

Soil Science (SOIL)

SOIL 194. Individual Study. 1-5 Credits.

SOIL 196. Field Experience. 1-15 Credits.

SOIL 199. Special Topics. 1-5 Credits.

SOIL 210. Introduction to Soil Science. 3 Credits.

This is a 3-credit introductory-level course that will cover the basic principles of soil science. Topics will include the concepts of soil as a natural body, composition of soil, functions of soil, soil formation and classification, physical/chemical/biological properties of soils, and soil management and conservation. Lecture periods will consist of a combination of material presentation and designated time for applied learning activities.

SOIL 217. Introduction to Meteorology & Climatology. 3 Credits.

Basic meteorology-climatology concepts and their application; includes energy balance, greenhouse effect, temperature, pressure systems, lows, highs, fronts, winds, clouds, storms, humidity, precipitation, and measurements. Lectures, discussions, demonstrations. S.

SOIL 264. Natural Resource Management Systems. 3 Credits.

General principles of natural resource management, including soil and water conservation, soil and wind erosion, use of tillage and vegetation for conservation, drainage, irrigation, and soil and water quality. 3 lectures. Prereq: MATH 103, MATH 104 or MATH 107. Cross-listed with ASM 264 and NRM 264.

SOIL 291. Seminar. 1-5 Credits.

SOIL 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOIL 294. Individual Study. 1-5 Credits.

SOIL 299. Special Topics. 1-5 Credits.

SOIL 351. Soil Ecology. 3 Credits.

Principles of soil-plant-animal interactions and their influences on environmental and agricultural issues of global significance (e.g. sustainable agriculture, global climate change, diversity conservation. Prereq: SOIL 210.

SOIL 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SOIL 391. Seminar. 1-5 Credits.

SOIL 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOIL 394. Individual Study. 1-5 Credits.

SOIL 397. Fe/Coop Ed/Internship. 1-4 Credits.

SOIL 399. Special Topics. 1-5 Credits.

SOIL 410. Soils and Land Use. 3 Credits.

Principles of chemistry, physics and biology will be used to determine the effects of soil management, agrichemical usage, livestock production, and vegetation on the environment using scales ranging from microsite to watershed. Prereq: SOIL 210, CHEM 121, CHEM 121L. {Also offered for graduate credit - see SOIL 610.}.

SOIL 422. Soil Fertility and Fertilizers. 3 Credits.

This course provides a broad-based understanding of the basic principles of soil fertility. Coverage includes occurrence, cycling, and plant availability of the essential mineral nutrients in soils; fertilizer sources, soil reactions, and efficiency; evaluating fertilizer/lime needs; methods of application; and the economics of fertilization. Prereq: SOIL 210, CHEM 121, CHEM 121L. Dual-listing: SOIL 622.

SOIL 433. Soil Ecohydrology and Physics. 3 Credits.

Introduction of the fate and transport of water, heat, and solutes in soils of natural ecosystems and agricultural landscapes with focus on the physical characteristics of soil, fluxes across interfaces, and prediction of flows within and across the vadose zone and the critical zone. Application of concepts and predictions to real-world scenarios and case studies. Prereq: SOIL 210, PHYS 211. {Also offered for graduate credit - see SOIL 633.}.

SOIL 444. Soil Genesis and Survey. 3 Credits.

Introduction to soil genesis, morphology, geography and soil survey, 2 lectures, 1 four-hour laboratory (first 10 weeks only) focuses on soil description and properties in situ. Prereq: SOIL 210. F {Also offered for graduate credit - see SOIL 644.}.

SOIL 447. Microclimatology. 3 Credits.

Characteristics and causes of the climate near the ground and its interaction with living organisms. Energy and mass transfer concepts. Lectures, discussions, demonstrations, field trips. Prereq: PHYS 211. F (odd years) {Also offered for graduate credit - see SOIL 647.}.

SOIL 451. Digging Deeper: Understanding Soil Biology. 2-3 Credits.

This course will review the theory and application of laboratory procedures used to measure soil health indicators and biological and chemical characteristics across agricultural, rangeland, and grassland soils. Students will gain fundamental laboratory skills, as well as learn how to evaluate and interpret soil analyses. This course consists of two one-hour and 45 min laboratory periods. Prereq: SOIL 210.

SOIL 452. Managing Natural and Rangeland Resources using GIS. 3 Credits.

The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with NRM 452 and RNG 452. Dual-listing: SOIL 652.

SOIL 454. Wetland Resources Management. 3 Credits.

Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Prereq: SOIL 210. Cross-listed with NRM 454 and RNG 454. F (even years) {Also offered for graduate credit - see SOIL 654.}.

SOIL 456. Ecological Restoration. 3 Credits.

This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with NRM 456 and RNG 456. Dual-listing: RNG 656, NRM 656 and SOIL 656.

SOIL 462. Natural Resource and Rangeland Planning. 3 Credits.

Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with NRM and RNG. {Also offered for graduate credit - see SOIL 662.}.

SOIL 465. Soil And Plant Analysis. 3 Credits.

Laboratory analysis of soil, plant, and environmental materials for constituent elements. 2 lectures, 1 laboratory. Prereq: SOIL 210, CHEM 121, CHEM 122. S (odd years) {Also offered for graduate credit - see SOIL 665.}.

SOIL 491. Seminar. 1-5 Credits.**SOIL 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOIL 494. Individual Study. 1-5 Credits.**SOIL 496. Field Experience. 1-15 Credits.****SOIL 499. Special Topics. 1-5 Credits.****SOIL 610. Soils and Land Use. 3 Credits.**

Principles of chemistry, physics and biology will be used to determine the effects of soil management, agrichemical usage, livestock production, and vegetation on the environment using scales ranging from microsite to watershed. {Also offered for undergraduate credit - see SOIL 410.}.

SOIL 622. Soil Fertility and Fertilizers. 3 Credits.

This course provides a broad-based understanding of the basic principles of soil fertility. Coverage includes occurrence, cycling, and plant availability of the essential mineral nutrients in soils; fertilizer sources, soil reactions, and efficiency; evaluating fertilizer/lime needs; methods of application; and the economics of fertilization. Dual-listing: SOIL 422.

SOIL 633. Soil Ecohydrology and Physics. 3 Credits.

Introduction of the fate and transport of water, heat, and solutes in soils of natural ecosystems and agricultural landscapes with focus on the physical characteristics of soil, fluxes across interfaces, and prediction of flows within and across the vadose zone and the critical zone. Application of concepts and predictions to real-world scenarios and case studies. {Also offered for undergraduate credit - see SOIL 433.}.

SOIL 644. Soil Genesis and Survey. 3 Credits.

Introduction to soil genesis, morphology, geography and soil survey, 2 lectures, 1 four-hour laboratory (first 10 weeks only) focuses on soil description and properties in situ. F {Also offered for undergraduate credit - see SOIL 444.}.

SOIL 647. Microclimatology. 3 Credits.

Characteristics and causes of the climate near the ground and its interaction with living organisms. Energy and mass transfer concepts. Lectures, discussions, demonstrations, field trips. F (odd years) {Also offered for undergraduate credit - see SOIL 447.}.

SOIL 651. Digging Deeper: Understanding Soil Biology. 2-3 Credits.

This course will review the theory and application of laboratory procedures used to measure soil health indicators and biological and chemical characteristics across agricultural, rangeland, and grassland soils. Students will gain fundamental laboratory skills, as well as learn how to evaluate and interpret soil analyses. This course consists of two one-hour and 45 min laboratory periods. Dual-listing: SOIL 451.

SOIL 652. Managing Natural and Rangeland Resources using GIS. 3 Credits.

The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with NRM 652 and RNG 652. Dual-listing: SOIL 452.

SOIL 654. Wetland Resources Management. 3 Credits.

Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Cross-listed with NRM 654 and RNG 654. F (even years) {Also offered for undergraduate credit - see SOIL 454.}.

SOIL 656. Ecological Restoration. 3 Credits.

This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with RNG 656 and NRM 656. Dual-listing: SOIL 456.

SOIL 662. Natural Resource and Rangeland Planning. 3 Credits.

Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Cross-listed with NRM and RNG. {Also offered for undergraduate credit - see SOIL 462.}.

SOIL 665. Soil And Plant Analysis. 3 Credits.

Laboratory analysis of soil, plant, and environmental materials for constituent elements. 2 lectures, 1 laboratory. S (odd years.) {Also offered for undergraduate credit - see SOIL 465.}.

SOIL 690. Graduate Seminar. 1-3 Credits.**SOIL 695. Field Experience. 1-15 Credits.****SOIL 696. Special Topics. 1-5 Credits.****SOIL 721. Environmental Field Instrumentation and Sampling. 2 Credits.**

To provide an overview of the tools (manual and electronic) concepts, and theories used to sample for physical, chemical, and biological parameters. F (odd years) (Two one-hour lectures and one four-hour laboratory per week.).

SOIL 722. Soil Testing Basics. 1 Credit.

This course provides an overview of the basic principles governing soil testing as it relates to crop production. Coverage includes a review of basic soil chemistry principles, the evolution of soil testing, test correlation versus calibration, as well as the cycling, testing, and management of various nutrients. At the end of the course, students will have the opportunity to apply previous material in practical scenarios.

SOIL 723. Soil Carbon. 1 Credit.

This course will review the explore the current knowns and unknowns of soil carbon, focusing on whether soils can be a sink of carbon in agricultural (e.g., cropping and range) systems. The first half of the semester will focus on the different types of carbon in soil, the origin of these different carbon fractions, and how they are measured. The second half of the semester will focus on how these types of carbon are (or are not) affected by management in cropland and rangeland systems, as well as whether management can be used to increase carbon sequestration in agricultural settings.

SOIL 724. Soil Salinity and Sodicity. 1 Credit.

This course provides an introduction to the causes, impacts, and management of soil salinity and sodicity. Students will learn to assess salinity and sodicity using key parameters like EC, SAR, and ESP and explore strategies for remediation, including leaching and soil amendments. Ideal for graduate students in soil and environmental sciences, this course equips participants with essential tools for managing saline and sodic soils effectively.

SOIL 725. Soil Reclamation. 1 Credit.

This course examines soil reclamation techniques and strategies to restore ecosystems impacted by energy extraction activities, with an emphasis on sustainable and practical solutions.

SOIL 726. Soil Conservation for Practitioners. 1 Credit.

This course will provide an overview of soil conservation in the United States, introduce students to groups involved in soil conservation research and outreach, and discuss practices used to improve soil conservation by reducing erosion. Students will evaluate common cultural and engineering practices used to control soil erosion based on attainability and economically feasibility.

SOIL 733. Advanced Soil Nutrient Cycling. 3 Credits.

Overview of origins, nature, fate, and measurements of organic matter in soils, with specific focus on microbially-mediated, physical, and chemical processing of carbon, nitrogen, phosphorus, and other plant nutrients. Three lectures per week. Offered spring semester, even years.

SOIL 755. Soil Chemistry. 3 Credits.

Chemical reactions and equilibria, solubility relationships, mineral weathering, cation and anion adsorption, redox reactions, metal chelation, and fixation of nutrients in the soil. 3 lectures. F.

SOIL 763. Advanced Soil Hydrology and Physics. 3 Credits.

Theory of the fate and transport of water, heat, and solutes in soils with focus on analytical and numerical modeling across scales of individual pores, soil horizons, the vadose zone, and the critical zone. Prereq: SOIL 633.

SOIL 782. Precision Agriculture Principles for Nutrient Management. 3 Credits.

Advanced study of soil-plant-nutrient relationships with emphasis on precision agricultural concepts. 3 lectures.

SOIL 790. Graduate Seminar. 1-3 Credits.

SOIL 791. Temporary/Trial Topics. 1-5 Credits.

SOIL 792. Graduate Teaching Experience. 1-6 Credits.

SOIL 793. Individual Study/Tutorial. 1-5 Credits.

SOIL 794. Practicum/Teaching. 1-8 Credits.

SOIL 795. Field Experience. 1-15 Credits.

SOIL 796. Special Topics. 1-5 Credits.

SOIL 797. Master's Paper. 1-3 Credits.

SOIL 798. Master's Thesis. 1-10 Credits.

SOIL 892. Graduate Teaching Experience. 1-6 Credits.

SOIL 893. Individual Study. 1-5 Credits.

SOIL 898. Continuing Enrollment. 1-9 Credits.

For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

SOIL 899. Doctoral Dissertation. 1-15 Credits.