Soils and Soil Management

SPEA E555

Spring 2019

Instructor:
Dr. Jon Eldon
jeldon@iu.edu
Office Hours: SPEA 322

Course Description:

This course provides an introduction to soil science and practical soil management, with an emphasis on issues related to agricultural and environmental sustainability. Students will gain a general background in traditional topics in soil science, such as soil formation and classification, nutrient cycling and soil ecology, and will then apply this foundation to critical management problems and concepts, such as agricultural production, nutrient pollution, and soil health. Throughout this course, students will work with both the scientific literature and more applied discussions about soil management, and they will be expected to produce material for both professional and general audiences.

Course Context:

This course is designed for graduate and advanced undergraduate students interested in practical scientific engagement with environmental issues and seeking to fill in an often-missing link in environmental science--soil! No previous soil courses are required, but students should have some familiarity with environmental science and a college-level chemistry course is recommended.

Learning Outcomes:

Upon completing this course, students will be able to

1) Describe key terms, concepts, and processes in soil science,

2) Apply knowledge of soil processes to practical management problems,

3) Critically assess the scientific foundation of alternative soil management practices and recommendations, and

4) Effectively convey scientific information to non-specialists.

Course Materials:

Brady, N.C. and Weil, R.R. 2010. *Elements of the Nature and Properties of Soil, 3rd edition.* Prentice Hall

The 2nd edition can be used, but the chapters and page numbers might not match.

Additional readings will be posted on Canvas

Teaching and Learning Methods:

This course is primarily classroom-based, and the time will be divided between 1) lecture, 2) case-study presentations, and 3) small-group projects. The first half of the course will focus on soil fundamentals and the second half on specific applied issues related to soil management. These applied issues will be taught as short courses **led by graduate students** working in groups of 2-3. I will work closely with the groups to help them design their material and will assist in the instruction, but the bulk of the responsibility for leading the work on the topic will be on the group.

The class will include 3-4 day-long field trips throughout the quarter, likely on Saturdays. Participation in one of these trips is mandatory (for a good grade) and any additional participation is extra credit. Likely field trips are:

- Purdue Small Farms Conference
- Farm visits in the Wabash watershed
- NRCS demonstration sites
- Mine reclamation site

Assignments:
1) Weekly assignments on Canvas
2) Midterm
3) Group short-course
4) Topical Memos
5) Final
6) Class and field trip participation

General Schedule:

Week	Session	Topic
1	A	Introduction
	B	Composition and formation
2	A	Physical properties
	B	
3	A	Soil water
	B	
4	A	Soil organic matter
	B	Soil ecology
5	A	Nutrient cycles
	B	
6	A	
	B	Research presentation
7	A	Spillover and review
	B	**Midterm**
8	A	Soil management practice in agricultural systems
	B	IU Farm visit
9	A	Short course: *Irrigation and water management*
	B	
10	A	Short course: *Soil Pollution and Remediation*
	B	
11	A	Short course: *Soil Carbon sequestration*
	B	
12	A	Short course: *Soil Fertility Management - low-input*
	B	
13	A	Short course: *Soil Fertility Management - high-input*
	B	
14	A	Short course: *Soil Health*
	B	
15	A	Research Presentation
	B	Spillover and review
Finals Week		**Cumulative Final**