

Part II. Description of Curricular Change

1. SYLLABUS OF RECORD

I. Catalog Description

GEOS 333 Soils and Soil Geochemistry

2 class hours

3 lab hours

3 credit hours

Prerequisite: GEOS 220

(2c-3l-3cr)

An introduction to the formation, classification and geochemistry of soils. Emphasizes

geology, climate, hydrology, and plant-soil interactions to investigate soil evolution and
fertility, nutrient dynamics and the role of soils in the global carbon cycle. Laboratory

III. Course Outline

Lecture

Part A (7 hours): Physical Characteristics of Soils

1. Introduction to soils, functions of soils in our ecosystem, soil water, soil organic matter, soil nutrients and soil quality
2. Formation of soils from parent material, weathering, evolution of the soil profile
3. Classification of soils, influence of climate on soil structure and chemistry
4. Soil architecture, soil texture and density, formation and stabilization of soil aggregates, tillage and its effects on aggregation

Exam 1 (1 hour)

Part B (4 hours): The Soil Environment

1. Soil water, infiltration and percolation, soil moisture, evaporation and water vapor movement in soils
2. Soil aeration, oxidation-reduction potential in soils, ecological effects of

soil aeration, wetlands and poorly aerated soils

3. Soil temperature and its effects, absorption and loss of solar energy, thermal properties of soils

Part C (8 hours): Soil Mineralogy and Chemistry

1. Weathering and soil minerals, soil colloids and clay minerals, geographic

Laboratory Exercises

Week 1: Soil Description and Classification I

Week 2: Soil Description and Classification II

Week 3: Particle-Size Analysis

Week 4: Soil Density and Porosity

Week 5: Soil Water and Moisture

Week 6: Soil pH and Salinity

Week 7: Soil Mineralogy - Microscopic Analysis

Week 8: Soil Mineralogy - X-ray Analysis

Week 9: Cation Exchange Capacity Measurement

Week 10: Field Trips - Salt-affected Soils

Week 11: Soil Organic Matter - Concentration

Week 12: Soil Organic Matter - Carbon Isotope Ratios

Week 13: Soil Organic Matter - Computer Modeling

Week 14: Presentation of Soil Organic Matter Project

The first four labs involve the characterization and classification of soils as well as

In-class Quizzes and Exercises (10%): There will be periodic in-class quizzes and exercises throughout the semester.

The final grade for this course will be determined according to the following schedule:
A=90-100%; B=80-89%, C=70-79%, D=60-69%, F=<60%

V. Attendance Policy

The attendance policy will conform to IUP's undergraduate course attendance policy.

VI. Required textbooks, supplemental books and readings

Brady, N.C. and Weil, R.R. (2004) Elements of the Nature and Properties of Soils, Upper Saddle River, New Jersey: Prentice Hall.

Approximately ten research articles will be selected from the current and past scientific literature to highlight historic contributions and current issues in soil science. Examples might include:

Simonson, R.W. (1958) Outline generalized theory of soil genesis: Soil Science Society of America Proceedings, v. 22, p. 152-156.

van Breeman, N. and Finzi, A.C. (1998) Plant-soil interactions: Ecological aspects and evolutionary implications: Biogeochemistry, v. 42, p. 1-19.

Six, J., Elliot, E.T. and Paustian, K. (2000) Soil structure and soil organic matter II. A normalized stability index and the effect of mineralogy. Soil Science Society of

America Journal, v. 64, p. 1042-1049.

Likens, G.E., Driscoll, C.T. and Buso, D.C. (1996) Long-term effects of acid rain: Response and recovery of a forest ecosystem: Science, v. 272, p. 244-246.

Weil, R.R. (2000) Soil and plant influences on crop response to two African phosphate rocks: Journal of Agronomy, v. 92, p. 1167-1175.

The following will be held on reserve as supplemental reading:

Singer, M. J. and Munns. D. N. (2002) Soils: An Introduction (5th ed.) Upper Saddle

Buol, S.W., Hole, F.D., McCracken, R.J. and Southard, R.J. (1997) Soil Genesis and Classification (4th ed.) Ames, Iowa: Iowa State University Press

Coleman, D.C. and Crossley, D.A. (1996) Fundamentals of Soil Ecology, San Diego, CA: Academic Press, Inc.

Dixon, J.B. and Schulze, D.J. (2002) Soil Mineralogy with Environmental Applications. Madison, Wis.: Soil Science Society of America.

Fanning, D.S. and Fanning, M.C.B. (1989) Soil: Morphology, Genesis, and Classification, New York: Wiley and Sons.

McPhee, M.P. (1994) Environmental Soil. New York: Oxford University Press

Course Analysis Questionnaire

Section A: Details of the Course

- A1. This course is one of the controlled electives offered to students pursuing BS degrees in either Geoscience-Geology Track or Geoscience-Environmental Geoscience Track. This course is not a Liberal Studies course. The content of this course reflects growing recognition of the importance of soils within the greater geoscience community. Although the content of the course will draw on some material covered more superficially in other Geoscience courses [GEOS 220

application of such material to soil science. The amount of material specific to

soil science is far too extensive to be successfully incorporated into these other

Section B: Interdisciplinary Implications

- B1. This course will be taught by one instructor from the Geoscience Department.
- B2. There is no direct overlap between the content of this course and that of other courses currently offered in other departments. BIOL 272 Conservation of Plant and Animal Resources and GEOG 440 Conservation: Environmental Analysis and Issues of Soil Conservation. The content of this proposed course does not

include soil conservation, but rather focuses on the physical and chemical processes of soil development, the chemistry of soil fertility and the

biogeochemical dynamics of soils

C4. The department expects that this course will be offered every other year as are most of the Geoscience Department's 300-level courses. There are no absolute

not likely to be frozen for the majority of the semester.

C5. We anticipate offering a single section of this course in a given semester.

C6. We plan to accommodate no more than twenty-four students in a section of this course. This is the maximum number of students that can be accommodated in the Geoscience Department's teaching laboratory rooms.

C7. No professional society recommends enrollment limits or parameters for this course.

C8. Not applicable.

Section D: Miscellaneous

None.

Part III. Letters of Support or Acknowledgment

Attached are copies of e-mails sent to Drs. Sechrist (Geography) and Luciano (Biology)

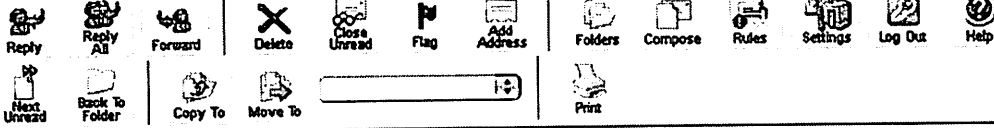
IUP I-Mail: Message from Sent Items Folder



IUP I-Mail: Message from Sent Items Folder



IUP I-Mail: Message from InBox Folder



From: "Art Hulse" <ntcc@iup.edu>
Subject: Soil course
Date: Fri, 29 Oct 2004 16:09:40 -0400
To: "Michael Poage" <mpoage@iup.edu>



Hi Michael:

I just my copy of your proposal for GEOS 333 that will be discussed at the College Curriculum Committee. I noticed that there was no response from Carl regarding overlap with our conservation course. Carl sent your proposal to me to look over. I told him I could see no problems with regard to over-lap and that we should support your proposal. Maybe he thought that I was going to send you a message directly instead of him contacting you.

The Department of Biology supports your proposal and wishes you luck. IN addition I think that the course could be of great value to some of our majors or graduate students.

Art