Agronomy 465 - Soil Physical Properties
Fall 2011
You are responsible for reading and understanding the contents of this syllabus!

Course Objectives: To understand basic physical processes that occur in soils; to develop a working knowledge of the methods and instrumentation used in evaluating soil physical properties; to gain some knowledge of the effects of soil physical conditions on plant growth; to understand how soil physical processes may influence environmental quality.

Professor
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T.A.
Edwin Suarez — Office: Plants and Soils Bldg Room 211; Office Hours: Drop in or email: esuarez@purdue.edu; Office Hours in LILY: Soils teaching Lab (LILY 3-427) Friday 10:30-11:30 am

Lab: Soils Teaching Lab (3-427) or in field

Study Center: Soils Resource Center (3-419) has resource material for this class (reference notebooks on bench) as well as a slotted wooden box (near computers) for turning in assignments. Graded labs will be returned to open wooden box near the door.

Websites: Agronomy Homepage: http://www.agry.purdue.edu
AGRY 465: http://www.agry.purdue.edu/courses/agry465/agry465.htm

Text: Introduction to Environmental Soil Physics, Daniel Hillel, 2004

Prerequisites: One course each in basic soils and basic physics.
Mastery-level knowledge of basic algebra.

Course Policy on Academic Dishonesty
Academic dishonesty or cheating in this course will not be tolerated. Examples of academic dishonesty include the following actions:
1. Obtaining or using work other than your own on assignments, exams, or quizzes.
2. Unauthorized use of calculators, or other programmable equipment during tests, exams, or quizzes.
3. Unauthorized use of study aids, answer or crib sheets.
4. Soliciting or providing answers on exams or quizzes.

Students who violate the above policy can expect disciplinary action. Disciplinary action may consist of receiving a zero on the assignment, failing the course, being reported to the Dean of Students, or other action as deemed appropriate by the course instructor.

For homework assignments and lab reports for this class, you are encouraged to discuss the questions and work together to help figure out the correct approaches to the work**. However, you must write up your own papers and discussions in your own words.** Each student must prepare their own lab report, even though you will work in groups during the lab period.

Algebra quiz:
A mastery-level algebra quiz on unit conversions and cancellations, scientific notation, and other basic algebraic manipulations must be passed with at least a 90% grade no later than Friday, Sept. 16 (end of the 4th week of class). It will be given once in lecture on August 31. If you don't achieve 90% on that day, you may try again, as many times as needed, by arrangement in the Soil Study Center. Consequences - If you have not passed the quiz by Sept. 16, no further homework assignments and lab reports will be accepted or graded (thus you will receive no credit) until such time as the quiz is passed. Note that the normal late penalty will be applied to these assignments. It is very important that you have a basic mastery of algebra, in order to complete this course, and the example quiz (pp. 16-17) and accompanying Metric System Review sheet (pp. 8-15) should help you refresh your skills as needed.

Assignments:
Course work includes assigned readings from text and other sources, problem sets, in-class exercises, lab writeups, and exams. Problem sets should be done on time to best assist your learning. **Problem sets not turned in on time will be penalized 30% for each day late, and will not be accepted after graded problem sets have been returned to the other students.** Lab reports turned in late will be penalized 10% for each day late up to one week late, after which they will not be accepted. All assignments are due by 5 PM on the due date (see calendar of assignments and labs). (Use the slotted turn-in box near the computer in Soil Study Center, Rm. 3-419, or give them to instructor during class that day.)

Short 5-point lab quizzes will be given at the start of six labs, to ensure you read the lab ahead of time and are prepared for lab—clod bulk density, penetrometer, infiltration, water retention, K_{SAT}, and aggregation.

Attendance Policy:
Attendance at lab is required. This is where you will really learn the applications of the material discussed in lecture. Missing a lab without prior special approval will result in no lab report being accepted for that week (therefore no credit). The schedule of lab exercises is included in the course calendar (pp. 5-7). For field labs, meet promptly at the West end of Lilly Hall, in the small parking lot by the greenhouses. We will use vans to get to the field sites. Be prepared to work outside for the 3-hour period (i.e., it's often colder and sometimes raining at the field sites, even though it's warm on campus!). Close-toed shoes are required during lab periods.

Attendance at lecture is expected. If you miss a class, you are responsible for obtaining notes and handout materials from one of your classmates. There will be regular (unannounced) in-class exercises and discussions, and attendance is required for credit to be received for those in-class small-group exercises. **No make-ups will be allowed for these exercises.** These in-class exercises will total about 30 points for the semester (approx. 5% of your grade).

-Attendance requirement exception—If you have the flu or other contagious illness, please inform the instructor by phone or email and do NOT attend lab or lecture, to protect yourself as well as other students. You will be given an opportunity to make up the lab and other coursework requirements.

		Approximate number of Points
Grading		
In-class exercises, discussions, attendance		~30
Lab quizzes	6 quizzes @ 5 pts.	30
Problem Sets	5 sets @ 15-30 pts. each	~100-125
Lab Reports	(most are 15 pts each)	~180
Final Lab Interpretative Summary	50 pts	50
Exams (Sept. 21, Oct. 21, Nov. 16)	3 x 100 points each =	300
Final Exam	(50% comprehensive, 50% standard exam) =	100
		~790-815 total

Grading Scheme* (calculated on % of total possible points)

A+	97-100%
A	90-96.9%
B+	87-89.9%
B	80-86.9%
C+	77-79.9%
C	70-76.9%
D+	67-69.9%
D	60-66.9%
F	<60%

*In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Here are ways to get information about changes in the course. My email address: kladivko@purdue.edu, and my office phone: 49-46372.

Course Topics and Reading Assignments

Topic	Reading Assignment (All assignments are from Hillel text unless otherwise noted) (suggested supplemental readings are given in parentheses)
Review basic physical terms	Chap. 1, pp. 12-17
	(Scott, Chap. 2)
Soil basics and variability	Chap. 20, pp 402-405
Bulk density	(Methods, 1986, Chap. 13)
Texture	Chap. 3
Structure	Chap. 5
	(Methods 1965, Chap. 39-40)
Compaction, mechanics	Chap. 13, pp. 245-255
	(Kohnke pp. 119-124)
	(Aarkin & Taylor, Chap. 2)
Temperature	Chap. 12
Water content & potential	Chap. 6
	Chap. 2, pp 23-33
	(Hanks & Ashcroft Chap. 2)
Water flow	Chap. 7; Chap. 8, pp. 149-150
	(Hanks & Ashcroft, Chap. 3)
Field water regime	Chap. 14, pp. 259-263; 279-282
	Chap. 16, pp. 303-305; 310-313
	Chap. 17, pp. 315-317; 327-335
Chemical transport	Chap. 9, pp. 167-178
Aeration	Chap. 10, 11
Evaporation	Chap. 18, pp. 337-339; 345-348; 355-358
Water balance	Chap. 20, pp. 385-389

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Suggested References

Hillel, D. 2004. Introduction to environmental soil physics. Elsevier/Acad. Press, San Diego, CA. 494 p.

*631.43 Sco84s 2000 — Scott, H.D. 2000. Soil Physics: Agricultural and environmental applications. Iowa State Press, Ames. 421 pp.

* — Jury, W.A., and R. Horton. 2004. Soil Physics, 6th ed., J. Wiley. Hoboken, New Jersey. 370 p.

* — Dane and Topp, 2002. Methods of Soil Analysis, Part 4, Physical Methods, No. 5, Soil Sci. Soc. Amer. Book Series, SSSA, Madison, WI 1692 p.

* — Klute, A. (ed.). 1986. Methods of Soil Analysis, Part I. 2nd. ed. Agronomy 9. Am. Soc. of Agronomy, Madison, WI. 1188 p.

* — Warrick, A.W. (ed.). 2002. Soil Physics Companion. CRC Press, New York, 389 p.

Lal, R., and M.K. Shukla. 2004. Principles of soil physics. Marcel Dekker, New York. 716 p.

*631.43 H557f — Hillel, D. 1980. Fundamentals of soil physics. Acad. Press, N.Y. 413 p.

*631.43 H557a — Hillel, D. 1980. Applications of soil physics. Acad. Press, N.Y. 385 p.

*631.43 T218p — Taylor, S. A., and G. L. Ashcroft. 1972. Physical edaphology. W. H. Freeman & Co., San Francisco. 533 p.

*631.43 H194a — Hanks, R. J., and G. L. Ashcroft. 1980. Applied soil physics. Springer-Verlag, Berlin. 159 p.

*631.43 K827s — Kohnke, H. 1968. Soil physics. McGraw-Hill, N.Y. 224 p.

*631 M7195 — Arkin, G. F. and H. M. Taylor (ed.) 1981. Modifying the root environment to reduce crop stress. Am. Soc. Ag. Eng. Monograph 4, St. Joseph, MI. 407 p.

*On Reserve in Life Science Library.