

CROP AND SOIL SCIENCE

The discipline of crop science provides the knowledge and understanding of technologies that contribute directly to improvements in production and quality of food, feed, fiber, seed, energy, and nutraceutical crops for the world. The art and science of plant improvement are key elements in efforts to feed, clothe and provide energy for the world's ever-growing population. Conventional and molecular tools assist in the development of new genetic strains of food and energy crops. Crop plants play an important role in the future of sustainable food and energy production.

The discipline of soil science provides the basic understanding of the physical, chemical, and biological properties of this important natural resource. Why is soil important? Soil is the fundamental substrate for life on terrestrial landscapes. Soil plays a vital role in sustaining human welfare and assuring future agricultural productivity and environmental stability. An understanding of global and local ecology depends on an awareness of the soil and its properties. Global information and mapping systems are essential tools for characterizing the landscape and its constituent soils.

Agronomists are crop and soil scientists who work to improve crops and agricultural productivity while effectively managing pests and weeds. Students in crop and soil science explore important contemporary issues faced by our society, including water quality and management, sustainability of different types of crop production, organic crop production, erosion and sedimentation, growing crops for biofuel production, land use and reclamation, genetic modification of crop plants, and soil quality and sustainability. An array of careers is available.

Career Opportunities

Careers for crop scientists are available in business, industry, farming, research, agricultural chemical industries, seed production, seed technology, communications, conservation, and education. Positions are available in agricultural experiment stations and extension services, state departments of agriculture, food processing companies, insurance agencies, lending institutions, and commercial firms, both domestic and international, dealing in the processing and sale of farm products, chemicals, and seed.

Careers for soil scientists are available in agriculture, forestry, education, state and federal resource agencies, private consulting, and research. Farms, ranches, and agricultural supply companies employ soil scientists as managers or field representatives. Soil scientists may become teachers of vocational agriculture or environmental education, or they may become county extension agents in agriculture or natural resources. The U.S. Department of Agriculture's Forest Service and Natural Resources Conservation Service often employ soil scientists, as do private consulting firms in environmental engineering and land use planning.

Academic Advising

Undergraduate curricula in crop and soil science are flexible enough to provide for the student's individual professional needs and interests and for a broad-based general education by allowing electives in other colleges throughout the university. Undergraduate advising is a vital part of the program, and the department is well known for excellence in advising. The department has a head advisor who meets with all students each term. Advisors and faculty provide curricular guidance and

aid in professional extracurricular activities, career decisions, and job placement.

Scholarships

The Department of Crop and Soil Science administers a number of scholarships available only to students majoring in the department. Over \$40,000 is given to students each year.

Student Clubs

The department supports a Crop Science Club that provides valuable co-curricular professional development, a collegiate Soil Judging Team that participates in both regional and national competitions, the OSU Organic Growers Club that provides hands-on experience in organic production of vegetable crops, and the OSU Bug Club, a student club whose members are actively engaged in insect education outreach to local schools and communities. Graduate students in soil science also have a student club.

Undergraduate Programs

Major

- Crop and Soil Science (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/crop-soil-science/crop-soil-science-bs-hbs/>)

Options:

- *Agronomy*
- *Plant Breeding and Genetics*
- *Soil Science*

Minors

- Crop Science (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/crop-soil-science/crop-science-minor/>)
- Soil Science (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/crop-soil-science/soil-science-minor/>)

Graduate Programs

Majors

- Crop Science (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/crop-soil-science/crop-science-ms-phd/>)

Options:

- *Entomology*
- *Plant Breeding and Genetics*
- Soil Science (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/crop-soil-science/soil-science-ms-phd/>)

Minors

- Crop Science (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/crop-soil-science/crop-science-graduate-minor/>)
- Soil Science (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/crop-soil-science/soil-science-graduate-minor/>)

Jay Noller, Head

107 Crop Science
3017 Ag and Life Sciences
Oregon State University
Corvallis, OR 97331
Phone: 541-737-2821
Email: jay.noller@oregonstate.edu

Website: <http://cropandsoil.oregonstate.edu/>

Faculty

Professors Bottomley, Butler (emeritus), Corp, Dragila, Hannaway, Hayes, Karow (emeritus), Kling (sr. research), Lajtha, Machado, Macnab, Mallory-Smith, Myrold, Noller, Rao, Reitz, Ross, Shock, Stephenson, Tuck, Young (emeritus), Zemetra

Associate Professors Angima, Baham (emeritus), Bohle, Chastain, Elias (sr. research), Felix, Flowers, Hulting, Kleber, Lutcher, Nonogaki, Parke (sr. research), Rondon, Roseberg, Schrupf (seed certification, emeritus), D. Sullivan, Walenta, Wysocki

Assistant Professors N. Anderson, Dreves (sr. research), Leonard (sr. research), Pett-Ridge, C. Sullivan, Townsend (sr. research)

Senior Instructors Cassidy, Charlton, Fery, McMorran (seed certification)

Instructors Buhrig, Burr (seed certification), A. Hunt, Japhet, Maley, Shafa (seed certification), S. Smith (seed certification), Zielinski (seed certification)

Courtesy Faculty

Professors Brillman, Brown, Griffith, Olszyk, Peterson

Associate Professors Henning, Mueller-Warrant, Riera-Lizaraz, Vales

Assistant Professors M. Johnson, M. Rogers, Weisbrod

Professional Faculty

Curry, Garay, Lewis, Lundeen

Crop Science (CROP)

CROP 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. CROSSLISTED as CROP 101/ENT 101/SOIL 101.

Equivalent to: ENT 101, HORT 101, SOIL 101

Available via Ecampus

CROP 199, SPECIAL STUDIES: ISSUES IN SUSTAINABLE AGRICULTURE, 1-16 Credits

Invited speakers present seminars on specific aspects of agriculture relating to sustainability. Topics vary from term to term and year to year. May be repeated for credit when topics differ.

Equivalent to: CROP 199H

This course is repeatable for 16 credits.

CROP 200, CROP ECOLOGY AND MORPHOLOGY, 3 Credits

An introduction to the concepts and principles of crop ecology and morphology and a foundation for other crop science courses. Examines the dynamics and function of crop communities, and the biotic and environmental interactions that influence productivity. Fundamentals of the developmental morphology of crop seeds, seedlings, and plants. Morphological features of seeds and plants in relation to the identification of crop families and species of economic importance.

Equivalent to: CSS 200

Available via Ecampus

CROP 280, INTRODUCTION TO THE COMPLEXITY OF OREGON CROPPING SYSTEMS, 4 Credits

An introduction to field cropping systems of western Oregon. Provides students with a broad overview of the complexity of cropping systems and the knowledge required to grow and produce a crop—plant physiology, seed biology, plant pathology, soil fertility, entomology, and weed science. Students will observe a crop under different management strategies to enhance understanding of management approaches.

Available via Ecampus

CROP 300, CROP PRODUCTION IN PACIFIC NORTHWEST AGROECOSYSTEMS, 4 Credits

Relation of crop production to human culture and the natural environment. Origins of agriculture and the processes of agricultural change, and productivity and sustainability of specific crop production systems in the Pacific Northwest. History, geography, resource requirements, and key challenges faced are presented. Fundamental crop production practices in relation to productivity and sustainability. Lec/lab/rec. CROSSLISTED as CROP 300/HORT 300.

Equivalent to: CSS 300, HORT 300

Recommended: One year of general biology

Available via Ecampus

CROP 310, FORAGE PRODUCTION, 4 Credits

Importance of, and current production practices for, forage crops. Lec/lab.

Equivalent to: CSS 310

Recommended: (CSS 300 or CROP 300 or HORT 300) and (CSS 305 or CSS 205 or SOIL 205)

Available via Ecampus

CROP 325, ^AG AND ENVIRONMENTAL PREDICAMENTS: A CASE STUDY APPROACH, 3 Credits

Analyze controversial agricultural and environmental issues, synthesize information from diverse sources, and apply scientific knowledge to recommend specific courses of action to solve real world problems. Develop oral and written communication skills through individual and group work. CROSSLISTED as CROP 325/SOIL 325/SUS 325. (Writing Intensive Course)

Attributes: CWIC – Core, Skills, WIC

Equivalent to: SOIL 325, SUS 325

CROP 330, *WORLD FOOD CROPS, 3 Credits

Origin, production, utilization, and improvement of the world's major food crops. The role of crop production in global economic and social development; food security and worldwide nutritional requirements. (Bacc Core Course)

Attributes: CSGI – Core, Synth, Global Issues

Equivalent to: CSS 330

Recommended: CSS 200 or CROP 200

Available via Ecampus

CROP 340, *PENS AND PLOWS: WRITINGS OF WORKING THE LAND, 3 Credits

A survey of literature from ancient Greece to the twentieth century focusing on the significance of agricultural life and/or the natural world. Students read and discuss writings considered critical in the development of Western culture and receive input on the literary significance and the accuracy of agriculture presented within the readings. (Bacc Core Course) Taught via Ecampus only.

Attributes: CPWC – Core, Pers, West Culture

Equivalent to: CSS 340

Available via Ecampus

CROP 355, ORGANIC CERTIFICATION, 3 Credits

Learn about the USDA National Organic Program (NOP) standards relating to certified operations, inspection, certification processes, and labeling. Focus on the crops, processing, and livestock aspects of organic certification for farms and food manufacturing operations.

Available via Ecampus

CROP 401, RESEARCH, 1-16 Credits

Equivalent to: CSS 401

This course is repeatable for 16 credits.

CROP 403, THESIS, 1-16 Credits

Independent, original study and preparation of a senior thesis.

Equivalent to: CSS 403

This course is repeatable for 16 credits.

CROP 405, READING AND CONFERENCE, 1-16 Credits

Equivalent to: CROP 405H, CSS 405

This course is repeatable for 16 credits.

CROP 405H, READING AND CONFERENCE, 1-16 Credits

Attributes: HNRS – Honors Course Designator

Equivalent to: CROP 405, CSS 405H

This course is repeatable for 16 credits.

CROP 407, SEMINAR, 1 Credit

Equivalent to: HORT 407, SOIL 407

Available via Ecampus

CROP 410, INTERNSHIP, 1-6 Credits

Professional work experience previously approved and supervised by the department, written report required.

Equivalent to: CSS 410

This course is repeatable for 12 credits.

CROP 414, PRECISION AGRICULTURE, 4 Credits

Provides insight into the technology available to support precision agriculture and data management planning applications. Examines the concepts and applications of precision agriculture to teach practical use of hardware, equipment and software. An overview of current technology including autonomous vehicles, GPS, soil and crop proximal sensors, imagery and mapping, variable rate control systems, and yield monitors. Lec/lab. CROSSLISTED as CROP 414/HORT 414.

Equivalent to: HORT 414

CROP 418, TOXIC PLANTS IN PNW PASTURES, 1 Credit

Identifying and understanding ecology and biology of harmful weeds and poisonous plants found in Pacific Northwest pastures and rangelands and determining best management and control options. Taught via Ecampus only.

Equivalent to: CSS 418

Recommended: College-level plant biology and/or taxonomy courses.

CROP 420, SEED SCIENCE AND TECHNOLOGY, 3 Credits

Seed formation and factors affecting their development and maturation. Seed structure and chemical composition. Physiological and biochemical aspects of seed germination, dormancy, deterioration and storability.

The concept of seed quality, its importance in agriculture, its attributes and impact on field performance. Methods of measuring seed quality of conventional and genetically modified seeds. Taught via Ecampus only.

Equivalent to: CSS 420

Recommended: Biology, plant anatomy and/or physiology courses

Available via Ecampus

CROP 433, SYSTEMATICS AND ADAPTATION OF VEGETABLE CROPS, 4 Credits

Covers the botanical and taxonomic relationships, breeding systems and adaptation of vegetable crops. Fresh material is used to illustrate varietal differences and traits of importance. Offered even years. CROSSLISTED as CROP 433/HORT 433 and CROP 533/HORT 533.

Prerequisite: BI 102 with D- or better or BI 213 with D- or better or BI 213H with D- or better or BI 223 with D- or better or BI 223H with D- or better or BI 311 with D- or better or BI 311H with D- or better or HORT 430 with D- or better or CSS 430 with D- or better or PBG 430 with D- or better or HORT 450 with D- or better or CSS 450 with D- or better or PBG 450 with D- or better

Equivalent to: HORT 433

CROP 440, WEED MANAGEMENT, 4 Credits

Principles of weed control by cultural, biological, and chemical means; weed identification; introduction to herbicides and factors influencing their use. Lec/lab/rec.

Equivalent to: CSS 440

Recommended: One year biological science and one course in organic chemistry.

Available via Ecampus

CROP 448, LIVESTOCK PRODUCTION ON PASTURE, 4 Credits

Focuses on grazing management in cultivated pastures in Oregon and other regions with similar agro-ecological conditions. Become familiar with the basic principles of pasture production, grazing management and feed planning and management in large and small ruminant production systems. Provides information on the underlying factors affecting pasture and animal production and product quality in pasture-based production systems. CROSSLISTED as ANS 448/CROP 448/RNG 448 and ANS 548/CROP 548/RNG 548.

Equivalent to: ANS 448, RNG 448

CROP 460, SEED PRODUCTION, 3 Credits

An introduction to principles and practices of seed-based genetic delivery systems. Fundamentals of seed crop biology, cultivar maintenance and production methods are stressed. Concepts are illustrated using Pacific Northwest seed crops.

Equivalent to: CSS 460

Recommended: CROP 200 or CSS 200

Available via Ecampus

CROP 463, SEED BIOLOGY, 3 Credits

Information about reproductive development of plants such as pollination and fertilization, which is important for the initiation of seed formation, will be provided. Embryo and endosperm development as well as accumulation of seed storage materials, which are major events during seed development, will be covered, as well as the dormancy and germination mechanisms in mature seeds. Lectures and discussions (presentations required for graduate students). Offered even years. Lec/lab. CROSSLISTED as CROP 463/HORT 463 and CROP 563/HORT 563.

Equivalent to: HORT 463

CROP 470, OILSEEDS AND ESSENTIAL OIL CROPS, 3 Credits

Provides students with an understanding of the principles and the latest research information of field crop production, chemistry, oil extraction and utilization of OEOC. Includes the importance of OEOC, their uses, current trends, production systems for major crops, harvesting, drying, processing, and other post-harvest operations, fixed (fatty acid) and essential oil extraction methods, and oil utilization. Relevant recent research and review papers will be also included and the information discussed and assessed.

Prerequisite: CROP 200 with D- or better

CROP 480, CASE STUDIES IN CROPPING SYSTEMS MANAGEMENT, 4 Credits

Decision cases involving the production of field and horticultural crops; individual and group activities; discussion of the decision-making process. Multiple field trips required. A field trip fee will be charged. CROSSLISTED as CROP 480/HORT 480 and CROP 580/HORT 580.

Equivalent to: HORT 480

Recommended: CROP 300 or HORT 300

Available via Ecampus

CROP 499, SPECIAL TOPICS IN CROP SCIENCE AND SOIL SCIENCE, 1-16 Credits

Technical knowledge and skills development courses offered in a wide array of course formats. Topics vary from term to term and year to year. May be repeated for credit when topics differ.

Equivalent to: CROP 499H, CSS 499

This course is repeatable for 16 credits.

Available via Ecampus

CROP 499H, SPECIAL TOPICS IN CROP SCIENCE AND SOIL SCIENCE, 1-16 Credits

Technical knowledge and skills development courses offered in a wide array of course formats. Topics vary from term to term and year to year. May be repeated for credit when topics differ.

Attributes: HNRS – Honors Course Designator

Equivalent to: CROP 499, CSS 499H

This course is repeatable for 16 credits.

CROP 501, RESEARCH, 1-16 Credits

Equivalent to: CSS 501

This course is repeatable for 16 credits.

CROP 503, THESIS, 1-16 Credits

Equivalent to: CSS 503

This course is repeatable for 999 credits.

CROP 505, READING AND CONFERENCE, 1-16 Credits

Equivalent to: CSS 505

This course is repeatable for 16 credits.

CROP 506, PROJECTS, 1-16 Credits

Equivalent to: CSS 506

This course is repeatable for 16 credits.

CROP 507, SEMINAR, 1 Credit

Graded P/N.

Equivalent to: CSS 507

This course is repeatable for 99 credits.

CROP 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. CROSSLISTED as CROP 509/ENT 509/PBG 509/SOIL 509.

Equivalent to: CSS 509, ENT 509, PBG 509, SOIL 509

This course is repeatable for 9 credits.

CROP 514, PRECISION AGRICULTURE, 4 Credits

Provides insight into the technology available to support precision agriculture and data management planning applications. Examines the concepts and applications of precision agriculture to teach practical use of hardware, equipment and software. An overview of current technology including autonomous vehicles, GPS, soil and crop proximal sensors, imagery and mapping, variable rate control systems, and yield monitors. Lec/lab.

CROP 520, SEED SCIENCE AND TECHNOLOGY, 3 Credits

Seed formation and factors affecting their development and maturation. Seed structure and chemical composition. Physiological and biochemical aspects of seed germination, dormancy, deterioration and storability. The concept of seed quality, its importance in agriculture, its attributes and impact on field performance. Methods of measuring seed quality of conventional and genetically modified seeds. Taught via Ecampus only.

Equivalent to: CSS 520

Recommended: Biology, plant anatomy and/or physiology courses
Available via Ecampus

CROP 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/SOIL 530.

Equivalent to: SOIL 530

Recommended: SOIL 525, CROP 200, SOIL 205 or introductory biology. Completion or concurrent enrollment in AGRI 520
Available via Ecampus

CROP 533, SYSTEMATICS AND ADAPTATION OF VEGETABLE CROPS, 4 Credits

Covers the botanical and taxonomic relationships, breeding systems and adaptation of vegetable crops. Fresh material is used to illustrate varietal differences and traits of importance. Lec/lab. Offered even years. CROSSLISTED as CROP 433/HORT 433 and CROP 533/HORT 533.

Equivalent to: CSS 533, HORT 533

Recommended: BI 102 or BI 213 or BI 311 or HORT 430 or CSS 430 or PBG 430 or HORT 450 or CSS 450 or PBG 450

CROP 540, WEED MANAGEMENT, 4 Credits

Principles of weed control by cultural, biological, and chemical means; weed identification; introduction to herbicides and factors influencing their use. Lec/lab/rec.

Equivalent to: CSS 540

Recommended: One year biological science and one course in organic chemistry.
Available via Ecampus

CROP 548, LIVESTOCK PRODUCTION ON PASTURE, 4 Credits

Focuses on grazing management in cultivated pastures in Oregon and other regions with similar agro-ecological conditions. Become familiar with the basic principles of pasture production, grazing management and feed planning and management in large and small ruminant production systems. Provides information on the underlying factors affecting pasture and animal production and product quality in pasture-based production systems. CROSSLISTED as ANS 448/CROP 448/RNG 448 and ANS 548/CROP 548/RNG 548.

Equivalent to: ANS 548, RNG 548

CROP 560, SEED PRODUCTION, 3 Credits

An introduction to principles and practices of seed-based genetic delivery systems. Fundamentals of seed crop biology, cultivar maintenance and production methods are stressed. Concepts are illustrated using Pacific Northwest seed crops.

Equivalent to: CSS 560

Recommended: CROP 200 or CSS 200

Available via Ecampus

CROP 563, SEED BIOLOGY, 3 Credits

Information about reproductive development of plants such as pollination and fertilization, which is important for the initiation of seed formation, will be provided. Embryo and endosperm development as well as accumulation of seed storage materials, which are major events during seed development, will be covered, as well as the dormancy and germination mechanisms in mature seeds. Lectures and discussions (presentations required for graduate students). Offered even years. Lec/lab. CROSSLISTED as CROP 463/HORT 463 and CROP 563/HORT 563.

Equivalent to: HORT 563

CROP 570, OILSEEDS AND ESSENTIAL OIL CROPS, 3 Credits

Provides students with an understanding of the principles and the latest research information of field crop production, chemistry, oil extraction and utilization of OEOC. Includes the importance of OEOC, their uses, current trends, production systems for major crops, harvesting, drying, processing, and other post-harvest operations, fixed (fatty acid) and essential oil extraction methods, and oil utilization. Relevant recent research and review papers will be also included and the information discussed and assessed.

Prerequisite: CROP 200 with D- or better

Recommended: Horticulture, biology or chemistry course

CROP 580, CASE STUDIES IN CROPPING SYSTEMS MANAGEMENT, 4 Credits

Decision cases involving the production of field and horticultural crops; individual and group activities; discussion of the decision-making process. Multiple field trips required. A field trip fee will be charged. CROSSLISTED as CROP 480/HORT 480 and CROP 580/HORT 580.

Equivalent to: HORT 580

Recommended: CROP 300 or HORT 300

Available via Ecampus

CROP 590, EXPERIMENTAL DESIGN IN AGRICULTURE, 4 Credits

Field layout, analysis, and interpretation of basic experimental designs used in agronomy and plant breeding and including field plot techniques such as optimum plot size and shape, factorial arrangement, replication, sub-sampling, randomization, and blocking. Recitation provides practical experience with SAS. Lec/rec.

Equivalent to: CSS 590

Recommended: ST 351

Available via Ecampus

CROP 599, SPECIAL TOPICS IN CROP SCIENCE AND SOIL SCIENCE, 0-16 Credits

Technical knowledge and skills development courses offered in a wide variety of course formats. Topics vary from term to term and year to year. May be repeated for credit when topics differ.

Equivalent to: CSS 599

This course is repeatable for 16 credits.

CROP 601, RESEARCH, 1-16 Credits

Equivalent to: CSS 601

This course is repeatable for 16 credits.

CROP 603, THESIS, 1-16 Credits

Equivalent to: CSS 603

This course is repeatable for 999 credits.

CROP 605, READING AND CONFERENCE, 1-16 Credits

Equivalent to: CSS 605

This course is repeatable for 16 credits.

CROP 606, PROJECTS, 1-16 Credits

Equivalent to: CSS 606

This course is repeatable for 16 credits.

CROP 607, SEMINAR, 1 Credit

Graded P/N.

Equivalent to: CSS 607

This course is repeatable for 99 credits.

CROP 608, WORKSHOP, 1-16 Credits

Equivalent to: CSS 608

This course is repeatable for 16 credits.

CROP 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: ENT 609, PBG 609, SOIL 609

This course is repeatable for 9 credits.

CROP 660, HERBICIDE SCIENCE, 4 Credits

Absorption, movement, and mechanism of action in plants; behavior of herbicides in soil. Offered alternate years.

Recommended: BOT 331 and (CSS 440 or CSS 540 or CROP 440 or CROP 540)

CROP 670, PHYSIOLOGY OF CROP YIELD, 3 Credits

Concepts of crop growth and production in relation to environmental and physiological factors and their interactions; current literature.

Equivalent to: CSS 670

Recommended: BOT 331

CROP 699, SPECIAL TOPICS IN CROP SCIENCE AND SOIL SCIENCE, 1-16 Credits

Equivalent to: CSS 699

This course is repeatable for 16 credits.

Crop and Soil Science (CSS)

CSS 205, *SOIL SCIENCE, 4 Credits

Introduction to the chemical, physical and biological nature of soils. Examines the functions of soil as a medium for plant growth, a recycling system for nutrients and wastes, a modifier of atmospheric chemistry, a habitat for soil organisms, a system for water purification, and an engineering medium. Field and laboratory projects provide an understanding of fundamental soil science principles and the impact of human activities on soil quality and sustainability. Lec/lab. (Bacc Core Course) Taught via Ecampus only.

Attributes: CPBS – Core, Pers, Biological Science; CPPS – Core, Pers, Physical Science

Equivalent to: CSS 305, SOIL 205

Available via Ecampus

CSS 305, PRINCIPLES OF SOIL SCIENCE, 4 Credits

Origin, formation, classification, physical, chemical, and biological characteristics; ecosystem functions of soils; effects of soil management on agricultural and forest crop production. Field trips. Taught at EOU LaGrande campus only.

Equivalent to: CSS 205, SOIL 205

Recommended: Two quarters of college chemistry and CSS 306

CSS 306, PROBLEM SOLVING: SOIL SCIENCE APPLICATIONS, 1 Credit

Problem solving for, and in-depth exploration of, Principles of Soil Science (CSS 305). Real-world problems requiring knowledge of soil physical, chemical, and biological properties. Taught at EOU LaGrande campus only.

Corequisites: CSS 305

CSS 315, ^NUTRIENT MANAGEMENT AND CYCLING, 4 Credits

Nutrient forms, transformations, and plant availability as influenced by chemical and biological reactions in soils; soil pH and management of acid and alkaline soils; characteristics and use of fertilizers, soil amendments and organic wastes. Labs include routine soil testing procedures, computer applications for soil fertility management, and field trips. Lec/lab. (Writing Intensive Course) Taught at EOU LaGrande campus only.

Attributes: CWIC – Core, Skills, WIC

Prerequisite: CSS 305 with D- or better

Recommended: CH 122 and courses in computers

CSS 320, PRINCIPLES OF OIL AND FIBER CROP PRODUCTION, 1 Credit

An overview of production practices and characteristics of oil seed, essential oil, and fiber crops. Taught at EOU LaGrande campus only.

Recommended: CSS 300 and CSS 305

CSS 321, PRINCIPLES OF CEREAL CROP PRODUCTION, 1 Credit

An overview of the principles underlying small grain production practices in the Pacific Northwest. Taught at EOU LaGrande campus only.

Recommended: CSS 300 and CSS 305

CSS 322, PRINCIPLES OF POTATO PRODUCTION, 1 Credit

Principles and practices governing all aspects of potato production, storage and use. Taught at EOU LaGrande campus only.

Recommended: CSS 300 and CSS 305

Plant Breeding and Genetics (PBG)

PBG 199, SPECIAL TOPICS, 1-16 Credits

Equivalent to: PBG 199H

This course is repeatable for 16 credits.

PBG 199H, SPECIAL TOPICS, 1-16 Credits

Attributes: HNRS – Honors Course Designator

Equivalent to: PBG 199

This course is repeatable for 16 credits.

PBG 299, SPECIAL TOPICS, 1-16 Credits

Equivalent to: PBG 299H

This course is repeatable for 16 credits.

PBG 299H, SPECIAL TOPICS, 1-16 Credits

Attributes: HNRS – Honors Course Designator

Equivalent to: PBG 299

This course is repeatable for 16 credits.

PBG 399, SPECIAL TOPICS, 1-16 Credits

This course is repeatable for 16 credits.

PBG 401, RESEARCH, 1-16 Credits

This course is repeatable for 16 credits.

PBG 403, THESIS, 1-16 Credits

Graded P/N.

This course is repeatable for 99 credits.

PBG 405, READING AND CONFERENCE, 1-16 Credits

Equivalent to: PBG 405H

This course is repeatable for 16 credits.

PBG 405H, READING AND CONFERENCE, 1-16 Credits

Attributes: HNRS – Honors Course Designator

Equivalent to: PBG 405

This course is repeatable for 16 credits.

PBG 407, SEMINAR, 1-16 Credits

This course is repeatable for 16 credits.

PBG 409, TEACHING PRACTICUM, 1-16 Credits

Graded P/N.

This course is repeatable for 16 credits.

PBG 410, INTERNSHIP, 1-12 Credits

Offered via Ecampus only.

This course is repeatable for 12 credits.

PBG 430, PLANT GENETICS, 3 Credits

Introduction to the principles of plant genetics with an emphasis on the structure and function of economically important plant genomes.

Equivalent to: HORT 430

Recommended: One year of biology and chemistry.

Available via Ecampus

PBG 431, PLANT GENETICS RECITATION, 1 Credit

Review and demonstration of plant genetics principles.

Equivalent to: CSS 431, HORT 431

PBG 441, PLANT TISSUE CULTURE, 4 Credits

Principles, methods, and applications of plant tissue culture. Laboratory is important part of course. Topics include callus culture, regeneration, somaclonal variation, micropropagation, anther culture, somatic hybridization, and transformation. CROSSLISTED as PBG 441 and MCB 541/PBG 541.

Equivalent to: HORT 441

Recommended: (BI 311 and BOT 331) or PBG 430 or CSS 430

PBG 450, PLANT BREEDING, 4 Credits

An introduction to the genetic improvement of self-pollinated, cross-pollinated, and asexually propagated species and the genetic principles on which breeding methods are based. Examples are drawn from a wide range of crops, including cereal grains, grasses, fruits, nuts, and vegetables; guest lecturers discuss their breeding programs. Additional topics include crop evaluation, germplasm preservation, disease resistance, and biotechnology. Lec/lab.

Prerequisite: PBG 430 with D- or better

Equivalent to: CSS 450, HORT 450

Recommended: BI 311 or PBG 430

PBG 499, SPECIAL TOPICS, 1-16 Credits

Equivalent to: PBG 499H

This course is repeatable for 16 credits.

PBG 499H, SPECIAL TOPICS, 1-16 Credits

Attributes: HNRS – Honors Course Designator

Equivalent to: PBG 499

This course is repeatable for 16 credits.

PBG 501, RESEARCH, 1-16 Credits

Graded P/N.

This course is repeatable for 16 credits.

PBG 503, THESIS, 1-16 Credits

Graded P/N.

This course is repeatable for 999 credits.

PBG 505, READING AND CONFERENCE, 1-16 Credits

This course is repeatable for 16 credits.

PBG 506, PROJECTS, 1-16 Credits

This course is repeatable for 16 credits.

PBG 507, SEMINAR, 1-16 Credits

Graded P/N.

This course is repeatable for 16 credits.

PBG 508, WORKSHOP, 1-16 Credits

This course is repeatable for 16 credits.

PBG 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. CROSSLISTED as CROP 509/ENT 509/PBG 509/SOIL 509.

Equivalent to: CROP 509, ENT 509, SOIL 509

This course is repeatable for 9 credits.

PBG 510, INTERNSHIP, 4 Credits

Offered via Ecampus only.

This course is repeatable for 12 credits.

PBG 513, PLANT GENETIC ENGINEERING, 3 Credits

Principles, methods, and recent developments in the genetic engineering of higher plants. Offered alternate years.

Equivalent to: HORT 513

Recommended: (BI 311 and BOT 331) or (CSS 430 or CSS 530) or (HORT 430 or HORT 530) or (PBG 430 or PBG 530)

PBG 519, CURRENT TOPICS IN PLANT BREEDING AND GENETICS, 2 Credits

Provides an advanced understanding of plant breeding and genetics and their relationship to other disciplines through critical analysis of the scientific literature. Practice synthesizing information and presenting findings to peers. Instructors, topics, and specific learning objectives vary from term to term. CROSSLISTED as HORT 519/PBG 519.

Equivalent to: HORT 519

This course is repeatable for 12 credits.

PBG 530, PLANT GENETICS, 3 Credits

Introduction to the principles of plant genetics with an emphasis on the structure and function of economically important plant genomes.

Equivalent to: HORT 530

Recommended: One year of biology and chemistry.

PBG 541, PLANT TISSUE CULTURE, 4 Credits

Principles, methods, and applications of plant tissue culture. Laboratory is important part of course. Topics include callus culture, regeneration, somaclonal variation, micropropagation, anther culture, somatic hybridization, and transformation. CROSSLISTED as PBG 441 and MCB 541/PBG 541.

Equivalent to: HORT 541, MCB 541

Recommended: (BI 311 and BOT 331) or PBG 430

PBG 550, PLANT BREEDING, 4 Credits

An introduction to the genetic improvement of self-pollinated, cross-pollinated, and asexually propagated species and the genetic principles on which breeding methods are based. Example are drawn from a wide range of crops, including cereal grains, grasses, fruits, nuts, and vegetables; guest lecturers discuss their breeding programs. Additional topics include crop evaluation, germplasm preservation, disease resistance, and biotechnology. Lec/lab.

Equivalent to: CSS 550, HORT 550

Recommended: BI 311 or PBG 430 or PBG 530

PBG 551, BREEDING CLONAL CROPS, 1 Credit

The overall goal of the course is to gain fundamental knowledge of breeding methods for clonal crops; these methods are different from those used for seed-propagated crops. Specific examples from a wide array of plant species (tree fruits, berries, tree nuts, potato, sweet potato, cassava, cacao) will be provided to illustrate application of the fundamental knowledge.

Prerequisite: PBG 450 with C or better or PBG 550 with C or better

PBG 552, PLANT BREEDING AND SEED PRODUCTION IN ORGANIC SYSTEMS, 3 Credits

Genetic improvement and seed propagation of self-pollinated and cross-pollinated crops bred for and used in organic production. The philosophical basis for organic agriculture will be reviewed in the context of what breeding technologies are allowed and why. Important traits for adaptation to organic production will be described. Models for organic plant breeding and examples of such programs are provided.

Prerequisite: PBG 530 with D or better

Recommended: BI 311 or PBG 430

PBG 556, CROP PLANT DOMESTICATION, 2 Credits

Learning is based on discussion of the contemporary literature on crop plant origins and domestication. The major agronomic and horticultural crops will be covered. Topics include primary centers of domestication, traits altered by domestication, effect of genetic architecture and local ecology on domestication, and importance of genetic diversity to current plant improvement efforts.

PBG 557, PLANTS AND PATENTS, 2 Credits

Learn about different methods of intellectual property protection in agriculture with a focus on plant patents, plant variety protection and utility patents. The rights, current issues and restrictions that different types of patents allow will be presented through reading the current literature.

PBG 591, SELECTED TOPICS, 1-16 Credits

This course is repeatable for 16 credits.

PBG 599, SPECIAL TOPICS, 1-16 Credits

This course is repeatable for 16 credits.

PBG 601, RESEARCH, 1-16 Credits

Graded P/N.

This course is repeatable for 16 credits.

PBG 603, DISSERTATION, 1-16 Credits

Graded P/N.

This course is repeatable for 999 credits.

PBG 605, READING AND CONFERENCE, 1-16 Credits

This course is repeatable for 16 credits.

PBG 607, SEMINAR, 1-16 Credits

This course is repeatable for 16 credits.

PBG 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, SOIL 609

This course is repeatable for 9 credits.

PBG 620, INTRODUCTION TO MOLECULAR MARKERS, 2 Credits

Principles and methods for molecular marker discovery and analysis. Offered even years. CROSSLISTED as MCB 620/PBG 620.

Equivalent to: MCB 620

Recommended: BI 311 or PBG 430 or PBG 530 or HORT 430 or HORT 530

PBG 621, GENETIC MAPPING AND ASSOCIATION, 2 Credits

Principles and methods for genetic map construction and genome-wide association studies. Offered even years. CROSSLISTED as MCB 621/PBG 621.

Equivalent to: MCB 621

Recommended: BI 311 or PBG 430 or PBG 530 or HORT 430 or HORT 530

PBG 622, MAPPING QUANTITATIVE TRAIT LOCI, 1 Credit

Principles and methods for mapping genes underlying phenotypically complex traits. Offered alternate years. CROSSLISTED as MCB 622/PBG 622.

Equivalent to: CSS 622, MCB 622

Recommended: CROP 590 or CSS 590 or ST 513

PBG 650, ADVANCED PLANT BREEDING AND QUANTITATIVE GENETICS, 3 Credits

Pedigree, bulk, single-seed-descent, doubled haploid, backcross, testcross, mass, and half-sib, S~1~, and S~2~ family breeding methods; breeding hybrids and selecting sources of alleles for developing superior hybrids; the nature and consequences of genotype by environment interactions; marker-assisted backcross and inbred line breeding; quantitative trait locus mapping; random linear models; designing and analyzing cultivar, line, and family selection experiments. Offered odd years.

Equivalent to: CSS 650

Recommended: (CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530) and (CSS 450 or CSS 550 or PBG 450 or PBG 550 or HORT 450 or HORT 550) and (ST 411 or ST 511) and (ST 412 or ST 512) and (ST 413 or ST 513)

PBG 691, SELECTED TOPICS, 1-16 Credits

This course is repeatable for 16 credits.

PBG 699, SPECIAL TOPICS, 1-16 Credits

This course is repeatable for 16 credits.

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. CROSSLISTED as CROP 101/ENT 101/SOIL 101.

Equivalent to: CROP 101, ENT 101, HORT 101

Available via Ecampus

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

Prerequisite: 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.

Prerequisite: (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 325, ^AG AND ENVIRONMENTAL PREDICAMENTS: A CASE STUDY APPROACH, 3 Credits

Analyze controversial agricultural and environmental issues, synthesize information from diverse sources, and apply scientific knowledge to recommend specific courses of action to solve real world problems. Develop oral and written communication skills through individual and group work. CROSSLISTED as CROP 325/SOIL 325/SUS 325. (Writing Intensive Course)

Attributes: CWIC – Core, Skills, WIC

Equivalent to: CROP 325, SUS 325

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).

Prerequisite: (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

Available via Ecampus

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.

Prerequisite: 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

Available via Ecampus

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.

Prerequisite: ((SOIL 205 with D- or better and (SOIL 206 [D-] or FOR 206 [D-])) or CSS 205 [D-]) and (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-]) or (BI 211H [D-] or BI 212H [D-] or BI 213H [D-]) or (BI 221 [D-] or BI 222 [D-] or BI 223 [D-]) or (BI 221H [D-] or BI 222H [D-] or BI 223H [D-]))

Available via Ecampus

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

Prerequisite: 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

Equivalent to: CSS 395

Recommended: One term of chemistry

Available via Ecampus

SOIL 399, SPECIAL TOPICS, 1-16 Credits

This course is repeatable for 16 credits.

SOIL 401, RESEARCH, 1-16 Credits

Equivalent to: CSS 401

This course is repeatable for 16 credits.

SOIL 403, THESIS, 1-16 Credits

Independent, original study and preparation of a senior thesis.

Equivalent to: CSS 403

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 Credit

Equivalent to: CROP 407, HORT 407

Available via Ecampus

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.

Equivalent to: CSS 408

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.

Equivalent to: CSS 410

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.

Prerequisite: CSS 205 with D- or better or CSS 305 with D- or better or SOIL 205 with D- or better

Equivalent to: CSS 435

Recommended: CH 123 and MTH 241 and PH 201

Available via Ecampus

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.

Equivalent to: CSS 445

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.

Equivalent to: CSS 455

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.

Prerequisite: SOIL 205 with D- or better or CSS 205 with D- or better or CSS 305 with D- or better

Equivalent to: CSS 466

Available via Ecampus

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.

Prerequisite: SOIL 466 (may be taken concurrently) with D- or better or CSS 466 (may be taken concurrently) with D- or better

Equivalent to: CSS 468

Available via Ecampus

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.

Equivalent to: CSS 508

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. CROSSLISTED as CROP 509/ENT 509/PBG 509/SOIL 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.

Available via Ecampus

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 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 such 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.

Prerequisite: 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.

Equivalent to: CSS 515

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 even years.

Equivalent to: CSS 523

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.

Equivalent to: CSS 525

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/SOIL 530.

Equivalent to: CROP 530

Recommended: (SOIL 525, CROP 200 and SOIL 205 or introductory biology) and completion or concurrent enrollment in AGRI 520

Available via Ecampus

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.

Equivalent to: CSS 535

Recommended: CSS 305, CSS 205, SOIL 205, MTH 241, CH 123, PH 201

SOIL 536, VADOSE 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.

Equivalent to: CSS 536

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.

Equivalent to: CSS 545

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/SOIL 547.

Equivalent to: BOT 547, FS 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.

Equivalent to: CSS 555

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.

Equivalent to: CSS 566

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.

Prerequisite: CSS 566 (may be taken concurrently) with C or better or SOIL 566 (may be taken concurrently) with C or better

Equivalent to: CSS 568

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.

Prerequisite: 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.

Equivalent to: CSS 645

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/SOIL 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 699, SPECIAL TOPICS, 1-16 Credits

This course is repeatable for 16 credits.

Sustainability (SUS)**SUS 102, *INTRODUCTION TO ENVIRONMENTAL SCIENCE AND SUSTAINABILITY, 4 Credits**

An introduction to the science behind critical environmental issues and the biological basis of creating and maintaining sustainable ecosystems. Focus on such questions as: how do we decide what to believe about environmental issues? How do we quantify, restore, and value biodiversity? What is valid science in the global warming debate? Lec/lab. (Bacc Core Course)

Attributes: CPBS – Core, Pers, Biological Science

Equivalent to: SOIL 102

Available via Ecampus

SUS 103, *INTRODUCTION TO CLIMATE CHANGE, 4 Credits

An introduction to the principles of climate change science with an emphasis on the empirical evidence for climate change. Students will learn critical thinking skills to assess such questions as: How do we determine the processes controlling global warming? How do we predict trends in climate change? How do we calculate and understand uncertainty in these predictions? What is valid science in the global warming debate? Lec/lab. (Bacc Core Course)

Attributes: CPPS – Core, Pers, Physical Science

Available via Ecampus

SUS 304, *SUSTAINABILITY ASSESSMENT, 4 Credits

Explores theories and application of sustainability assessment techniques and analysis methods. Practical application of globally recognized assessment protocol, including checklists, footprinting, life-cycle analysis and the indicators used to conduct these analyses. Emphasis on ecological and social indicators, although economic indicators are explored. (Bacc Core Course)

Attributes: CSST – Core, Synthesis, Science/Technology/Society

Available via Ecampus

SUS 325, ^AG AND ENVIRONMENTAL PREDICAMENTS: A CASE STUDY APPROACH, 3 Credits

Analyze controversial agricultural and environmental issues, synthesize information from diverse sources, and apply scientific knowledge to recommend specific courses of action to solve real world problems. Develop oral and written communication skills through individual and group work. CROSSLISTED as CROP 325/SOIL 325/SUS 325. (Writing Intensive Course)

Attributes: CWIC – Core, Skills, WIC

Equivalent to: CROP 325, SOIL 325

SUS 331, *SUSTAINABILITY, JUSTICE, AND ENGAGEMENT, 3 Credits

Many sustainability crises are local, and the people most impacted tend to be groups already experiencing difference, lack of power, and discrimination. Transformational responses led by those most affected will be examined – responses that address the environmental problem while also building social and economic power for those affected. The tools and tactics used to achieve positive changes will be analyzed.

(Bacc Core Course)

Attributes: CPDP – Core, Perspective, Difference/Power/Discrimination

Equivalent to: SUS 331H

Available via Ecampus

SUS 331H, *SUSTAINABILITY, JUSTICE, AND ENGAGEMENT, 3 Credits

Many sustainability crises are local, and the people most impacted tend to be groups already experiencing difference, lack of power, and discrimination. Transformational responses led by those most affected will be examined – responses that address the environmental problem while also building social and economic power for those affected. The tools and tactics used to achieve positive changes will be analyzed.

(Bacc Core Course)

Attributes: CPDP – Core, Perspective, Difference/Power/Discrimination; HNRS – Honors Course Designator

Equivalent to: SUS 331

SUS 350, *SUSTAINABLE COMMUNITIES, 4 Credits

Introduction to the concept of sustainable communities from a multidisciplinary perspective. Instructors from a broad array of disciplines and professions. Development of holistic thinking skills and innovative solutions to complex problems. (Bacc Core Course)

Attributes: CSGI – Core, Synth, Global Issues

Equivalent to: NR 350

Available via Ecampus

SUS 401, RESEARCH, 1-16 Credits

This course is repeatable for 16 credits.

Available via Ecampus

SUS 410, INTERNSHIP, 1-16 Credits

This course is repeatable for 16 credits.

Available via Ecampus

SUS 420, SOCIAL DIMENSIONS OF SUSTAINABILITY, 3 Credits

Focuses on the social aspects of sustainability, including how the environment, the economy, social life interact to create the world we live in. Explores how social institutions (school, government, business, family) contribute to sustainability and promote or discourage social and environmental justice at local and global scales. Also offered at OSU-Cascades and via Ecampus.

Available via Ecampus

SUS 499, SPECIAL TOPICS, 1-16 Credits

This course is repeatable for 16 credits.

SUS 512, TOPICS IN THE SCIENCE OF SUSTAINABILITY, 4 Credits

Provides a graduate-level introduction to key concepts and issues in environmental science and sustainability, targeted at business-oriented graduate and post-bacc students who do not have a science background. The course is a core requirement of the Sustainable Business certificate program offered jointly by the College of Business (COB) and the College of Agricultural Sciences' (CAS) Sustainability Double-Degree (SDD) Program.

SUS 514, SUSTAINABILITY PLANNING AND ASSESSMENT, 4 Credits

Sustainability is fundamentally about balancing social, economic and ecological systems. This course examines a range of different methodologies for measuring and evaluating performance towards established sustainability criteria and indicators. Students will critically evaluate tools for making sustainable decisions and understand the limitations of individual assessment approaches in different contexts. Specific assessment techniques to be explored include ecological footprinting, sustainable community indicators, greenhouse gas emissions inventories, sustainability checklists, environmental management systems (ISO standards), life-cycle analysis, and business sustainability reporting. Students will leave the course with the fundamental skills required to complete sustainability assessments via globally relevant approaches.

SUS 599, SPECIAL TOPICS, 0-16 Credits

This course is repeatable for 16 credits.