SOILS (SOIL)

SOIL 205 The Soil Ecosystem
3 credits
*Gen Ed: Natural and Applied Sciences*
Introduction to the physical, chemical, and biological nature of soils.
*Prereq:* CHEM 101 or CHEM 111 or Instructor Permission

SOIL 206 The Soil Ecosystem Lab
1 credit
*Gen Ed: Natural and Applied Sciences*
Lab study relevant to SOIL 205. Experiments and demonstrations on basic and applied aspects of soil science. One 3-hour lab per week.
*Coreq:* SOIL 205

SOIL 210 Food Systems and Healthy Lifestyles
3 credits
Introduction to food systems including the historical development of our current global food system. Linkages among the production, marketing and transportation of food and food policy on human health will be explored. Students will complete a semester-long assessment of the local food system and its impacts on individual, school and community health and strategies to improve the food system.

SOIL 299 (s) Directed Study
Credit arranged

SOIL 398 (s) Internship
1-6 credits, max 6
Graded P/F.
*Prereq:* Department Permission

SOIL 400 (s) Seminar
Credit arranged

SOIL 404 (s) Special Topics
Credit arranged

SOIL 409 Principles of Environmental Toxicology
3 credits
Cross-listed with FS 409 and ENVS 409, Joint-listed with ENVS 509, FS 509, and SOIL 509
Fundamental toxicological concepts including dose-response relationships, absorption of toxicants, distribution and storage of toxicants, biotransformation and elimination of toxicants, target organ toxicity and teratogenesis, mutagenesis, and carcinogenesis; chemodynamics of environmental contaminants including transport, fate, and receptors; chemicals of environmental interest and how they are tested and regulated; risk assessment fundamentals. Graduate students are required to prepare an additional in-depth report. Recommended Preparation: BIOL 102 or BIOL 115, CHEM 111, CHEM 112, CHEM 275, and STAT 251. Cooperative: open to WSU degree-seeking students.

SOIL 410 Principles of Environmental Toxicology (s)
3 credits
Joint-listed with SOIL 509
An introduction to basic and applied aspects of soil science. One 3-hour lab per week.

SOIL 415 Soil and Environmental Physics
3 credits
Joint-listed with SOIL 515
Physical properties of soils and their relationships to moisture, aeration, and temperature; plant-soil-atmospheric relationships; solute transport and soil salinity. Two lectures and one 3-hour lab per week.
*Recommended Preparation:* SOIL 205, SOIL 206, and PHYS 111. SOIL 415 is a cooperative course available to WSU degree-seeking students. (Fall, alt/years)

SOIL 417 Market Garden Practicum
1-6 credits
Experiential learning based course that covers all aspects of running a small acreage vegetable farm. Topics include farm planning, crop rotation, soil fertility and testing, weed management, and food systems. Students satisfy credit hours through participation in lecture/discussion, field work, and field trips. Class meets at the Plant Science Farm.
*Recommended Preparation:* SOIL 205.

SOIL 422 Environmental Soil Chemistry
3 credits
Chemical processes in soil environment. Recommended Preparation: SOIL 205, SOIL 206, and CHEM 112. Cooperative: open to WSU degree-seeking students. (Alt/years)

SOIL 425 Microbial Ecology
3 credits
Joint-listed with SOIL 525
Biogeochmical activities and relationships of microorganisms in soil, water, plants, and animals. Extra oral and/or written assignments required for graduate credit. Recommended Preparation: MATH 143. (Spring alt/years)
*Prereq:* EPPN 154 or BIOL 250

SOIL 427 Sustainable Food Systems
3 credits
*Gen Ed: Senior Experience*
Joint-listed with SOIL 527
The purpose of this course is to help students apply systems thinking and systems methodological problem solving skills to identify and describe current and future food system issues. Through lectures, case studies and research students will explore elements and behavior of food systems that impart sustainability. Additional readings, research, and presentations required for graduate credit.
*Prereq:* FOR 221, REM 221, or SOIL 210; or Instructor Permission

SOIL 434 Landscape Nutrient Management
3 credits
Joint-listed with SOIL 534
Fundamentals of elemental cycles in managed and natural terrestrial systems. The basis underlying nutrient and soil fertility recommendations is explored. Impacts of climate, lithology, and plant-soil feedbacks are discussed. Management at field to watershed scale is addressed. Extra oral and/or written assignments required for graduate credit.
*Prereq:* SOIL 205 and SOIL 206

SOIL 436 Principles of Sustainability
3 credits
Cross-listed with FS 436, Joint-listed with FS 536 and SOIL 536
Presented as online doculectures, covering topics such as: Origins of Sustainability, Standards of Sustainability, Culture of Waste, Built Environment, Industrial Sustainability, Energy Sustainability, Water Resources, Measuring Sustainability, Sustainable Impact Assessment, and Our Sustainable Future. Readings and homework are assigned with each topic. Learning assessment will be from homework, exams and written papers. Additional work is required for graduate credit. Cooperative: open to WSU degree-seeking students.
*Prereq:* Junior standing or higher
SOIL 438 Pesticides in the Environment
3 credits
Gen Ed: Senior Experience
Cross-listed with ENT 438 and PLSC 438
Principles of pesticide fate in soil, water, and air; pesticide metabolism in plants, pesticide toxicology, and pesticide mode-mechanism of action; pest resistance to pesticides; biotechnology in pest control; regulations and liability; equipment application technology; pesticide transport, storage, and disposal; and social and ethical considerations. Recommended Preparation: CHEM 275.

SOIL 444 Water Quality in the Pacific Northwest
3 credits
Cross-listed with ENVS 444, Joint-listed with ENVS 544 and SOIL 544
Qualitative aspects of water are covered in this class. Major topics are qualitative aspects of (1) surface water, (2) groundwater, (3) drinking water; (4) water in the oceans, and (5) the human waste stream. Concepts presented are relevant to world-wide water quality issues and concepts; however, however, an emphasis is placed on issues within the four Pacific Northwest states (ID, AK, OR, WA).

SOIL 446 (s) Soil Fertility
1-3 credits, max 3
Principles of soil fertility management; availability of plant nutrients and their relationship to plant growth and fertilization practices. Recommended Preparation: SOIL 205 and 206.

SOIL 448 Drinking Water and Human Health
3 credits
Cross-listed with ENVS 448, Joint-listed with ENVS 548 and SOIL 548
Understand the characterization, testing, and treatment of chemical, microbial, and hazardous compounds and their impact on human health. Be familiar with drinking water standards, regulatory aspects, and protection of municipal, community, and private well systems. (Spring)

SOIL 450 Environmental Hydrology
3 credits
Cross-listed with ENVS 450
Comprehensive understanding of the hydrologic processes associated with the environmental processes. Includes components of the hydrologic cycle, analysis of precipitation and run off, evapotranspiration, routing, peak flow, infiltration, soil and water relationships, snowmelt, and frequency analysis. (Spring)
Prereq: MATH 143 or vertically related higher course

SOIL 452 Environmental Water Quality
3 credits
Joint-listed with SOIL 552
Students are exposed to techniques, approaches and strategies to monitor and assess non-point pollution and its effects on beneficial uses in downstream water bodies. The class covers field lab, and modeling approaches as applied to mixed forest, urban and agricultural watersheds. Students will learn approaches commonly used in TMDL assessment and the development of best management practices in implementation planning. Additional work required for graduate credit. Two lectures and one 3-hour lab a week. Recommended preparation: SOIL 205 and BIOL 250.
Prereq: CHEM 111 and CHEM 111L; SOIL 450 or ENVS 450 or FOR 462 or CE 325 or BE 355

SOIL 454 Pedology
3 credits
Morphology, genesis, and classification of soils; distribution of soils as related to environmental processes and factors. Two lectures and one 4-hour lab per week. Recommended Preparation: SOIL 205 and SOIL 206. Cooperative: open to WSU degree-seeking students.

SOIL 456 North Idaho Field Trip
1 credit
Joint-listed with SOIL 556
Soils and land use in northern Idaho ecosystems; emphasis on soil parent materials, soil formation and morphology, and soil-plant community relationships. Graded P/F. One 3-day field trip; additional class meetings and assignments before and after field trip. Recommended preparation: SOIL 205. Cooperative: open to WSU degree-seeking students.

SOIL 444 Water Quality in the Pacific Northwest
3 credits
Cross-listed with FS 464, Joint-listed with FS 564 and SOIL 564
General principles of toxicologic evaluation of chemicals, which intentionally or unintentionally enter the food chain. Toxicology of food additives, colors, preservatives, drugs, pesticides and natural toxins in foods and risk characterization. Additional projects/assignments required for graduate credit. Cooperative: open to WSU degree-seeking students.

SOIL 452 Environmental Water Quality
3 credits
Cross-listed with ENVS 452
Students are exposed to techniques, approaches and strategies to monitor and assess non-point pollution and its effects on beneficial uses in downstream water bodies. The class covers field lab, and modeling approaches as applied to mixed forest, urban and agricultural watersheds. Students will learn approaches commonly used in TMDL assessment and the development of best management practices in implementation planning. Additional work required for graduate credit. Two lectures and one 3-hour lab a week. Recommended preparation: SOIL 205 and BIOL 250.
Prereq: CHEM 111 and CHEM 111L; SOIL 450 or ENVS 450 or FOR 462 or CE 325 or BE 355

SOIL 454 Pedology
3 credits
Morphology, genesis, and classification of soils; distribution of soils as related to environmental processes and factors. Two lectures and one 4-hour lab per week. Recommended Preparation: SOIL 205 and SOIL 206. Cooperative: open to WSU degree-seeking students.

SOIL 456 North Idaho Field Trip
1 credit
Joint-listed with SOIL 556
Soils and land use in northern Idaho ecosystems; emphasis on soil parent materials, soil formation and morphology, and soil-plant community relationships. Graded P/F. One 3-day field trip; additional class meetings and assignments before and after field trip. Recommended preparation: SOIL 205. Cooperative: open to WSU degree-seeking students.
SOIL 514 Environmental Geophysics
3 credits
This course will provide an introduction to near-surface geophysical techniques. The aim is to provide a solid foundation on physical principles used to non-invasively study characteristics and properties of the earth in general, and the shallow subsurface in particular. We will discuss applications ranging from eco-hydrology, precision agriculture, and civil engineering to archeology. The course consists of two parts. Lectures will provide a conceptual understanding of the theory and methods, and a field-based case study will apply these concepts collecting integrated geophysical data that will be processed and interpreted to introduce students to practical procedures and challenges in environmental geophysics. Cooperative: open to WSU degree-seeking students.

SOIL 515 Soil and Environmental Physics
3 credits
Joint-listed with SOIL 415
Physical properties of soils and their relationships to moisture, aeration, and temperature; plant-soil-atmospheric relationships; solute transport and soil salinity. Two lectures and one 3-hour lab per week. Recommended Preparation: SOIL 205, SOIL 206, and PHYS 111. (Fall, alt/years)

SOIL 525 Microbial Ecology
3 credits
Joint-listed with SOIL 425
Biogeochemical activities and relationships of microorganisms in soil, water, plants, and animals. Extra oral and/or written assignments required for graduate credit. Recommended Preparation: MATH 143. (Spring alt/years)

SOIL 527 Sustainable Food Systems
3 credits
Joint-listed with SOIL 427
The purpose of this course is to help students apply systems thinking and systems methodological problem solving skills to identify and describe current and future food system issues. Through lectures, case studies and research students will explore elements and behavior of food systems that impart sustainability. Additional readings, research, and presentations required for graduate credit.

SOIL 534 Landscape Nutrient Management
3 credits
Joint-listed with SOIL 434
Fundamentals of elemental cycles in managed and natural terrestrial systems. The basis underlying nutrient and soil fertility recommendations is explored. Impacts of climate, lithology, and plant-soil feedbacks are discussed. Management at field to watershed scale is addressed. Extra oral and/or written assignments required for graduate credit.

SOIL 536 Principles of Sustainability
3 credits
Cross-listed with FS 536, Joint-listed with FS 436 and SOIL 436
Presented as online doculectures, covering topics such as: Origins of Sustainability, Standards of Sustainability, Culture of Waste, Built Environment, Industrial Sustainability, Energy Sustainability, Water Resources, Measuring Sustainability, Sustainable Impact Assessment, and Our Sustainable Future. Readings and homework are assigned with each topic. Learning assessment will be from homework, exams and written papers. Additional work is required for graduate credit. Cooperative: open to WSU degree-seeking students.

SOIL 544 Water Quality in the Pacific Northwest
3 credits
Cross-listed with ENVS 544, Joint-listed with ENVS 448 and SOIL 444
Qualitative aspects of water are covered in this class. Major topics are qualitative aspects of (1) surface water, (2) groundwater, (3) drinking water, (4) water in the oceans, and (5) the human waste stream. Concepts presented are relevant to world-wide water quality issues and concepts; however, however, an emphasis is placed on issues within the four Pacific Northwest states (ID, AK, OR, WA).

SOIL 548 Drinking Water and Human Health
3 credits
Cross-listed with ENVS 548, Joint-listed with ENVS 448 and SOIL 448
Understand the characterization, testing, and treatment of chemical, microbial, and hazardous compounds and their impact on human health. Be familiar with drinking water standards, regulatory aspects, and protection of municipal, community, and private well systems. (Spring)

SOIL 552 Environmental Water Quality
3 credits
Joint-listed with SOIL 552
Students are exposed to techniques, approaches and strategies to monitor and assess non-point pollution and its effects on beneficial uses in downstream water bodies. The class covers field lab, and modeling approaches as applied to mixed forest, urban and agricultural watersheds. Students will learn approaches commonly used in TMDL assessment and the development of best management practices in implementation planning. Additional work required for graduate credit. Two lectures and one 3-hour lab a week. Recommended preparation: SOIL 205 and BIOL 250.

SOIL 556 North Idaho Field Trip
1 credit
Joint-listed with SOIL 456
Soils and land use in northern Idaho ecosystems; emphasis on soil parent materials, soil formation and morphology, and soil-plant community relationships. Graded P/F. One 3-day field trip; additional class meetings and assignments before and after field trip. Cooperative: open to WSU degree-seeking students.

SOIL 556 Principles of Sustainability
3 credits
Cross-listed with FS 536, Joint-listed with FS 436 and SOIL 436
Presented as online doculectures, covering topics such as: Origins of Sustainability, Standards of Sustainability, Culture of Waste, Built Environment, Industrial Sustainability, Energy Sustainability, Water Resources, Measuring Sustainability, Sustainable Impact Assessment, and Our Sustainable Future. Readings and homework are assigned with each topic. Learning assessment will be from homework, exams and written papers. Additional work is required for graduate credit. Cooperative: open to WSU degree-seeking students.

SOIL 565 North Idaho Field Trip
1 credit
Joint-listed with SOIL 456
Soils and land use in northern Idaho ecosystems; emphasis on soil parent materials, soil formation and morphology, and soil-plant community relationships. Graded P/F. One 3-day field trip; additional class meetings and assignments before and after field trip. Cooperative: open to WSU degree-seeking students.

Prereq: SOIL 205 and Permission
SOIL 564 Food Toxicology
3 credits
Cross-listed with FS 564, Joint-listed with FS 464 and SOIL 464
General principles of toxicologic evaluation of chemicals, which intentionally or unintentionally enter the food chain. Toxicology of food additives, colors, preservatives, drugs, pesticides and natural toxins in foods and risk characterization. Additional projects/assignments required for graduate credit. Cooperative: open to WSU degree-seeking students.
Prereq: BIOL 300 or BIOL 380

SOIL 598 (s) Internship
Credit arranged
Graded P/F
Prereq: Permission

SOIL 599 (s) Research
Credit arranged
Research not directly related to a thesis or dissertation.
Prereq: Permission

SOIL 600 Doctoral Research and Dissertation
Credit arranged