

SOILS 451 – PEDOLOGY (*SOIL GEOGRAPHY*)

Fall 2009



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Pedology is the science of soil geography: *How and why do soil properties and features vary spatially at hillslope to global scales?* Why are tropical soils often red? Why do prairie soils often have thick, dark surface horizons? Why are wetland soils yellow and/or grey?

We will study (1) key soil features (*morphology*); (2) how these features form (*genesis*); (3) the nomenclature that scientists use to talk about soils (*classification*); and most importantly, (4) the spatial distribution of soils over the earth's surface (*mapping*).

Learning opportunities:

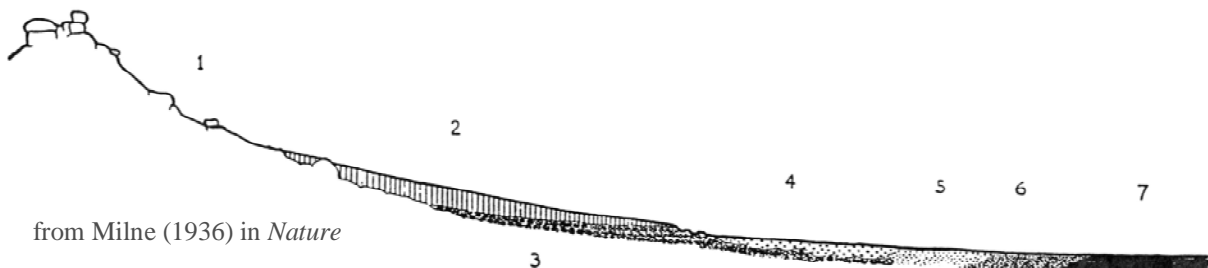
Lectures: M/W 9:10-10:00am (Plant Biosciences 1, Room 43)

Labs: F 8:10-11:00am (Johnson 116 or field)

Online: I will post material on Angel Learning Systems to complement lectures and labs.

Writing: "Writing in major" or "M" course for soil science majors, with two major writing assignments (each requiring a revision).

Office hours: 9:10-10:00am, M/W or by appointment (let's talk about soils!)



from Milne (1936) in *Nature*

Grading Scheme

Component	%	Description
Notecard quizzes	10	One-question quizzes to start each class (best 20)
Labs	20	Active participation and writeups
Reports	20	Two writing assignments; each graded, revised & graded again
Midterm	20	Closed book, in-class
Final	30	Comprehensive Final Exam

Grading Philosophy

A “B” grade requires demonstrating a significant understanding of the course material. An “A” grade requires superior effort and/or ability, and a demonstrated mastery of pedology. Exams are purposely challenging. Consequently, success in this course depends on picking up as many points as possible on “effort” components.

Texts:

Required –

- Vepraskas, M.J., 1992. **Redoximorphic Features for Identifying Aquic Conditions.** Technical Bulletin 301, Dept. of Agricultural Communications, North Carolina State University, Raleigh, N.C.
- Schoeneberger, P.J., Wysocki, D.A., Benham, E.C. and Broderson, W.D. (Editors), 2002. **Field book for describing and sampling soils, Version 2.0.** Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (download online version)

Recommended –

- Sumner, M.E. (Editor), 2000. **Handbook of Soil Science.** CRC Press, Boca Raton, FL.
- Schaetzl, Randall and Sharon Anderson, 2005. **Soils, Genesis and Geomorphology.** Cambridge University Press, Cambridge, UK.
- Brady, N.C. and Weil, R.R., 1999. **The Nature and Properties of Soils.** Prentice Hall, Upper Saddle River, NJ, 881 pp.

Course Web Site <http://lms.wsu.edu/>.

Lab Reports

Soils 451 is listed as a WSU writing intensive course. To satisfy this requirement, you will write two professional quality reports. Each report will first be submitted for first draft grading, then revised for a final submission. The first report will be on the geography of soils on the Palouse. The second will be on global soil geography with several options available depending upon your interests. More details on these reports will be provided in a separate handout.

Approximate lecture outline

Soils on the Palouse

Week 1

08/24 What is soil geography?

08/26 If soil is a natural body, what are its limbs?

08/28 *Let's describe a soil profile at the Cook Agronomy Farm!* *FIELD LAB*

Week 2

08/31 How does an A-horizon form?

09/02 What are the key controls on A-horizon differences?

09/04 *Let's compare different soil profiles at the Cook Agronomy Farm!* *FIELD LAB*

Week 3

09/07 Labor Day Holiday (No Class)

09/09 What is the difference between illuviation and eluviation?

09/11 *Let's look for fragipans in Idaho?* *FIELD LAB*

Week 4

09/14 Why are Bt or Argillic horizons so ubiquitous?

09/16 How, why and where do fragipans form?

09/18 *Let's drop some acid... on calcic horizons to the west!* *FIELD LAB*

Week 5

09/21 Bk or calcic horizons?

09/23 What is so special about volcanic soils?

09/25 *Let's look at a volcanic soil on Moscow Mountain!* *FIELD LAB*

Week 6

09/28 What are polygenetic soils?

09/30 Do we find catena's on the Palouse?

10/02 *Hydric soils (if we can find them)!* *FIELD LAB*

Week 7

10/05 How does soil nomenclature work?

10/07 What soil taxonomic classes do we find on the Palouse?

10/09 *Let's map Palouse Soils!* *COMPUTER LAB*

Week 8

10/12 Mid-Term exam – Soils on the Palouse

Global Soil Geography

10/14 What and where is the Intertropical Convergence Zone?

10/16 *US soil mapping exercise!*

COMPUTER LAB

***Palouse Soils Report due by 5pm (1st draft).*

Week 9

10/19 Why are tropical soils often red?

10/21 Why are tropical soils considered infertile?

10/23 *US soil mapping exercise!*

COMPUTER LAB

***Palouse Soils Report due by 5pm (2nd draft).*

Week 10

10/26 Where are the world's major deserts?

10/28 What kinds of soils do we find in arid areas?

10/30 *US soil mapping exercise!*

COMPUTER LAB

Week 11

11/02 Where are the world's prairie soils?

11/04 Are all prairie soils the same?

11/06 *Global soil mapping exercise!*

COMPUTER LAB

Week 12

11/09 Where are deciduous forest soils found?

11/11 **Veteran's Day Holiday (No Class)**

11/13 *Global soil mapping exercise!*

COMPUTER LAB

Week 13

11/16 Under what conditions can iron and organic matter leach down a profile?

11/18 Where do we find Spodosols globally?

11/20 *Global soil mapping exercise!*

COMPUTER LAB

Week off

11/23-11/27

Thanksgiving Break

Week 14

11/30 Where do we find frozen soils?

12/02 How and where do smectitic clays form?

12/04 How do we classify and manage Vertisols?

*** Global soil report, 1st draft*

Week 15

12/07 Can we explain global soil patterns?

12/09 Where do we find “young soils”?

12/11 What information is missed when looking at coarse global data?

*** Global soil report, 2nd draft*

Finals Week

12/17 **Comprehensive Final Exam** (Thursday, 8:00-10:00AM)

General Policies

Disability statement

Students with Disabilities: Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, please visit the Disability Resource Center (DRC). All accommodations **MUST** be approved through the DRC (Admin Annex Bldg, Room 205). Please stop by or call 509-335-3417 to make an appointment with a disability specialist.

Cheating (WAC 504-25-310)

Cheating is the intentional use of, or attempt to use, unauthorized material, information, or study aids in any academic activity to gain advantage. Cheating includes, but is not limited to, communicating improperly with others, especially other students, during tests or the preparation of assignments for classes; copying from books, notes, or other sources during a test when this is not permitted; copying from another student’s work (reports, laboratory work, computer programs, files, etc.); making improper use of calculators or other devices during a test; illegitimately procuring or using copies of current examinations; allowing a substitute to take an examination or write a paper for oneself.

Plagiarism (WAC 504-25-310)

Plagiarism is knowingly representing the work of another as one’s own, without proper acknowledgment of the source. The only exceptions to the requirement that sources be acknowledged occur when the information, ideas, etc., are common knowledge. Plagiarism includes, but is not limited to, submitting as one’s own work the work of a “ghost writer” or work obtained from a commercial writing service; quoting directly or paraphrasing closely from a source without giving proper credit; using figures, graphs, charts, or other such material without identifying the sources.

Academic Integrity Processes (WAC 504-25-315)

Every act of academic dishonesty affects academic evaluation of the student and also is a violation of the University’s standards of conduct. Responsible instructors retain the authority and responsibility to assign grades to students, considering from an academic standpoint the nature of the student’s action. This is the case even when the case is referred to the University Academic Integrity Process. Students have recourse to appealing the responsible instructor’s assignment of grades according to usual academic policy. See Academic Regulation 104.

All clear instances of academic dishonesty shall be reported to the Office of Student Conduct as outlined in 504-35-335(2). The first reported instance at WSU of academic dishonesty by a student will be treated as purely an academic matter unless, in the judgment of the responsible instructor, more serious action should be taken through the disciplinary process. Any allegation of subsequent academic dishonesty will be treated as a matter to be referred to the Office of Student Conduct.

Reports of Academic Dishonesty (WAC 504-35-320)

Any member of the University community who witnesses an apparent act of academic dishonesty shall report the act either to the instructor responsible for the course or activity or to the Office of Student Conduct.