

# EPSc 413: Introduction to Soil Science

Fall 2018

3 Credits

**Instructor:** Prof. Jeff Catalano, Rudolph Hall 242, 935-6015, [catalano@wustl.edu](mailto:catalano@wustl.edu)

*Office Hours:* T 2:30 PM to 3:30 PM, or by appointment

**Teaching Assistant:** Rachel Siegel, [rsiegel@wustl.edu](mailto:rsiegel@wustl.edu)

*TA Office Hours:* M and Th 2:45 PM to 3:45 PM

*TA Office Hour Location:* Rudolph Hall 394

**Course Meeting Times and Place:** MWF 9:00 to 10:00 am, Rudolph Hall 204

**Website:** <http://epsc413.wustl.edu/>

## Course Objectives:

- To comprehend the physical, chemical, and biological processes functioning within soils
- To define factors influencing elemental (nutrient and contaminant) cycling within terrestrial ecosystems
- To obtain an appreciation for soils as a dynamic, non-renewable natural resources
- To learn the difference between “soil” and “dirt”

**Course Description:** The physical, chemical, and biological processes that occur within soil systems. The types of soils and how these relate to soil formation. The major components of soil, including soil water, minerals, organic matter, and microorganisms. Soils in wetlands and arid regions. Cycling of nutrients and contaminants in soils. Soil quality, conservation, and sustainability. Soil carbon sequestration. Includes a one-day field trip.

## Require Textbook:

*The Nature and Properties of Soils 15<sup>th</sup> ed.*, by N.C. Brady and R.R. Weil, Prentice Hall, Inc.

You are free to use an earlier version of this textbook, such as the 14<sup>th</sup> or 13<sup>th</sup> editions, or the abridged version of the textbook, *Elements of the Nature and Properties of Soils*. These are often substantially cheaper than the newest edition of the full textbook. However, be aware that reading assignments will be given only for the required textbook.

## Other Useful/Interesting Texts:

*Soil Chemistry* by Daniel G. Strawn, Hinrich L. Bohn, and George A. O'Connor

*Introduction to Environmental Soil Physics* by Daniel Hillel

*Soils: Genesis and Geomorphology* by Randall J. Schaetzl and Michael L. Thompson

*Soil Microbiology, Ecology and Biochemistry* by Eldor A. Paul

*Fundamentals of Soil Ecology* by David C. Coleman et al.

*Dirt: The Ecstatic Skin of the Earth* by William Bryant Logan

*Dirt: The Erosion on Civilizations* by David R. Montgomery

**Field Trip:** This course will have one *required* field trip to the Tyson Research Center to observe soil development in the field as well as to characterize soil profiles. It is tentatively scheduled for Saturday, October 27. The trip will depart Washington University at approximately 8:30 AM and return before dinner. Contact Prof. Catalano well in advance if you have a valid conflict to arrange an alternative assignment.

**Course Responsibilities:** Course grades will be determined based on problems sets, three exams, a project, and field trip reports:

Homework:	30% (5% each)
Exams:	60% (20% each)
Field Trip Report:	10%

**Homework:** Six homework assignments will be given that review key concepts in the course.

**Exams:** Three exams will be given. The second and third exams will be focused on the most recent material covered but students will still need to recall information from the entire course.

**Field Trip Report:** Students will complete a brief written summary of the field trip activities. Details will be provided during the class period preceding the field trip.

**Grading:** Final grades will be determined by the instructor and may be curved. However, students are guaranteed the following minimum letter grade (+/- grades will be given):

A:	90 – 100%
B:	80 – 90%
C:	70 – 80%
D:	60 – 70%
F:	<60%

**Homework Policy:** Late homework will be accepted until the graded homework is returned in class or, for homework due right before exams, until the answer key is provided for studying. A penalty of -20% per day (including weekends and holidays) will be enforced. Late homework must be turned in to the course instructor or teaching assistant in person unless other arrangements have been made. No homework will be accepted on weekends and University holidays. Once graded homework has been returned or an answer key provided any outstanding assignments will result in a grade of zero.

**Exam Policy:** If you have an exam conflict related to an academic activity, religious holiday, athletic function, or a major event for an organization in which you are a member then you may request *before the date of the exam* an alternative arrangement. You must discuss this with the instructor at least one course period before the exam. Depending on the duration of your absence and the course schedule the instructor may choose to schedule a make-up exam or assign 30% of your grade to each of the other two exams. Failure to attend an exam without prior notice will result in a grade of zero except in cases of serious emergencies.

**Academic Integrity:** All students are expected to adhere to high standards of academic integrity as outlined in our academic integrity policies:

Undergraduate Students: <http://wustl.edu/policies/undergraduate-academic-integrity.html>

Graduate Students: <https://graduateschool.wustl.edu/policies-procedures>

It is the responsibility of each student to read and be familiar with these policies. Unfamiliarity because of failure to read the respective document is not an excuse for lack of compliance. If you have any doubts or questions about the policies, please ask the instructor.

**Accommodations Based upon Sexual Assault:** The University is committed to offering reasonable academic accommodations to students who are victims of sexual assault. Students are eligible for accommodation regardless of whether they seek criminal or disciplinary action. Depending on the specific nature of the allegation, such measures may include but are not limited to: implementation of a no-contact order, course/classroom assignment changes, and other academic support services and accommodations. If you need to request such accommodations, please direct your request to Kim Webb (kim\_webb@wustl.edu), Director of the Relationship and Sexual Violence Prevention Center. Ms. Webb is a confidential resource; however, requests for accommodations will be shared with the appropriate University administration and faculty. The University will maintain as confidential any accommodations or protective measures provided to an individual student so long as it does not impair the ability to provide such measures.

If a student comes to me to discuss or disclose an instance of sexual assault, sex discrimination, sexual harassment, dating violence, domestic violence or stalking, or if I otherwise observe or become aware of such an allegation, I will keep the information as private as I can, but as a faculty member of Washington University, I am required to immediately report it to my Department Chair or Dean or directly to Ms. Jessica Kennedy, the University's Title IX Coordinator. If you would like to speak with the Title IX Coordinator directly, Ms. Kennedy can be reached at (314) 935-3118, jwkennedy@wustl.edu, or by visiting her office in the Women's Building. Additionally, you can report incidents or complaints to Tamara King, Associate Dean for Students and Director of Student Conduct, or by contacting WUPD at (314) 935-5555 or your local law enforcement agency.

You can also speak confidentially and learn more about available resources at the Relationship and Sexual Violence Prevention Center by calling (314) 935-8761 or visiting the 4<sup>th</sup> floor of Seigle Hall.

**Bias Reporting:** The University has a process through which students, faculty, staff and community members who have experienced or witnessed incidents of bias, prejudice or discrimination against a student can report their experiences to the University's Bias Report and Support System (BRSS) team at: <https://brss.wustl.edu/>

**Mental Health:** Mental Health Services' professional staff members work with students to resolve personal and interpersonal difficulties, many of which can affect the academic experience. These include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression. More information is available at: <http://shs.wustl.edu/MentalHealth/>

**Schedule:** Listed below is a *tentative* schedule. The instructor reserves the right to modify the order and topics as necessary. All readings are from the textbook. The textbook chapters relevant to the lecture material are listed below; *specific sections to read will be posted on the course website.*

<b>Dates</b>	<b>Lecture Number</b>	<b>Topic</b>	<b>Relevant Chapters</b>	<b>Comments</b>
8/27, 29, 31	1, 2, 3	Introduction; Overview of Soil Components and Profiles; Soil Horizons	Ch. 1, 2	
9/5, 7	4, 5	Formation and Classification; Soil Physical Properties and Architecture; <b>No Class 9/3 Labor Day</b>	Ch. 2, 3, 4	
9/10, 12, 14	6, 7, 8	Soil Physical Properties and Architecture; In Class Lab Activity	Ch. 4	HW1 Due 9/10
9/17, 19, 21	9, 10, 11	Soil Water; Soils and the Hydrologic Cycle	Ch. 5, 6	
9/24, 26, 28	12, 13	Soil Water Budgets; Soil Mineralogy; <b>EXAM 1 in class on 9/28</b>	Ch. 6, 8	HW2 Due 9/26
10/1, 3, 5	14, 15, 16	Soil Chemistry; Soil Acidity; Introduction to Soil Ecology	Ch. 8, 9, 11	
10/8, 10, 12	17, 18, 19	Soil Organisms, Soil Organic Matter	Ch. 11, 12	
10/17, 19	20, 21	Organic Matter Decomposition; Aeration; Hydric Soils; <b>No Class 10/15 Fall Break</b>	Ch. 12, 7	HW3 Due 10/17
10/22, 24, 26	22, 23, 24	Soils of Dry Regions; Saline and Sodic Soils; Soil Surveys and Mapping; Field Methods	Ch. 10, 19	<b>Field Trip 10/27</b>
10/29, 31, 11/2	25, 26	Soil Spatial Variability; Soil Classification; <b>EXAM 2 in class on 11/2</b>	Ch. 19, 3	HW4 Due 10/29
11/5, 7, 9	27, 28, 29	Soil Classification; Soil Formation	Ch. 3, 2	
11/12, 14, 16	30, 31, 32	Nutrient Cycling	Ch. 13, 14, 15	HW5 Due 11/16
11/19	33	Micronutrients; <b>No Class 11/21 and 23 Thanksgiving</b>	Ch 15	
11/26, 28, 30	34, 35	Nutrient Management; Soil Contamination; <b>No Class 11/30 Prof. Catalano on Travel</b>	Ch. 16, 18	
12/3, 5, 7	37, 38, 39	Soil Erosion; Humans and Soil Sustainability; Soils and Climate Change	Ch. 17, 20, 12	HW6 Due 12/7
12/14		<b>Exam 3 during Scheduled Final Exam Period, 8:00 am to 10:00 am in classroom</b>		

**The instructor reserves the right to modify this syllabus during the semester. These changes will be announced in class, and it is the students' responsibility to attend class or make other necessary arrangements to keep current on the course schedule.**