SOIL SCIENCE (SOIL)

SOIL 101. INTRODUCTION TO CROP, SOIL, AND INSECT SCIENCE. (1 Credit)
Introduces students with interests in crop, soil, and insect sciences to educational and professional opportunities in these disciplines. Speakers will discuss opportunities in research and academia as well as in the applied professional job market. Open to all students. CROSSLISTED as ENT 101, CROP 101.

SOIL 199. SPECIAL TOPICS. (1-16 Credits)
Equivalent to: SOIL 199H
This course is repeatable for 16 credits.

SOIL 199H. SPECIAL TOPICS. (1-16 Credits)
Attributes: HNRS – Honors Course Designator
Equivalent to: SOIL 199
This course is repeatable for 16 credits.

SOIL 205. SOIL SCIENCE. (3 Credits)
Introduction to the chemical, physical and biological nature of soils. Examines how soils function in terms of plant growth, nutrient supply, the global carbon cycle, ecological habitat, and water purification. Community-based learning projects provide hands-on experience with fundamental soil science principles and the impact of human activities on soil quality and sustainability. Lec. (Bacc Core Course if taken with SOIL 206 or FOR 206)
Attributes: CPBL – Core, Pers, BioSci Attached Lec; CPPL – Core, Pers, PhySci Attached Lec
Prerequisites: SOIL 206 (may be taken concurrently) with D- or better or FOR 206 (may be taken concurrently) with D- or better
Equivalent to: CSS 205, CSS 305

SOIL 206. *SOIL SCIENCE LABORATORY FOR SOIL 205. (1 Credit)
Students will gain hands-on experience with soil science concepts and applications. Laboratory exercises and field trips will help students develop proficiency in the methods/tools for analyzing soil chemistry, biology, morphology, physical properties, and soil forming factors. Skills will be taught in the context of soils’ social, economic, and environmental importance. (Bacc Core Course if taken with SOIL 205)
Attributes: CPBS – Core, Pers, Biological Science; CPPS – Core, Pers, Physical Science
Corequisites: SOIL 205

SOIL 299. SPECIAL TOPICS. (1-16 Credits)
Equivalent to: SOIL 299H
This course is repeatable for 16 credits.

SOIL 299H. SPECIAL TOPICS. (1-16 Credits)
Attributes: HNRS – Honors Course Designator
Equivalent to: SOIL 299
This course is repeatable for 16 credits.

SOIL 316. NUTRIENT CYCLING IN AGROECOSYSTEMS. (4 Credits)
Nutrient forms, transformations, and cycling. Diagnosis and correction of nutrient deficiencies, pH and salinity. Impact of nutrient management practices on crop production, soil health, nutrient use efficiency, and environmental quality. Organic and inorganic fertilization. Labs include soil sampling and testing procedures, data collection on soil and plants, computer applications for soil fertility management, and field trips. Lec/lab.
Prerequisites: (CH 121 with D- or better or CH 231 with D- or better) and (SOIL 205 [C] or CSS 205 [C] or CSS 305 [C])

SOIL 360. SOIL MANAGEMENT FOR ORGANIC PRODUCTION. (3 Credits)
This is a skills-based soil management course that is part lecture and part student-centered learning. Significant class time will be devoted to making field-scale management decisions. The course includes individual and group work, presentation, and discussion. The intent is to prepare students for real-world application of soil management decisions in certified organic systems. Using the National Organic Program as a starting point as well as farm system descriptions with extensive long-term data sets, we will interpret soil nutrient analyses, cover cropping systems, and organic amendments, to design soil management plans for two model cropping systems (annual and perennial).
Prerequisites: (SOIL 205 with C or better and (SOIL 206 [C] or FOR 206 [C])) or CSS 205 [C]
Recommended: Introductory soil science course with lab

SOIL 366. ECOSYSTEMS OF WILDLAND SOILS. (3 Credits)
Focuses on soils that occur in relatively undisturbed ecosystems such as forests and rangelands. Topics covered include properties and processes specific to understanding and managing the soil resource in these areas. An overview of US Soil Taxonomy will also be given.
Prerequisites: SOIL 205 with D- or better or CSS 205 with D- or better or CSS 305 with D- or better
Recommended: An understanding and appreciation of environmental chemistry, biology, ecology, and physics

SOIL 388. SOIL SYSTEMS AND PLANT GROWTH. (4 Credits)
Introduces soils as providers of critical resources for plant growth. Explains how soils supply water, air, thermal energy and nutrients to plants. Shows that sustainable management of soil resources requires substantial understanding of their role in the functioning of natural, forest, and agricultural systems. Explains controls on stocks and availabilities of individual soil resources and mechanisms making these resources plant-available.
Prerequisites: ((SOIL 205 with D- or better and (SOIL 206 [D-] or FOR 206 [D-]) or CSS 205 [D-]) or (CH 121 [D-] or CH 231 [D-] and (BOT 220 [D-] or BI 204 [D-] or BI 205 [D-] or BI 206 [D-]) or (BI 211 [D-] or BI 212 [D-] or BI 213 [D-])

SOIL 395. *WORLD SOIL RESOURCES. (3 Credits)
The properties, global distribution, and agricultural productivity of major world soil groups are described. Potentials for human-accelerated soil degradation are introduced for each soil group, and reasons for conflicting assessments of degradation are discussed. Offered via ECampus only. (Bacc Core Course) (Writing Intensive Course)
Attributes: CSST – Core, Synthesis, Science/Technology/Society; CWIC – Core, Skills, WIC
Prerequisites: CH 121 with D- or better or CH 122 with D- or better or CH 123 with D- or better or CH 201 with D- or better or CH 202 with D- or better or CH 231 with D- or better or CH 231H with D- or better or CH 232 with D- or better or CH 232H with D- or better or CH 233 with D- or better or CH 233H with D- or better
Recommended: One term of chemistry

SOIL 399. SPECIAL TOPICS. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 401. RESEARCH. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 403. THESIS. (1-16 Credits)
Independent, original study and preparation of a senior thesis. This course is repeatable for 16 credits.

SOIL 405. READING AND CONFERENCE. (1-16 Credits)
Equivalent to: SOIL 405H
This course is repeatable for 16 credits.
SOIL 405H. READING AND CONFERENCE. (1-16 Credits)
Attributes: HNRS – Honors Course Designator
Equivalent to: SOIL 405
This course is repeatable for 16 credits.

SOIL 407. SEMINAR. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 408. WORKSHOP. (1-16 Credits)
Evaluation and judging of soils in Oregon and other states; directed studies of soil morphology, soil survey, soil fertility, soil physics, soil chemistry, soil biology, and soil information systems.
This course is repeatable for 16 credits.

SOIL 409. PRACTICUM. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 410. INTERNSHIP. (1-6 Credits)
Professional work experience previously approved and supervised by the department, written report required.
This course is repeatable for 12 credits.

SOIL 435. ENVIRONMENTAL SOIL PHYSICS. (3 Credits)
Covers principles of soil physical properties and processes as they relate to agricultural, hydrological and environmental problems. Lec/lab. Offered odd years.
Prerequisites: CSS 205 with D- or better or CSS 305 with D- or better or SOIL 205 with D- or better
Recommended: CH 123 and MTH 241 and PH 201

SOIL 445. ENVIRONMENTAL SOIL CHEMISTRY. (3 Credits)
Structural chemistry of clay minerals and organic matter, cation and anion exchange, and soil solution equilibria of soils. Ion exchange, mineral-solution equilibria, and adsorption reactions of silicate clays, oxides, and organic matter are emphasized. Covers the sorption behavior of environmental contaminants and the weathering reactions that govern the transport of reactive solutes through soils. Lec/rec. Offered odd years.

SOIL 455. BIOLOGY OF SOIL ECOSYSTEMS. (4 Credits)
A detailed study of the organisms that live in the soil and their activities in the soil ecosystems, soil as a habitat for organisms, taxonomy and biology of soil organisms, fundamentals of nutrient cycles, special topics in soil biology, review basis of soil microbial and ecological principles. Lec/rec/lab.
Recommended: (CSS 305 or CSS 205 or SOIL 205). Courses in chemistry, physics, and microbiology

SOIL 466. SOIL MORPHOLOGY AND CLASSIFICATION. (4 Credits)
Observation and description of soil properties in the field; writing soil profile descriptions; evaluating criteria that define features used to classify soils; using soil classification keys. Lec/lab.
Prerequisites: SOIL 205 with D- or better or CSS 205 with D- or better or CSS 305 with D- or better

SOIL 468. SOIL LANDSCAPE ANALYSIS. (4 Credits)
Principles of soil geomorphology, soil stratigraphy, and surficial processes as applied to understanding the soil system and landscape scales. Emphasis on field observations of soils, geomorphic surfaces, and environment. Field project entails design of soil survey map units, field mapping and GIS cartographic techniques. Lec/lab. Offered even years.
Prerequisites: SOIL 466 (may be taken concurrently) with D- or better or CSS 466 (may be taken concurrently) with D- or better

SOIL 475. SOIL RESOURCE POTENTIALS. (4 Credits)
Course builds on knowledge from introductory pedology, soil chemistry, soil physics and soil biology to practice the evaluation of nutrient availability and soil moisture storage in the rooting space. Results from the application of pedotransfer functions to observations at the pit wall are translated into quantitative, numerical expressions of soil resource potentials. Lec/lab.
Prerequisites: SOIL 435 with D- or better and SOIL 455 [D-] and SOIL 466 [D-]

SOIL 499. SPECIAL TOPICS. (1-16 Credits)
Equivalent to: SOIL 499H
This course is repeatable for 16 credits.

SOIL 499H. SPECIAL TOPICS. (1-16 Credits)
Attributes: HNRS – Honors Course Designator
Equivalent to: SOIL 499
This course is repeatable for 16 credits.

SOIL 501. RESEARCH AND SCHOLARSHIP. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 503. THESIS/DISSERTATION. (1-16 Credits)
This course is repeatable for 999 credits.

SOIL 505. READING AND CONFERENCE. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 506. PROJECTS. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 507. SEMINAR. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 508. WORKSHOP. (1-16 Credits)
Evaluation and judging of soils in Oregon and other states; directed studies of soil morphology, soil survey, soil fertility, soil physics, soil chemistry, soil biology, and soil information systems.
This course is repeatable for 16 credits.

SOIL 509. PRACTICUM IN TEACHING. (1-3 Credits)
Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. CROSSTLISTED as ENT 509, CROP 509, PBG 509.
Equivalent to: CROP 509, ENT 509, PBG 509
This course is repeatable for 9 credits.

SOIL 510. INTERNSHIP. (1-6 Credits)
Professional work experience previously approved and supervised by the department, written report required.
This course is repeatable for 6 credits.

SOIL 511. SOIL: A NATURAL AND SOCIETAL RESOURCE. (3 Credits)
Serves degree- and non-degree-seeking graduate learners wanting soil science knowledge but having minimal science background. Understanding soil physical, chemical, and biological properties promotes informed soil management while supporting individual to global societal values. Established curriculum facilitates graduate degrees or certificates, continuing education, professional certification, and self-improvement goals. A highly interactive social media framework supports weekly student-student and instructor-student learning interactions.
SOIL 512. METHODS OF SOIL ANALYSIS - FIELD. (1 Credit)  
Recognition and quantitative description of soil properties in agroecosystems. Assessments of soil environments used for crop production in Oregon. Demonstration and practice of volumetric and bulk soil sampling techniques as well as the application of pedotransfer functions. Each participant will be responsible for analyzing at least one soil sample in the chemical level. Five-day duration with four overnight stays at campgrounds. Participants will use their own or borrowed camping equipment.  
**Recommended:** SOIL 205 with a minimum grade of C

**SOIL 513. PROPERTIES, PROCESSES, AND FUNCTIONS OF SOILS. (4 Credits)**  
Physical, chemical, biological, and landscape properties; processes of fluid retention and movement, weathering and cation exchange, decomposition and C-N dynamics, erosion and sedimentation; functions of hydrologic regulation, nutrient cycling, environmental protection, ecological habitat.  
**Equivalent to:** CSS 513  
**Recommended:** CH 223 or CH 233 or CH 233H or equivalent

**SOIL 514. METHODS OF SOIL ANALYSIS - LABORATORY. (2 Credits)**  
Provide the theoretical background, as well as practical experience needed to plan, select, execute, and interpret soil chemical and physical analyses as those typically used for nutrient management recommendations. Individual and group activities involve classroom presentations, as well as hands-on work in a teaching laboratory. Samples processed are those collected in SOIL 512, Methods of Soil Analysis - Field. Duration is five full work days.  
**Prerequisites:** SOIL 512 (may be taken concurrently) with C or better  
**Recommended:** SOIL 205 and successful completion of EH&S Laboratory

**SOIL 515. SOIL FERTILITY MANAGEMENT. (3 Credits)**  
Management of plant nutrients in agronomic systems; diagnosis of nutrient availability and prediction of crop response to fertilizers; interactions between nutrient response and chemical, physical and biological properties of soils.  
**Recommended:** CSS 315 and courses in statistics, chemistry and plant physiology.

**SOIL 523. PRINCIPLES OF STABLE ISOTOPES. (3 Credits)**  
An introduction to the theory and use of stable isotopes. Applications of stable isotopes to soil science, plant physiology, hydrology, and ecosystem studies. Offered every year.

**SOIL 525. MINERAL-ORGANIC MATTER INTERACTIONS. (3 Credits)**  
Studies the fundamental properties of the mineral-organic interface and the mechanisms of interaction between mineral and organic soil properties.  
**Recommended:** CSS 305 or CSS 205 or SOIL 205

**SOIL 530. ORGANIC SOIL AND CROP MANAGEMENT. (3 Credits)**  
Overview of organic soil and crop management, organic soil system management, soil microbiology under organic systems, cropping systems, organic cereal production systems, organic forage production system, organic horticultural systems management, organic field and horticulture cropping systems; recent research and case studies.  
**CROSSLISTED AS CROP 530.**  
**Equivalent to:** CROP 530  
**Recommended:** (SOIL 525, CROP 200 and SOIL 205 or introductory biology) and completion or concurrent enrollment in AGRI 520

**SOIL 535. SOIL PHYSICS. (3 Credits)**  
Theoretical elements of soil physical properties and processes related to agricultural, hydrological and environmental problems. Offered fall term in even years.  
**Recommended:** CSS 305, CSS 205, SOIL 205, MTH 241, CH 123, PH 201

**SOIL 536. VADOZE ZONE HYDROLOGY LABORATORY. (1 Credit)**  
Experimental elements of soil physical properties and processes allowing practical experience in the measurement and analysis of soil physical processes related to agricultural, hydrological and environmental problems. Weekly laboratory. Offered even years.  
**Recommended:** CH 123 and PH 201

**SOIL 545. ENVIRONMENTAL SOIL CHEMISTRY. (3 Credits)**  
Structural chemistry of clay minerals and organic matter, cation and anion exchange, and soil solution equilibria of soils. Ion exchange, mineral-solution equilibria, and adsorption reactions of silicate clays, oxides, and organic matter are emphasized. Covers the sorption behavior of environmental contaminants and the weathering reactions that govern the transport of reactive solutes through soils.  
**Lec/rec. Offered odd years.**

**SOIL 547. NUTRIENT CYCLING. (3 Credits)**  
Reviews and discusses ecosystem-level biogeochemical concepts for terrestrial and freshwater ecosystems, primarily by reading and discussing classic and current literature to determine the state-of-knowledge and uncertainties associated with it. Topics include root nutrient uptake mechanisms, soil chemical and biochemical transformations in different soil and ecosystems, measuring soil solution and watershed fluxes, soil organic matter formation and structure, the meaning of sustainability, the concept of N saturation in terrestrial ecosystems, and the use of natural abundance and tracer isotopes in ecosystem biogeochemistry. While forest biogeochemical processes will be emphasized, desert, aquatic, wetland, and prairie ecosystems will also be explored.  
**CROSSLISTED as BOT 547.**  
**Recommended:** College-level chemistry and biology and one class in ecology (eg. BI 370) and/or soils (eg. SOIL 205)

**SOIL 555. BIOLOGY OF SOIL ECOSYSTEMS. (4 Credits)**  
A detailed study of the organisms that live in the soil and their activities in the soil ecosystems, soil as a habitat for organisms, taxonomy and biology of soil organisms, fundamentals of nutrient cycles, special topics in soil biology, review basis of soil microbial and ecological principles.  
**Lec/rec/lab.**  
**Recommended:** CSS 305 or CSS 205 or SOIL 205. Courses in chemistry, physics, and microbiology

**SOIL 566. SOIL MORPHOLOGY AND CLASSIFICATION. (4 Credits)**  
Observation and description of soil properties in the field; writing soil profile descriptions; evaluating criteria that define features used to classify soils; using soil classification keys.  
**Lec/lab.**  
**Recommended:** CSS 305 or CSS 205 or SOIL 205

**SOIL 568. SOIL LANDSCAPE ANALYSIS. (4 Credits)**  
Principles of soil geomorphology, soil stratigraphy, and surficial processes as applied to understanding the soil system at landscape scales. Emphasis on field observations of soils, geomorphic surfaces, and environment. Field project entails design of soil survey map units, field mapping and GIS cartographic techniques.  
**Lec/lab. Offered odd years.**  
**Prerequisites:** CSS 566 (may be taken concurrently) with C or better or SOIL 566 (may be taken concurrently) with C or better

**SOIL 591. SELECTED TOPICS. (1-16 Credits)**  
Course content and title will change with each offering.  
**This course is repeatable for 16 credits.**
SOIL 599. SPECIAL TOPICS. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 601. RESEARCH. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 603. THESIS/DISSERTATION. (1-16 Credits)
This course is repeatable for 999 credits.

SOIL 605. READING AND CONFERENCE. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 606. PROJECTS. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 607. SEMINAR. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 608. WORKSHOP. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 609. PRACTICUM IN TEACHING. (1-3 Credits)
Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. Graded P/N.
Equivalent to: CROP 609, ENT 609, PBG 609
This course is repeatable for 9 credits.

SOIL 635. ADVANCED SOIL PHYSICS. (3 Credits)
Explores theoretical development of a key topic in soil physics. Topics may include evaporation from porous media, multiphase fluid movement, soil deformation, and soil salinization, with respect to either historical development, present day understanding or future needs of the field.
Course structure incorporates lectures and discussion requiring intensive student participation. Offered odd years.
Prerequisites: CSS 535 with C or better or SOIL 535 with C or better
Recommended: A working knowledge of soil physics and a passing grade in a graduate-level soil physics course

SOIL 645. SOIL MICROBIAL ECOLOGY. (3 Credits)
An advanced treatment of current topics in soil microbiology, with an emphasis on the ecology of soil microorganisms. Topics include the size, composition, diversity, and activity of soil microbial communities, linkage of microbial community structure to ecosystem functions, and applications of molecular biology to soil microbiology. Offered even years.
Recommended: SOIL 455 or CSS 455 or MB 448

SOIL 684. GLOBAL BIOGEOCHEMICAL CYCLES. (4 Credits)
An in-depth treatment of global biogeochemical cycles, focusing on cycles of carbon, oxygen, nitrogen, phosphorus, and sulfur in the atmosphere, hydrosphere, and lithosphere. CROSSLISTED as GEO 684.
Equivalent to: GEO 684
Recommended: One year of college-level physics and chemistry, including introductory biology. One year of graduate coursework in soil, earth, ocean, atmospheric or forest science

SOIL 691. SELECTED TOPICS. (1-16 Credits)
This course is repeatable for 16 credits.

SOIL 699. SPECIAL TOPICS. (1-16 Credits)
This course is repeatable for 16 credits.