Today’s Students, Tomorrow’s Land Managers and Policy Makers: Teaching Sustainable Soil Management by integrating chemical, physical and biological considerations in theory and practice

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Course Overview

“Soil Management for Sustainability”

- A hands-on course, providing both the theory and practice of information-driven, holistic, sustainable soil quality management. Training in soil quality assessment and management is essential in fostering new generations to succeed in sustaining our soils through informed on-the-ground management and policy decisions.

- Students apply concepts in groups through a semester-long case study project.

Teaching Theory of Sustainable Soil Management

During the first half of the semester, students explore physical, chemical, and biological soil processes that control crop productivity and environmental quality. They read Montgomery's Dirt, The Erosion of Civilizations, write a book review and conduct a peer-review. Students become laboratory technicians, measuring and interpreting the soil health indicators that make up the Cornell Soil Health Test (CSHT) for a local agricultural soil sample of as-of-yet unknown origin.

Course integrates the recently developed Cornell Soil Health Test

- Available to public since 2006
- Inexpensive indicators of SQ represent agronomically-essential soil processes
- Identifies constraints
- Guides management to alleviate quantified constraints

Semester Group Project: Part I.

Students conduct Cornell Soil Health Test (CSHT):

- Analyze indicators in laboratory
- Process raw data for report
- Interpret data using scoring functions
- Write a lab report

Teaching Practice of Sustainable Soil Management

In the second half of the semester, students explore sustainable soil management options in the broader context of various agroecosystems through hands-on laboratory activities, a field trip and lectures about a variety of management practices. Students then become agricultural consultants, and design a sustainable soil management plan, specific to the constraints they have identified for their field.

Semester Group Project: Part II.

Students use information from 1) their case study’s Cornell Soil Health Test results, 2) the grower, situation and current management practices, and 3) management options they have learned about, to:

- Design a short- and long-term soil management plan for their field that will target identified constraints
- Present findings and plan to group and discuss options
- Write an agricultural consultant report to grower

Field Trip

Students visit an experimental farm and a variety of commercial farms to see equipment, management practices, and effects on soil quality in action.

Selected Resources


Student Feedback

Students state that they will be able to use knowledge and skills gained in this course in their occupations after college, and will manage soils more sustainably as a result of this course.

- “Coming from a dairy farm and farming more than 3000 acres, I have learned a lot about what the soil needs to be healthy and ways you achieve those needs.”
- “I have thought a lot about tillage practices and how I may be able to integrate some of them [on my farm]…….I will be farming with reduced tillage in the future.”
- “I would like to run drag-line manure spreading instead of large spreaders to help eliminate compaction. Other things that I am thinking about are cover crops in corn to corn rotations, no-till, nitrogen and phosphorus levels, and driving lanes.”
- “Very valuable course. I think over time I am going to be finding it even more valuable than I yet realize.”

- Student quotes from evaluations