulture which involves the planning, production, handling, and marketing of horticultural crops with emphasis on multiple, diverse crops produced with environmentally and economically sound techniques.

DEGREES

- Plant and Soil Science M.S. (<http://catalogue.uvm.edu/graduate/plantsoil/plantandsoilsciencems/>)
- Plant and Soil Science Ph.D. (<http://catalogue.uvm.edu/graduate/plantsoil/plantandsoilsciencephd/>)

FACULTY

Bishop-von Wettberg, Eric; Assistant Professor, Department of Plant and Soil Science; PHD, Brown University
Bradshaw, Terence; Research Assistant Professor, Department of Plant and Soil Science; PHD, University
Chen, Yolanda H.; Associate Professor, Department of Plant and Soil Science; PHD, University of California Berkeley
Darby, Heather Marie; Extension Professor; Department of Ext - Programming and Faculty Support; PHD, Oregon State University
Faulkner, Joshua; Research Assistant Prof; Department of Ext - Programming and Faculty Support; PHD, Cornell University
Gorres, Josef H.; Associate Professor; Department of Plant and Soil Science; PHD, University of Manchester
Grubinger, Vernon; Extension Professor; Department of Extension - Programming and Faculty Support; PHD; Cornell University
Hazelrigg, Ann; Extension Assistant Professor, Extension; PHD, University of Vermont; MS, Cornell University
Hurley, Stephanie E.; Associate Professor, Department of Plant and Soil Science; DDES, Harvard University
Mendez, Victor E.; Professor; Department of Plant and Soil Science; PHD, University of California Santa Cruz
Merrill, Scott; Research Assistant Professor, Department of Plant and Soil Science; PHD, Colorado State University
Neher, Deborah; Professor; Department of Plant and Soil Science; PHD, University of California Davis
Parker, Bruce Lawrence; Professor; Department of Plant and Soil Science; PHD, Cornell University
Ross, Donald Savage; Research Professor Emeritus; Department of Plant and Soil Science; PHD, University of Vermont
Skinner, Margaret; Research Professor; Department of Plant and Soil Science; PHD, University of Vermont
Starrett, Mark C.; Associate Professor; Department of Plant and Soil Science; PHD, North Carolina State University-Raleigh

Courses

PSS 209. Diversified Farm Operations. 6 Credits.

An experiential course in sustainable, diversified vegetable production that includes soil fertility, weed, insect and disease control, crop planning and farm management skills. Prerequisites: PSS 021 and one 100-level PSS course, equivalent experience, or Instructor permission.

PSS 212. SU: Advanced Agroecology. 0 or 4 Credits.

An in-depth overview of research and applications in the field of agroecology, including current ecological and social dynamics in agricultural landscapes in Vermont and abroad. Prerequisites: PSS 021 or one semester ecology at the 100-level or above or Instructor permission. Cross-listed with: ENVS 212.

PSS 218. Agricultural Policy and Ethics. 3 Credits.

An examination of American agriculture and policies from various perspectives - historical, political, ecological, technological, social, economic, and ethical. Emphasis on contemporary issues, policy options, and future development. Prerequisites: CDAE 102 or PSS 212 or equivalent. Cross-listed with: CDAE 208.

PSS 225. Eco Frontiers in Agroecology. 3 Credits.

Examines recent peer-reviewed research that has the potential to transform the productivity or sustainability of agroecosystems. Students will be guided in developing, communicating, and justifying new questions that may potentially transform agroecology. Prerequisites: BIOL 001/BIOL 002 or BCOR 011/BCOR 012; and NR 103 or BCOR 102 or PSS 106 or equivalent; or Instructor permission.

PSS 232. Biological Control. 3 Credits.

Describes theory and application of biological control of insects, disease, and weeds. Discuss ecological factors that contribute to the success of classical, augmentative, and conservation approaches to biological control. Approved for Graduate credit. Prerequisite: Course in entomology, ecology, or relevant experience.

PSS 238. Ecological Landscape Design. 4 Credits.

Studio course synthesizing work from fields of landscape ecology and landscape design, exploring ecological design alternatives at multiple scales, and developing multifunctional landscape solutions. Prerequisites: Junior standing; PSS 137 or one course in ecology plus one course in design or drawing.

PSS 261. Soil Morph Class & Land Use. 0 or 3 Credits.

Field techniques that describe soil properties, formation, and classification. The principles and processes of soil genesis, land use classification systems, and land use challenges. Prerequisite: PSS 161 or Instructor permission.

PSS 264. Chemistry of Soil & Water. 0 or 4 Credits.

An environmentally oriented study of the colloidal chemistry of soil and its interfaces with roots, water, and air. Prerequisites: PSS 161, two semesters Chemistry or Instructor permission.

PSS 268. Soil Ecology. 0 or 4 Credits.

Underlying concepts and theory of modern soil ecology will be reviewed including spatial and temporal distributions, sampling methods, biogeochemical cycles, and ecological functions of soil. Prerequisites: BCOR 102 or NR 103, and PSS 161. Cross-listed with: NR 268.

PSS 269. Soil/Water Pollution/Bioremed. 3 Credits.

Examines key issues in pollution of soil and water. Topics include type of pollutants, their reactions in soil and water, pollution prevention and bioremediation. Prerequisites: PSS 161 or Instructor permission.

PSS 301. Professional Skills Colloquium. 1 Credit.

Presentation and peer review of oral and written communication. Professional development skills including technical writing, literature review, mentorship, scientific integrity, grant proposals, and job market.

PSS 311. Introduction to Agroecology. 3 Credits.

In-depth overview of research and applications in the field of agroecology, with a focus on providing the student with conceptual and analytical content. Prerequisite: Graduate standing or Instructor permission.

PSS 312. Ecological Foundations of Agro. 3 Credits.

Examines the ecological foundations of Agroecology, largely from a biophysical perspective. Over the course of three sequential modules, students will explore the fundamental principles of ecology and their application to agricultural systems and landscapes. Prerequisite: One semester biological science at the 100-level or Instructor permission.

PSS 313. PAR & Transdiscipl Agroecology. 3 Credits.

Introduces students to Participatory Action Research (PAR) in the context of agroecology, and examines how the integration of PAR and transdisciplinary approaches can serve to deepen our collective understanding of complex problems/issues. Prerequisite: PSS 311.

PSS 314. Agroecol, Food Sov. & Soc Mov.. 3 Credits.

Investigates social, political, and economic elements of the global food system from multiple perspectives, considering the ability to scale-up agroecology, and the potential intersection between agroecology, food sovereignty and government policies. Prerequisite: Graduate standing.

PSS 315. Agroecology Grad Capstone. 3 Credits.

The capstone designed for the application of newly developed knowledge and skills in a culminating experience/project that addresses an agroecological topic relevant to the individual student. Prerequisites: PSS 311, PSS 312, PSS 313, PSS 314.

PSS 381. Graduate Special Topics. 1-3 Credits.

Advanced readings and discussion of horticulture, crops, or soils research literature.

PSS 390. Internship. 1-18 Credits.

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

PSS 391. Master's Thesis Research. 1-18 Credits.**PSS 392. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

PSS 393. Seminar Series. 1 Credit.

Presentations of personal research by faculty, Graduate students and outside guest speakers. Attendance and oral presentations are required of Graduate students in Plant and Soil Science. Repeatable 2 times for M.S. students and 4 times for Ph.D. students.

PSS 394. Seminar Series. 1 Credit.

Presentations of personal research by faculty, Graduate students, and outside guest speakers. Attendance and oral presentations are required of Graduate students in Plant and Soil Science. Repeatable 2 times for M.S. students and 4 times for Ph.D. students.

PSS 395. Advanced Special Topics. 1-18 Credits.

See Schedule of Courses for specific titles.

PSS 397. Independent Graduate Research. 1-18 Credits.

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

PSS 490. Internship. 1-18 Credits.

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

PSS 491. Doctoral Dissertation Research. 1-18 Credits.**PSS 494. Independent Graduate Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

PSS 496. Advanced Special Topics. 1-18 Credits.

See Schedule of Courses for specific titles.