ENV 310: Soil Science
Spring 2017
Lecture/Lab: Tu Th 10:30-11:45 AM
CLCC 199

Instructor
Dr. Becky Ball
CLCC 315D
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Office hours: Tu 9-10 AM, Th 12-1 PM
or by appointment

Class info
Semester hours: 4
Pre-requisites: BIO 320, CHM 116, PHY 101
Co-requisites: None
Course Webpage: myasucourses.asu.edu

Course Description
This course introduces the fundamental principles of soil science, including physical, chemical, biological, and ecological properties. These principles will be applied to explain the importance of soil as both a natural resource and ecosystem. We will discuss the role of soils as the heart of terrestrial ecosystems, both natural and managed, and the importance of this key natural resource to environmental health and biological productivity. We will also explore how human activity and global change are impacting this vital natural resource and ecosystem that is crucial to life on earth. The laboratory component will also introduce applications and standard methodology for investigating these principles.

Course Objectives / Learning Outcomes
Students completing this course will be able to:
- Describe the chemical, physical, and biological characteristics of soil and the soil formation processes that create the diversity of soils across the planet.
- Explain the role of key soil processes in overall ecosystem function.
- Demonstrate facility with laboratory methods to analyze soil chemical, biological and physical properties, as well as major soil ecological processes.

Course Reading
Required Text
Weil, R. and Brady, N. 2017. The Nature and Property of Soils. 15th Edition. Pearson Prentice Hall.

Journal articles
Journal articles are listed in the "Course Reading List" on Blackboard™ and available online through ASU's library's electronic journals. A demonstration on how to access and use electronic journals will be made during the first class.

Grading

Lab Assignments	30%
Examinations	50%
Term paper	20%

Grading Scale

90%	≤ A ≤		100%
80%	≤ B ≤		89.9%
70%	≤ C ≤		79.9%
60%	≤ D ≤		69.9%
	E ≤		59.9%

Laboratory Assignments
There are 6 laboratory assignments that will introduce and practice basic concepts in soil science to reinforce topics covered in lecture. Assignments will be handed out and explained during laboratory exercises, *due by 9:00 A.M. on the following Thursday*. Students may discuss the assignments with

one another, but written work must be completed individually. No late assignments will be accepted for full credit without *prior* permission of the instructor. Each assignment is worth 5% of your final grade, for a total of 30%.

Examinations

There will be three exams given this semester: 2 exams during the semester and a final exam. Exams 1 and 2 are each be worth 15% of your final class grade. The final exam will be comprehensive and worth 20% of your final grade. The format of the exams will be a combination of multiple choice, short answer, and applications from the problem sets.

Term Paper: Independent Soil Investigation Project

You will demonstrate your skill in soils investigation and interpretation through an independent project undertaken in groups of one to three students and presented in class using visual aids. Groups will explore a soil ecosystem of interest and demonstrate the ability to describe and interpret soils in terms of key processes. Details on this project will be presented during the semester. A detailed rubric for this project, including grading criteria, will be provided on the Blackboard site. Your final group project will be 20 % of your grade.

Contacting me:

The best way to contact me is by email. I will typically respond within 24-48 hours. If I do not respond in 2 days, call or email again. A lack of response should never be interpreted as agreeing to your request! If I have not responded, it is because I did not receive your email, and you need to try again.

Course Policies and Expectations:

Assignments. Written assignments must be word-processed and spell-checked. Use of the Writing Center is strongly encouraged (http://studentsuccess.asu.edu/writingcenters). Your name should appear at the top of each assignment. Please submit your work electronically as a PDF or a Word (.doc or .docx) document using the Assignment feature on Blackboard. All assignments must be turned in on time for full credit; 10% of your grade will be automatically deducted *per day* for days 1 and 2 late. Assignments will not be accepted more than 2 days late.

Absence policy. The only excused absences are those outlined in the ACD for religious observances/practices and university-sanctioned activities. However, if an emergency arises that causes you to miss class, communication is key! Contact the professor and/or classmates to learn what you missed, and you will be required to provide evidence of the emergency (e.g., doctor's note, obituaries, police report, etc.) if your absence caused you to miss an exam or assignment. Please note that work schedules, vacation travel, meetings on other campuses, homework load, and sleepiness *do not* count as emergencies.

Study and Preparation Time. The Arizona Board of Regents specifies that students are expected to spend at least two hours per week on course-related research and scholarly activities per course credit. This means that each week you should expect to spend at least eight hours preparing for class.

Academic Integrity and Misconduct. As defined in the ASU Student Academic Integrity Policy (http://provost.asu.edu/academicintegrity), each student has an obligation to act with honesty and integrity, and to respect the rights of others in carrying out all academic assignments. A student may be found to have violated this obligation and to have engaged in academic dishonesty if during or in connection with any academic evaluation, he or she:

- Engages in any form of academic deceit;
- Refers to materials or sources or employs devices (e.g., audio recorders, crib sheets, calculators, solution manuals, or commercial research services) not authorized by the instructor for use during the academic evaluation;
- Possesses, buys, sells, obtains, or uses, without appropriate authorization, a copy of any materials intended to be used for academic evaluation in advance of its administration;
- Acts as a substitute for another person in any academic evaluation;
- Uses a substitute in any academic evaluation;
- Depends on the aid of others to the extent that the work is not representative of the student's abilities, knowing or having good reason to believe that this aid is not authorized by the instructor;
- Provides inappropriate aid to another person, knowing or having good reason to believe the aid is not authorized by the instructor;
- Engages in plagiarism;
- Permits his or her work to be submitted by another person without the instructor's authorization; or
- Attempts to influence or change any academic evaluation or record for reasons having no relevance to class achievement.

ENV 310 follows the ASU Academic Integrity Policy in the administration of all course examinations and assignments. Violations of the University Academic Integrity policy will not be ignored. Penalties include reduced or no credit for submitted work, a failing grade in the class, a note on your official transcript that shows you were punished for cheating, suspension, expulsion and revocation of already awarded degrees. The university requires that the implementation of any of these penalties for violations of the academic integrity policy be reported to the Dean's office. The Integrity Policy defines the process to be used if the student wishes to appeal this action. In ENV 310, you are expected to follow the *ASU Student Code of Conduct* (http://students.asu.edu/srr/code) especially when communicating with your peers, instructors, and teaching assistants. Violations of the student code of conduct may result in withdrawal from the class.

Disability Accommodations. The Disability Resource Center (DRC) provides information and services to students with any documented disability who are attending ASU West. Individualized program strategies and recommendations are available for each student as well as current information regarding community resources. Students also may have access to specialized equipment and supportive services and should contact the instructor for accommodations that are necessary for course completion.

Final Exam Make-up Policy. The final exam schedule listed in the Schedule of Classes will be strictly followed. Exceptions to the schedule and requests for make-up examinations can be granted only by the director of the School of Mathematical and Natural Sciences for one of the following reasons: religious conflict, the student has more than three exams scheduled on the same day, or two finals are scheduled to occur at the same time. Make-up exams will NOT be given for reasons of non-refundable airline tickets, vacation plans, work schedules, weddings, family reunions, or other such activities. Students should consult the final exam schedule before making end-of-semester travel plans. If there is a last-minute personal or medical emergency, the student may receive a grade of Incomplete and makeup the final within one calendar month. The student must provide written documentation and be passing the class at the time to receive an Incomplete. A signed "Request for Grade of Incomplete" must be submitted by the student and approved by the student's instructor and the Director of the School of Mathematical and Natural Sciences.

The Grade of Incomplete. A grade of incomplete will be awarded only in the event that a documented emergency or illness prevents a student who is doing acceptable work from completing a small percentage of the course requirements at the end of the semester. The guidelines in the current general ASU catalog regarding a grade of incomplete will be strictly followed. **A grade of incomplete will NOT be awarded unless there is documented evidence of extreme personal or immediate family hardship.** Changes in work hours, child-care emergencies, or other similar personal problems will not be approved as reasons for awarding incompletes. The Director of the School of Mathematical and Natural Sciences must approve all incomplete grade requests.

Course/Instructor Evaluation. The course/instructor evaluation for this course will be conducted online 7-10 days before the last official day of classes of each semester. Your response(s) to the course/instructor are anonymous and will not be returned to your instructor until after grades have been submitted. The use of a course/instructor evaluation is an important process that allows our college to (1) help faculty improve their instruction, (2) help administrators evaluate instructional quality, (3) ensure high standards of teaching, and (4) ultimately improve instruction and student learning over time. Completion of the evaluation is not required for you to pass this class and will not affect your grade, but your cooperation and participation in this process is critical. About two weeks before the class finishes, watch for an e-mail with "NCIAS Course/Instructor Evaluation" in the subject heading. The email will be sent to your official ASU e-mail address.

Withdrawals. **The instructor will NOT withdraw students for any reason.** Specifically, students should be aware that non-attendance will NOT automatically result in their being dropped from the course. Therefore, if a student does not attend class during the first week or for any extended period of time during the semester, they should not presume that they are no longer registered. It is the student's responsibility to be aware of their registration status.

Please note the following dates:

Drop/Add Deadline	January 15, 2017
Tuition and Fees 100% Refund Deadline	January 22, 2017
Course Withdrawal Deadline*	April 2, 2017
Complete Session Withdrawal Deadline*	April 28, 2017

*As part of a complete session withdrawal a student must withdraw from all classes in a session. Beginning the first day of classes, undergraduate students are required to work with a Student Retention Coordinator to facilitate the withdrawal process. Please refer to http://students.asu.edu/StudentRetention

Any withdrawal transaction must be completed by the deadline date in accordance to the appropriate session at the registrar's office. If not, you will still be officially enrolled and you will receive a grade based on your work completed. For additional information about ASU's withdrawal policy and the possible consequences of withdrawing from a class, contact Registration Services or your academic counselor. **Students are responsible for their registration status!**

Power Outage. In the event of a campus power outage or other event affecting the ability of the University to deliver classes, any decision to cancel classes will be announced using the ASU emergency notification system. For this reason, it is imperative that students register with the ASU emergency notification system at: https://cfo.asu.edu/emergency-alert. In cases in which a limited number of buildings are affected, students should check the university website and/or call the School office at (602) 543-6050.

Emergency Evacuation Plan. Students should be aware of the evacuation route posted on the exit door of each classroom. Students who cannot walk down stairs should notify the instructor as early in

the course as possible so the instructor can provide information regarding the location of the designated meeting area on each upper floor of the building (marked with a blue sign that states Emergency Evacuation Response Area).

Title IX. Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

Policy against Threatening Behavior. In the classroom and out students are required to conduct themselves in a manner that promotes an environment that is safe and conducive to learning and conducting other university-related business. All incidents and allegations of violent or threatening conduct by an ASU student will be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students. Such incidents will be dealt with in accordance with the policies and procedures described in Section 104-02 of the Student Services Manual (http://www.asu.edu/aad/manuals/ssm/ssm104-02.html).

Subject to Change. All class syllabi are subject to minor changes as necessary to accommodate the needs of the instructor, school, or class.

Week	Date	Topic	*Reading* **Assignments Due**
1	Tu 1/10	Course introduction, syllabus Introduction to soils	*Ch 1*
	Th 1/12	Soil formation and structure	*Ch 2*
2	Tu 1/17	Soils of the world (orders & classification)	*Ch 3, Tenneson 2014*
	Th 1/19	LAB 1: Working with soil data	
3	Tu 1/24	Soil physics: texture & structure	*Ch 4*
	Th 1/26	Soil physics: water dynamics	*Ch 5, 6* **Lab 1 report due**
4	Tu 1/31	Soil physics: air & temperature	*Ch 7*
	Th 2/2	LAB 2: Physical properties of soil	
5	Tu 2/7	Soil chemistry: colloidal fraction	*Ch 8*
	Th 2/9	Soil chemistry: pH	*Ch 9* **Lab 2 report due**
6	Tu 2/14	Soil chemistry: alkalinity and salinity	*Ch 10*
	Th 2/16	LAB 3: Soil chemistry analysis	
7	Tu 2/21	**Exam 1**	
	Th 2/23	Soil biology: microbes	*Ch 11* **Lab 3 report due**
8	Tu 2/28	Soil biology: fauna	*Coleman 2002*
	Th 3/2	LAB 4: Soil biology	
SPRING BREAK 3/6-3/10 --- NO CLASS (try not to miss me too much)			
9	Tu 3/14	Soil biodiversity and ecosystem function	*Coleman & Whitman 2005*
	Th 3/16	Soil chemistry: nutrients Independent investigation introduction	*Ch 13,14* **Lab 4 report due**
10	Tu 3/21	Soil chemistry: nutrients cont.	*Ch 14,15*
	Th 3/23	Lab 5: Biogeochemistry	
11	Tu 3/28	Organic matter dynamics	*Ch 12*
	Th 3/30	Soil-plant interactions	*Wardle et al. 2004* **Lab 5 report due**
12	Tu 4/4	**Exam 2**	
	Th 4/6	Soil degradation: desertification, erosion, and salinization	*Ch 17*
13	Tu 4/11	Soil contamination and remediation	*Ch 18*
	Th 4/13	Lab 6: Soil quality and soil health	
14	Tu 4/18	Global change and soils: climate	*Crowther et al. 2016*
	Th 4/20	Global change and soils: land use	*Ch 20* **Lab 6 report due**
15	Tu 4/25	Global change and soils: human health	*Wall et al. 2015*
	Th 4/27	Student presentations, discussion	**Independent soil investigation paper**
	Tu 5/2	**Final Exam 9:50-11:40 AM**	