

SOCR 571 Foundations of Soil Science (Spring Semester 2015)

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C-15 Plant Science Bldg, **Phone:** 491-6881

Credits: 2 (Meet Monday and Friday 11-11:50A in Plant Science)

Class Web Site: <http://soilcrop.agsci.colostate.edu/faculty-2/kelly-eugene/>

Goals of the course: Many Graduate Programs at CSU and nationally stress interdisciplinary training for students with interests in a wide range of environmental and ecological subjects. Most graduate programs are designed to "to provide advanced training in current scientific methods, theories, concepts, controversies and applications by synthesizing knowledge from a wide variety of traditional disciplinary areas of science". SOCR 571 is a course that is designed to meet this goal. It is one of the few courses that all students can take to gain a Foundational Knowledge of the breadth and scope of Soil Science and will be useful for students of varied backgrounds and academic goals.

The objectives of this course: Although the course title might imply that SOCR 571 is a "General Soil Science" course at the graduate level, this is not the case. One might also assume that a "Foundations" course might be a "History of Soil Science" course - also not the case. Specific Objectives are as follows: 1) *students will learn to integrate the many sub-disciplines of Soil Science and ultimately increase their understanding of the breadth of Soil Science,* 2) *Students will improve their understanding of the context of Soil Science and its broad applications and foundational place in ecological and earth system sciences.*

This requires some knowledge of where, how and why Soil Science came to be, how and why Soil Scientists ask questions today, appreciating what is unique about Soil Science and its role in ecological and earth systems studies, how it compares to other sciences, and where Soil Sciences might be headed in the future. Along the way, students will develop abilities to both critique and value scientific ideas past and present, and approach the future with an open mind.

Format: Typically there will be a lecture on Monday to introduce a topic or issue in Soil Science, and a discussion on Friday that may be general in nature or may focus on critiquing case studies from the literature. Readings and case studies will for the most part be from journal papers (most available from the course website). This basic format will be flexible however with several guests' speakers presenting topics and perhaps leading discussions.

Semester Schedule

<u>Dates</u>	<u>Topics</u>	<u>Reading Materials</u>
	<u>Fundamentals of Soil Science</u>	
1/23	No Class	
1/26, 1/30	Course Overview and History of Soil Science Lecturer: E.F. Kelly	Readings 1, 2
2/2, 2/6	Soil water storage and mobility: Theoretical and Experimental Aspects Lecturer: G. Butters	Readings 3, 4
2/9, 2/13	The Pedological Aspects of Soil Science Lecturer: E.F. Kelly	Readings 5,6
2/16, 2/20	Soil Management of Drylands Lecturer: Gary Peterson	Readings 7-9
2/23, 2/27	The Biology of Soils: Lecturer: Mary Stromberger	Readings 10,11
	<u>Broadening Our View Of Soils</u>	
3/2, 3/6	Atmosphere-Ecosystem Interactions Lecturer: J. Ham	Readings 12,13
3/9, 3/13	Environmental Biogeochemistry Lecturer: T. Borch	Readings 13,14
3/16, 3/20	NO CLASS THIS WEEK	
3/23, 3/27	Agroecology and Soils Lecturer: Megan Schipanksi	Readings 18,19
3/30, 4/3	Forest Fire Impacts on Soils Lecturer: Chuck Rhoades	Readings 15-17
	<u>Soils and Environmental Issues</u>	
4/6, 4/10	Climate Change: Contemporary Ecological Studies of Soil Water Lecturer: A.K. Knapp	Readings 20,21
4/13, 4/17	Climate Change: Reconstructing of the Ancient Climates with Soils Lecturer: E.F. Kelly	Readings 22-24
4/20, 4/24	Nutrient Management of Agricultural Lands Lecturer: TBD	Readings 25-26
4/27, 5/1	Soils and Biodiversity Lecturer: TBD	Readings 27,29
5/4, 5/ 8	Wrap-up - E.F. Kelly	

Grading and Assignments

Weekly assignments: 50% - Discussions of the weekly topic and the readings will be held on Friday. To facilitate involvement by all each student will email the instructor a minimum of 2 questions/comments for discussion based on the readings. These can be points of interest, confusion, elaboration, or general (not specific) questions, etc. The key is to generate discussion in areas that you have an interest. This email must be received by Gene (eugene.kelly@colostate.edu) by 5:00 pm (Thursday) before the morning of the proposed class discussion time! In addition, each week I will call on students to provide a brief elaboration on their comments as an introduction to their discussion points. So please be prepared for class!

Discussions: 30% - this class is all about ideas in and about Soils, understanding how and why Soil Science is done, and identifying the strengths and weaknesses of different scientific approaches, so participation in the discussions is a key part of the course grade. Participation will be assessed in a number of ways...in-class surveys and activities, random attendance, etc...

Final exam: 20%. The final exam (a short paper) will be based on synthesizing ideas from a selected group of readings assigned during the semester and providing one of the following: 1) A short Science/Nature style news/commentary of role of soils in a current environmental issue approximately ~ 1000 words or 2) Write an NSF/NASA grant application or Grad School Essay Centering on Soils. Students should focus on a 3-4 page, concise, NSF-style research proposal centering on soil-related problem of your choice.