

Syllabus - SOIL 4683/5683
Soil, Water, and Weather
Spring 2021

Instructor: Tyson E. Ochsner
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Course website: <http://soilphysics.okstate.edu/teaching/soil-4683-5683>

Teaching Assistant: Jerry Brown, jerry.brown10@okstate.edu, 205 Agricultural Hall

Course meeting time and location: 9:30-10:15, MWF, Engineering North 450

Office hours:

You may e-mail me to schedule an appointment. You are also welcome to stop by my office any time the door is open. I can usually make time to talk with you. I enjoy getting to know students and want to help you learn and succeed.

Course description:

This course introduces the physics of the soil-plant-atmosphere continuum. The focus is on soil, its physical properties, and their interactions with water and weather in terrestrial ecosystems. Processes examined include precipitation, rainfall interception, raindrop impact, infiltration, runoff, drainage, soil water storage, evaporation, transpiration, solar radiation partitioning, soil temperature, and heat transfer near the land surface. Interactions of these processes with plant growth, solute transport, water quality, and greenhouse gas emissions are considered. Quantitative analysis is emphasized with applications in soil and environmental science, agronomy, ecology, hydrology, and climatology.

Prerequisites: General Physics (PHYS 1114) and Fundamentals of Soil Science (SOIL 2124)

Course objectives: Students should develop and demonstrate the ability to —

1. **Define** the primary processes in the soil water balance, the primary processes in the surface energy balance, and the fundamental physical properties of the soil.
2. **Relate** the processes in the soil water balance and the surface energy balance to each other and to the soil physical properties and relate all these components to issues of agricultural and environmental concern.
3. **Quantify** the magnitude and direction of water and energy flows in the soil-plant-atmosphere continuum and calculate values for soil physical properties.

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Performance evaluation:

Student performance will be evaluated based on class participation, homework assignments, two mid-term exams, and a final exam. Class participation will be assessed by the instructor based on three criteria: 1) *presence*, 2) *preparation*, and 3) *professionalism*. To receive full credit for class participation students must:

- 1) be *present* at every class period, except for officially permitted absences;
- 2) be fully *prepared* to learn, having read and studied the assigned content (text or video) before class and completed all assigned tasks;
- 3) and be completely *professional* in their conduct and work products.

Students taking the course for graduate credit will have extra homework. The maximum points that can be earned for each activity are listed below. To earn an overall grade of "A" for the course requires 450 points, a "B" requires 400 points, and so on.

<u>Possible points</u>	
Class participation	100
Homework	100
Mid-term exam 1	100
Mid-term exam 2	100
Final exam	100

Class policies:

1. It will be necessary to attend all scheduled class periods and take all exams at their assigned time in order to fulfill the requirements and receive an acceptable grade.
2. Students missing any class period should arrange with other students enrolled in the class to obtain lecture notes. Lecture recordings can be requested from the instructor.
3. Make-up exams will be available for officially permitted absences that occur on the scheduled exam dates and times. Valid reasons for absences include, but are not limited to, COVID-19 quarantine, serious illnesses, death in the immediate family, and university-sanctioned extracurricular activities. Students are responsible for providing valid written justification of the permitted absence prior to the exam.

Important dates:

Exam 1	Friday, February 26
Exam 2	Wednesday, April 7
Final exam	Wednesday, May 5 8:00 to 9:50 a.m.

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Textbook:

The textbook for this course is “Rain or Shine: An introduction to soil physical properties and processes” by Tyson E. Ochsner. A free electronic version of the textbook is available at <http://soilphysics.okstate.edu/>. Students may find it helpful to print a hard copy of the textbook for their own reference.

Participation Cards:

For each chapter in the textbook, students will study the chapter and associated materials (e.g. videos, webpages, or handouts) and complete *participation cards* before class to earn participation points. In this class, a participation card is a 3-inch by 5-inch index card on which the student writes his or her name and the date, the relevant chapter number, and responses to three prompts: the star prompt, the question mark prompt, and the arrow prompt.



What is the most interesting or important concept in the assigned content?



What question or questions did this content bring to your mind?



Describe one way that this content is relevant to you or others.

Each response must be a single, grammatically correct, complete sentence. Participations cards that meet the instructor’s expectations for content and professionalism are graded with a “check mark”, which is equivalent to a grade of 90%. Participation cards that do not meet expectations receive a “check minus”, i.e. 80%. Participation cards that exceed expectations receive a “check plus”, i.e. 100%. Participation cards that are not completed count as 0%, unless the student has an officially permitted absence. Participation cards may only be submitted in person during class unless prior arrangements have been made with the instructor. No late cards will be accepted.

Extra Homework Assignment for Graduate Students:

Each graduate student must create a 2-6 minute educational video that explains, reinforces, or extends a topic or equation from the textbook. This video must be complementary to and not redundant with any of the existing videos on the Oklahoma State University Soil Physics Youtube Channel ([link](#)). The video file must be in MP4 format with a 16:9 aspect ratio and must respect all applicable copyright laws. The instructor may post selected student-created videos to the Oklahoma State University Soil Physics Youtube Channel.