

**School of Natural Resources**  
Area of M.S. Specialization (Soil Science)

Content and Format of the Program:

**A. Educational Goals and Objectives.**

1. The specialization draws attention to the Soils emphasis of the degree program. This can be important when seeking employment and professionally in maintaining career identity. This is of special concern given the wide range of disciplines embodied in Natural Resources.
2. Having this description on the transcripts can be important for foreign students whose home country is paying for their education. Many of these students must specifically study Soil Science. Their sponsoring agencies may fail to identify the University of Nebraska as providing an acceptable program without such a specialization.
3. This designation can be of value in recruiting students from more traditional basic science areas. These students may not be aware of this aspect of Natural Resources or they may associate Soils as exclusively within the purview of Agronomy.

**B. Courses to be offered within specialization.**

855. Soil Chemistry and Mineralogy (Agronomy 455/855) (3 cr I) Lect 3. Prereq: Agron 153, Chem 116 or 221 or equivalent.

Study of chemical and mineralogical properties of soil components with emphasis on the inorganic colloidal fraction. Structures of soil minerals will be discussed as a means of understanding properties, such as ion exchange and equilibria; release and supply of nutrient and toxic materials; and soil acidity and alkalinity.

857. Soil Chemical Measurements (Agronomy 457/857) (2-3 cr I, offered even-numbered calendar years) (Permission of instructor required to register for 2 credits.) Lect 2 Lab 4-6. Prereq. Agron 153, Chem 116 or 221 or equivalent or permission of instructor.

Theory and practice of soil chemical analyses commonly encountered in research and industrial settings. Emphasis is on wet analyses of inorganic fraction of soil and operation of instrumentation necessary to quantify results of those analyses. Students registered for three credits will design, carry out, and report on an independent study project conducted during the semester.

858. Soil Physical Determinations (Agronomy 458/858) (2 cr I) Lab 3 TBA 3. Prereq: Agron 361, one semester of physics, Math 102 or Math 103, or graduate standing.

A survey of measurement techniques and principles used in characterizing the physical properties of soils. Also included is an analysis of experimental design and sources of experimental error. Techniques included are: particle size analysis, soil water content, pore size analysis, field sampling techniques, soil strength, and saturated hydraulic conductivity. Graduate Students will be expected to carry out an independent project and give an oral report.

860. Soil Microbiology (Agronomy 460/860, Biological Sciences 447/847) (3 cr II) Lect 3. Prereq: 1 semester of microbiology, 1 semester biochemistry or organic chemistry.

Students discover: i) soil from a microbes perspective--growth, activity and survival strategies; ii) principles governing methods to study microorganisms and biochemical processes in soil; iii) mechanisms controlling organic matter cycling and stabilization with reference to C,N,S and P; iv) microbial interactions with plants and animals; and, v) agronomic and environmental applications of soil microorganisms.

861. Soil Physics (Agronomy, Geology 461/861; Water Science 461) (3 cr I) Lect 3. Prereq: AGRO153/SOIL153, PHYS141 or equivalent, and one semester of calculus. Recommended: Concurrent enrollment in AGR1458/858.

This is a first course in the principles of soil physics. The movement of water, air, heat and solutes in soils is presented. Emphasis is given to water retention and movement including infiltration and field water regime. Special attention is given to movement of chemicals in soils.

877. (IS) Soil Morphology, Classification and Survey (Agron 477/877, Geog 867, SoilSci 477) (4 cr II) Prereq: AGRO/SOIL153 or permission.

A study of the spatial relationship of soil properties on various parts of landscape typical of the Plains, casual factors, and predictions of such relationships on other landscapes. Also a study of grouping these properties into classes, naming the classes, and the taxonomy that results from this grouping. Finally the course requires the application of a taxonomy to a real situation through making a field soil survey in a region representative of the Plains border, predicting land use response of various mapped units as it affects the ecosystem, and evaluating the effectiveness of the taxonomic system used in the region surveyed.

958. Theoretical Aspects of Physical Chemistry of Soils (3 cr II, offered spring semester of even-numbered calendar years) Lect 3. Prereq: Math 208, Agron 855, Chem 871 or 882 or permission.

Topics in physical chemistry which have a special significance in the field of soil chemistry. Includes problems and outside readings in this area of soil chemistry.

961. Advanced Soil Physics (3 cr II, offered spring semester of odd-numbered calendar

years) Lect 3. Prereq: MATH208 and PPHYS/ASTR212 or equivalents, or permission.

Physics of soils and porous media, with emphasis on the physics and mathematics of the movement of water, air, and heat through soils.

966. Soil Fertility (3 cr I) Lect 3. Prereq: Biomet 801, Agron 855, 857 and Math 106.

Studies of the conditions and transformations involved in the transfer of a mineral nutrient ion from soil into the plant. Evaluation of nutrient supply to plants.

977. Soil Genesis and Classification (Geography 967) (3 cr II) Lect 2 rec 1. Prereq: Agron 153, 877 and permission.

A detailed study of procedures used to classify soils, the concepts behind the systems in use, and the genesis of the soils in the major categories of each system.

996A. Research in Soils (Soil Science Only) (2-5 cr I, II, III). Prereq: 12 hrs agronomy or closely related science and permission.

### **C. Guidelines for accreditation.**

There are currently no national guidelines for such accreditation.

### **D. Requirements.**

Complete requirements for a M.S. degree in Natural Resource Sciences including at least 9 credit hours in Soils related coursework selected from the above list excluding 996A.

The specialization proposal was sent out to all SNRS faculty for review on October 20, 1998 and approved at a general faculty meeting on November 17, 1998.