SOIL 2125

Basic Soil Science
Spring 2020

> We know more about the movement of celestial bodies than about the soil underfoot.
>
> *- Leonardo Da Vinci*

Lecture:
M/W/F* 9:35 - 10:25 AM
335 Borlaug Hall
*Meets F - 1/24, 2/21, 3/20, 4/17

Discussion:
Section 3 - Th 9:35 - 10:25 AM
Section 4 - Th 10:40 - 11:30 AM
Section 5 - Th 11:45 - 12:35 PM
Section 6 - Th 3:00 - 3:50 PM
Section 7 - Th 4:05 - 4:55 PM
243 Borlaug Hall

Lab (Open Times):
W 10:30 AM - 9:00 PM
Th 9:00 AM - 9:00 PM
F 9:00 AM - 4:30 PM
241 Borlaug Hall

PROFESSOR
Dr. Nic Jelinski
558 Borlaug Hall 612.626.9936
jeli0026@umn.edu
Office Hrs: M 10:30 - 11:30 AM, W 1:00 - 2:00 PM, and by appointment

TA
Leanna Leverich
S401 Soil Science
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Office Hrs: T 1:30 - 2:30 PM, W 10:30 - 11:30PM, and by appointment.

Whether you know it or not, at some point in your life you have studied soil. Many of you studied soils as children; digging holes, hunting for nightcrawlers, making sandcastles, or painting faces with mud. Others of you grew up working on farms or planting gardens. Whatever your background, you come into this class already knowing at least a few things about what soil looks like, feels like and smells like.

Many people have only had the chance to interact with the top six inches of soil and think all soil looks the same. In reality, soils are highly diverse and once you know a little bit about soils and their diversity, it is difficult to find a "boring" place on earth ever again. In this class, we approach soil as a natural system worthy of study in its own right. Because complex biological, chemical and physical processes affect the way soils form and the way that they are managed, we will use first principles from biology, chemistry and physics to understand them.

Francis Hole, a famous soil scientist, was well known for saying that all humans are TNS, or "Temporarily Not Soil". The atomic building blocks for most of our body mass came from or were supported by soil through the plants or animals that we eat, and when we die those building blocks will return to the soil. So, in a very real sense, we are all made up of soil and our lives, communities, and cultures depend on our understanding of it.

LEARNING OUTCOMES

- Understand and appreciate local, regional, and global soil diversity.
- Understand and apply fundamental principles in soil science.
- Communicate fundamental principles in soil science to others.
- Obtain, interpret, and utilize information from soil surveys.
- Understand the influence of management on soil properties.

LECTURE, LABORATORY AND EXAM LOGISTICS

Lectures: Most weeks, lectures will meet on Monday and Wednesdays only. However, we will have lecture on the following 4 Fridays: January 24th, February 21th, March 20th, and April 17th.

Laboratory: Plan on spending 1-2 hrs each week in lab. The lab has open hours and is self-paced so you can return as often as needed to complete the lab exercises (Laboratory TA's will be in the lab during all open hours to help you). **Make sure you sign in and out**.

Exams: There are three unit exams, with two on the following days: February 17th and April 15th. Exam 2 will be a take home exam due March 18 at the beginning of class. The final exam is scheduled for Wednesday, May 13th, 2019 from 10:30 AM - 12:30 PM in 335 Borlaug Hall.

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Canvas Access:

➡ Via myU portal:
Go to myU Portal page at http://myu.umn.edu, login with your Internet ID, and click on the Key Links tab. Click on Canvas in the dropdown menu.

➡ Via Canvas server:
Go to http://canvas.umn.edu and login there with your Internet ID. Once logged in, you will be able to see the link to sites you have access to.

Socrative Access:

➡ Phone App: If you plan on using your phone to answer lecture questions, you should download the Socrative Student App (available for iOS and Android).

➡ Internet: If you plan on using your computer or other internet connected device, you can access Socrative through the following link (which I recommend you bookmark): https://b.socrative.com/login/student/

➡ In both cases, enter "SOIL2020" as the Room Name. You will then be prompted to enter your student ID.

➡ Complete the extra credit quiz by Tuesday, January 21st at 11:59PM to receive 2 extra credit points.

COURSE RESOURCES

Course Packet: The course packet is required, comes in two parts, and contains handouts and laboratory materials. You can purchase the SOIL 2125 course packet at the St. Paul Bookstore.

Textbook: No textbook is required for this course. However, if you need a reference or if you are planning on continuing your work with and study of soils in the future, I highly recommend the following text, which is available from most online booksellers, the University of Minnesota libraries, or on loan from me:

- *Elements of the Nature and Properties of Soils (3rd Ed.),* Brady and Weil.

OR

- *The Nature and Properties of Soils,* Brady and Weil.

Course Website: Lecture notes and other course materials will be available on the class website through Canvas. If you are registered for the class, you have automatically been given access privileges to the Soil 2125 website on Canvas. The instructions at left tell you how to login to the site. If you have any problems, let us know.

"*Socrative" for Lecture Questions*: You will use Socrative to get credit for answering lecture questions and attendance. You can access the Socrative site by phone app or any web browser (see directions on the left hand side of this page). You will enter the room name for this course, which is "SOIL2020" and then will be prompted for your student ID. **You will receive 2 extra credit points if you complete the open extra credit quiz by Tuesday, January 21st at 11:59PM**. *These are the only extra credit points I offer in this class, so be sure to get them!* If you have any problems accessing the site, let me know.

During each lecture, a multiple choice question (or set of questions) will be posted for you to respond to. When a multiple choice question is posted in lecture, you will just use the Socrative app or webpage to answer and receive attendance points. We will go through this on the first day of class so everyone is clear on how this works. We will also provide paper slips to respond on if you don't have a phone or computer or forgot your device on any particular day.

RECOMMENDED HABITS FOR SUCCESS IN THIS CLASS

Participation is key in this course! If you attend all lectures, discussion sections, and complete weekly labs, you will be very familiar with the material and won't have a problem on the exams. Come to lecture prepared to take notes and participate. My lecture slides won't always read like a textbook because I also use pictures and hand-write problems out on the board. Unit summaries, review sessions, and additional materials on the Canvas site will help you study as well. You are encouraged to ask any and all questions - even the "stupid" ones!

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Evaluation:
Final course grades use the +/- system of grading. Course grades will be broken down by the following scale:

A	> 93
A-	90 to < 93
B+	87 to < 90
B	83 to < 87
B-	80 to < 83
C+	77 to < 80
C	73 to < 77
C-	70 to < 73
D+	67 to < 70
D	60 to < 67
F	< 60

A grade of C- is required to pass this class if you elected to take it under the Pass/Fail grading system.

Grade Definitions:
http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html

Grade assignment:
Grades will be assigned by earned point values as described on this page. No curve will be applied.

Grading challenges:
Any challenges to graded assignments you wish to be considered should be emailed to the TA within one week of the posting date of the graded item.

COURSE ASSIGNMENTS AND POINTS (675 points)
(See page 6 for Makeup Policies)

- Lecture Questions (60 points, 9% of your grade)

Every lecture will have at least one question which is used for attendance and participation purposes, i.e. you don't need to answer the question correctly to get full points. However, the questions also serve as review. Lecture questions are answered through Socrative or by paper in lecture. There is no make- up work for lecture questions! (30 lectures X 2 points = 60 points).

- Pre-Discussion Quizzes (75 points, 11% of your grade)

There will be a short pre-discussion quiz on Canvas each week. You are required to complete it prior to your Thursday discussion section. (15 quizzes x 5 points = 75 points).

- Discussion Team Exercises (105 points, 16% of your grade)

Group exercises will be introduced during weekly discussions. These exercises will include small group discussion and large group sharing of ideas. The small groups will be 3 to 4 people in size. Each exercise is worth 7 points. One exercise sheet will be handed in for each group. (15 exercises X 7 points = 105 points).

- Lab Assignment and Quizzes (104 points, 15% of your grade)

Each weekly lab will require students to complete a laboratory exercise sheet and lab quiz. The quiz will be taken after the TA has checked the lab assignment sheet. The lab assignment sheet is worth 3 points and the quiz is worth 5 points. Make sure to sign in and out of lab. (13 labs X 8 points = 104 points).

- Land-use Report (81 points, 12% of your grade)

One of the main goals is this course is for you to walk away knowing how to obtain, use, understand and interpret information from soil surveys. This is an important skill that will set you apart in the workforce from people who don't know how to do this. To support this course objective, you will be required to produce a brief (2 p.), professional-style report (with a cover letter) on appropriate land-uses for a client based on information from a soil survey. Your client and property selections will be due on 2/20. Part 1 of the report will be due 3/27. A partial draft will be due on 4/24. Your final draft with cover letter will be due on Friday 5/8 at 11:59PM.

- Exams (250 points, 37% of your grade)

There will be three unit exams and one final exam. Unit exams will include material from that unit's lectures and labs (50 points each). The final exam will be comprehensive (100 points). Note: The final exam is scheduled for Monday, May 13th, 2019 from 10:30 AM to 12:30 PM in 335 Borlaug Hall.

- Field Trip - OPTIONAL - attendance does not affect your grade

There will be an optional field trip in early May with 2 time-slot options: Fri, 5/1 12:30PM-4:00PM OR Sat 5/2 8:30AM-12:00PM.

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Board of Regents Student Conduct Code:
http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf

Board of Regents Sexual Harassment Policy:
http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf

Board of Regents Policy on Equal Opportunity and Affirmative Action:
http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf

Important Dates:
1/24: Friday Lecture
2/3: Last day to cancel classes without receiving a "W".
2/17: Exam 1
2/21: Friday Lecture
3/4: Exam 2 handed out
3/18: Exam 2 due
3/20: Friday Lecture
4/6: Last day to cancel classes without college approval.
4/15: Exam 3
4/17: Friday Lecture
4/24: Land-use report draft due
5/8: Final land-use report due
5/13: Final Exam

THE FINE PRINT

Key Summary: Most of the below text and policies can be summed up with the following points.

- Take responsibility for your own actions.
- Be honest.
- Respect yourself and others - zero tolerance for discrimination.
- Don't do things in class that aren't related to class - remember, you or someone else is paying for you to be here.
- If you need help of any kind, just ask!

Attendance Policy: Points for lecture attendance (Lecture Questions) cannot be made up, even for legitimate reasons. Discussion absences must be arranged in advance in order to receive make up work. I am also more than willing to work with you for legitimate excuses due to serious illness or a personal/family crisis.

Student Conduct Code: The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community. As a student at the University you are expected to adhere to the Board of Regents Policy: Student Conduct Code.

Use of Personal Electronic Devices: Both lecture and discussion are designed to be active, technology-assisted environments. To that end, the use of personal electronics such as cell phones, tablets or laptops are encouraged if they are used for class purposes. However, all cell phones should be silenced when you come to class and should only be used to answer questions. The use of any electronic music players is prohibited, and the use of the prior listed devices is prohibited if used for purposes other than class.

Sexual Harassment: "Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting.

Equity, Diversity, Equal Opportunity, and Affirmative Action: The University provides equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression.

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Disability Services Website: https://diversity.umn.edu/disability/

Student Mental Health Website: http://www.mentalhealth.umn.edu

MORE FINE PRINT

Disability Accommodations: The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations. If you are registered with DS and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

Animals: Animals are not permitted in class unless they are certified service animals or emotional support animals approved through the Disability Resource Center.

Mental Health and Stress Management: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you.

Academic Freedom and Responsibility: Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled. Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost.

Appropriate Student Use of Class Notes and Course Materials: Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community.

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University Makeup Work Policy: http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html

Class Make-up Policies for Missed Work (Unexcused):
Lecture Questions: Everyone gets 6 free attendance points back to cover for short-term absences.

Lab Exercises and Quizzes: Lab exercises take time to set up and tear down, so if you are unable to complete the lab exercise in a given week, you cannot make up the lab exercise (3 pts). You are eligible, however, to take the lab quiz (5 pts). Any late lab quizzes must be completed and turned in upon the completion of the following week's lab.

Discussion Exercises: Discussion exercises are team activities. If you miss discussion you will receive a 2 pt deduction. You can still complete the exercise for 6 pts, however. The completed sheet must be turned in at the beginning of discussion the following week to receive a grade.

Land-Use Reports: Deduct 11% for every 24 hour period late.

Exams: No exam make-ups for unexcused absences.

EVEN MORE FINE PRINT

Make-up Work for Legitimate Absences: Students will not be penalized for absence during the semester due to unavoidable or pre-coordinated legitimate circumstances. Such circumstances include verified illness lasting more than one week, participation in intercollegiate athletic events or other University sanctioned activities, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections.

Scholastic Dishonesty: You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (see Student Conduct Code: link on page 4 of this syllabus. If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information,please see: http://policy.umn.edu/Policies/Education/INSTRUCTORRESP.html
The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: http://www1.umn.edu/oscai/integrity/student/index.html. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

Extra Credit: There is only one opportunity for extra credit in this class - you will receive 2 extra credit points if you complete the pre-semester Socrative quiz by 11:59 PM on Tuesday, January 21st.

FURTHER OPPORTUNITIES

Soil Science Minor and Professional Certifications: The Department of Soil, Water and Climate hosts a 20 credit minor in Soil Science which can be added on to most majors. Classes in this minor can also prepare you to meet the requirements for the Professional Soil Scientist certification exam and prepare you to receive professional certifications in Wetland Delineation, On-site Sewage Treatment and Erosion Control. The minor coordinator is Dr. Ed Nater: nater001@umn.edu.

Field Classes: If you want to get out in the field and see a lot more soils in person, consider taking SOIL 4511 (Field Study of Soils - 2 cr./May Session and SOIL 3521 (Soil Judging - 1 cr./Fall.

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[CLASS SCHEDULE - SUBJECT TO CHANGE]

WEEK	DAY	DATE	TOPIC FOCUS	SUGGESTED READINGS Brady and Weil, 3rd Ed.	LAB UNIT
01	W	1/22	Introduction and Overview, Soil Diversity	pp 3–14	No Lab
	Th	1/23	Discussion 1		
	F	1/24	Soil physical properties and components (1)	pp 15–21	
02	M	1/27	Soil physical properties and components (2)	pp 96–109	1. Soil Properties - Texture, Color and Structure
	W	1/29	Soil physical properties and components (3)	pp 114–123, 141–143	
	Th	1/30	Discussion 2 - *Prep Redox Vials*		
03	M	2/3	Soil Chemical Properties - Elemental Composition	Canvas	2. Soil Properties - Clays and Mineralogy
	W	2/5	Soil Chemical Properties - Mineralogy	pp 235–247, 263–265	
	Th	2/6	Discussion 3		
04	M	2/10	Soil Chemical Properties - Organic Matter	pp 361–378, 383–387	3. Soil Properties - Bulk Density, Porosity, Organic Matter
	W	2/12	Soil Chemical Properties - pH	pp 270–311	
	Th	2/13	Discussion 4		
05	M	2/17	***** EXAM #1 ***** Unit 1		4. Ion exchange, CEC, pH
	W	2/19	Soil Processes - Ion Exchange and CEC (1)	pp 248–260	
	Th	2/20	Discussion 5; **Land Use Property and Client Due**		
	F	2/21	Soil Processes - Ion Exchange and CEC (2)	pp 248–260	
06	M	2/24	Soil Processes - Water Movement (1)	pp 132–163, 165–199	5. Soil Water
	W	2/26	Soil Processes - Water Movement (2)	pp 132–163, 165–199	
	Th	2/27	Discussion 6		
07	M	3/2	Soil Processes - Energy and Microorganisms	pp 322–351	6. Soil Biological Processes (1)
	W	3/4	Soil Processes - C and N cycles ***** TAKE HOME EXAM #2 ***** Unit 2	pp 396–412	
	Th	3/5	Discussion 7 --- TAKE HOME		
08	M-F	3/9-13	*****NO CLASS - SPRING BREAK*****		

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[CLASS SCHEDULE - SUBJECT TO CHANGE]

WEEK	DAY	DATE	TOPIC FOCUS	SUGGESTED READINGS Brady and Weil, 3rd Ed.	LAB UNIT
09	M	3/16	Soil Processes - Redox	pp 201–206, 213–218	7. Soil Biological Processes (2)
	W	3/18	Soil Processes - Pedoturbation, **Take Home EXAM 2 due at beginning of class**		
	Th	3/19	Discussion 8		
	F	3/20	Topics on Land Use Reports	pp 89–93	
10	M	3/23	Soil Genesis and Soil Forming Factors	pp 27–43, 51–52	8. Mineral Weathering
	W	3/25	Soil Genesis: Parent Materials	pp 27–43, 51–52	
	Th	3/26	Discussion 9; **Land-Use Report PART 1 due Friday 3/27 @ 11:59PM**		
11	M	3/30	Soil Genesis: Climate and Organisms	pp 43–51	9. Soil Forming Factors
	W	4/1	Soil Horizons	pp 52–57	
	Th	4/2	Discussion 10		
12	M	4/6	Soil Taxonomy (1)	pp 58–95	10. Soil Classification
	W	4/8	Soil Taxonomy (2)	pp 58–95	
	Th	4/9	Discussion 11		
13	M	4/13	UNIT 3 REVIEW		11. Soil Survey
	W	4/15	***** EXAM #3 ***** Unit 3		
	Th	4/16	Discussion 12		
	F	4/17	Soil Survey (1&2)	pp 89–93	
14	M	4/20	Nutrient Management and Fertility (1)	pp 420–442, 455–496	12. Soil Fertility
	W	4/22	Nutrient Management and Fertility (2)	pp 420–442, 455–496	
	Th	4/23	Discussion 13; **Land-Use Report Draft due Friday 4/24 @ 11:59PM**		
15	M	4/27	Soil Physical Management - Tillage	pp 110–114	13. Soil Physical Management
	W	4/29	Soil Physical Management - Erosion	pp 499–533	
	Th	4/30	Discussion 14		
16	M	5/4	Soil Biological Management/State of the Soil	pp 368–371, 545–551	No Lab
	W	5/6	Review		
	F	5/8	**Final Land-Use Report due 5/8**		

FINAL EXAM - Wednesday, May 13th, 2020 10:30 AM - 12:30 PM 335 Borlaug

[Syllabus design adapted from Ken Harper, Syracuse University]