

# SOIL SCIENCE (SSC)

## College of Agricultural & Environmental Sciences

### SSC 010 – Soils in Our Environment (3 units)

*Course Description:* Soils in our global ecosystem; soils as natural bodies formed by interactive environmental processes; soil response to use and management; sustainable use of soil resources; role of soils in agricultural and environmental issues; role of soils in our daily lives.

*Learning Activities:* Lecture 3 hour(s), Independent Study.

*Enrollment Restriction(s):* Limited to 90 students.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL).

### SSC 092 – Soil Science Internship (1-12 units)

*Course Description:* Work experience off and on campus in soil science. Internship supervised by a member of the faculty.

*Prerequisite(s):* Consent of instructor; lower division standing.

*Learning Activities:* Internship 3-36 hour(s).

*Grade Mode:* Pass/No Pass only.

### SSC 100 – Principles of Soil Science (5 units)

*Course Description:* Soil as part of natural and managed ecosystems and landscapes. Solid, liquid, and gas phases and their interactions in the soil. Water, gas and heat movement in soil. Soil biology. Plant nutrient acquisition and use. Soil development, management and use.

*Prerequisite(s):* College-level courses in each of chemistry, physics, biology, and geology recommended.

*Learning Activities:* Lecture 3 hour(s), Laboratory 3 hour(s), Term Paper.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL).

### SSC 102 – Environmental Soil Chemistry (3 units)

*Course Description:* Soil chemistry processes related to the fate and transport of contaminants in soil. Soil minerals, natural organic matter, surface charge, soil solution chemistry, redox reactions in soil, and sorption of inorganic and organic contaminants.

*Prerequisite(s):* General chemistry; SSC 100 or equivalent recommended.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL).

### SSC 105 – Field Studies of Soils in California Ecosystems (5 units)

*Course Description:* Field-based studies of soils in California ecosystems, away from campus, throughout California. Emphasis on description and classification of soils; relationships among soils, vegetation, geology, and climate; physical, chemical, and biological processes in soils on the landscape; and the role of soils in land use.

*Prerequisite(s):* SSC 100 and SSC 120 or equivalent recommended.

*Learning Activities:* Fieldwork.

*Enrollment Restriction(s):* Limited to a minimum of 10 students; maximum of 24.

*Repeat Credit:* May be repeated 1 time(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL); Writing Experience (WE).

### SSC 107 – Soil Physics (5 units)

*Course Description:* Physical properties of soil. Principles of water, gas, heat, and solute movement in soil with selected examples related to soil and water management. Influence of soil properties on transfer processes.

*Prerequisite(s):* SSC 100; ERS 100; MAT 016A.

*Learning Activities:* Lecture 3 hour(s), Laboratory 3 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE).

### SSC 109 – Sustainable Nutrient Management (4 units)

*Course Description:* Availability of nutrients in organic and conventional agricultural, vineyard, orchard and plantation forest soils; management of fertilizers, cover crops, compost, sewage sludge and manures for crop production and to prevent loss to the environment is emphasized.

*Prerequisite(s):* SSC 100; or the equivalent.

*Learning Activities:* Lecture 3 hour(s), Laboratory 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL); Writing Experience (WE).

### SSC 111 – Soil Microbiology (4 units)

*Course Description:* Major groups of microorganisms in soil, their interrelationships, and their responses to environmental variables. Role of microorganisms in cycling of nutrients. Plant-microbe relationships. Transformations of organic and inorganic pollutants.

*Prerequisite(s):* BIS 002C recommended.

*Learning Activities:* Lecture 3 hour(s), Laboratory 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Writing Experience (WE).

### SSC 112 – Soil Ecology (3 units)

*Course Description:* Overview of living constituents of soils, their interactions, importance to, and impact on biogeochemical cycles, decomposition, and soil properties. Practical applications of soil biological diversity are emphasized.

*Prerequisite(s):* SSC 100 or equivalent recommended.

*Learning Activities:* Lecture 2 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE).

### SSC 118 – Soils in Land Use & the Environment (4 units)

*Course Description:* Soils are considered as elements in land use planning and environmental quality. Topics include: soil survey reports, remote sensing, land capability classification, soil erosion/conservation, waste disposal on soils and soil reclamation. One one-day field trip.

*Prerequisite(s):* Consent of instructor; SSC 100 or equivalent recommended.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Scientific Literacy (SL).

## SSC 120 – Soil Genesis, Morphology, & Classification (5 units)

**Course Description:** Recognition and description of soils; chemical, biological and physical processes of soil formation. Factors of soil formation. Interactions of soils with diverse ecosystems. Introduction to soil classification. Practice using soil taxonomy. Practical experience describing soil properties in the field.

**Prerequisite(s):** SSC 100; GEL 050 recommended.

**Learning Activities:** Lecture 4 hour(s), Laboratory 3 hour(s).

**Grade Mode:** Letter.

**General Education:** Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL).

## SSC 192 – Soil Science Internship (1-12 units)

**Course Description:** Work experience off and on campus in soil science. Internship supervised by a member of the faculty.

**Prerequisite(s):** Consent of instructor; completion of 84 units.

**Learning Activities:** Internship 3-36 hour(s).

**Grade Mode:** Pass/No Pass only.

## SSC 198 – Directed Group Study (1-5 units)

**Course Description:** Directed group study.

**Prerequisite(s):** Consent of instructor.

**Learning Activities:** Variable.

**Grade Mode:** Pass/No Pass only.

## SSC 199 – Special Study for Advanced Undergraduates (1-5 units)

**Course Description:** Special study for advanced undergraduates.

**Prerequisite(s):** Consent of instructor.

**Learning Activities:** Variable.

**Grade Mode:** Pass/No Pass only.

## SSC 202 – Topics in Advanced Soil Chemistry (4 units)

**Course Description:** Reviews of current research in soil chemistry. Topics include double layer theory; clay mineral and oxide surface chemistry; adsorption on soil surfaces; speciation and modeling of solution ions; solubility and mineral stability diagrams.

**Prerequisite(s):** Consent of instructor; general chemistry; SSC 100 or equivalent recommended.

**Learning Activities:** Lecture 3 hour(s), Discussion 1 hour(s).

**Enrollment Restriction(s):** Restricted to 18 students.

**Repeat Credit:** May be repeated 1 time(s) when topic differs.

**Grade Mode:** Letter.

## SSC 205 – Field Studies of Soils in California Ecosystems (5 units)

**Course Description:** Field-based soil studies in California ecosystems. Description and classification of soils; relationships among soils, vegetation, geology, and climate; physical, chemical, and biological processes; their role in land use. Similar to SSC 105; requires additional work for graduate credit.

**Prerequisite(s):** SSC 100 and SSC 120 or equivalent recommended.

**Learning Activities:** Fieldwork 50 hour(s), Discussion 15 hour(s), Lecture 5 hour(s).

**Enrollment Restriction(s):** Limited to 24 students.

**Repeat Credit:** May be repeated 1 time(s) when geographic locale differs.

**Grade Mode:** Letter.

## SSC 208 – Soil-Plant Interrelationships (3 units)

**Course Description:** Plant needs, occurrence and reactions of water and mineral nutrients in soils; root systems and their growth in soils; mass flow and diffusion mechanisms in nutrient acquisition; models relating nutrient uptake to soil and plant characteristics; nutrient assimilation and crop quality.

**Prerequisite(s):** SSC 100; PLB 111; or consent of instructor.

**Learning Activities:** Lecture 3 hour(s).

**Grade Mode:** Letter.

## SSC 211 – Advanced Soil Microbiology (3 units)

**Course Description:** Microbial metabolism of organic chemicals in soil, both natural and xenobiotic. Decomposition of organic matter. Kinetics of microbial processes in soil.

**Prerequisite(s):** CHE 008A; CHE 008B; SSC 111; BIS 102, BIS 103 or an equivalent course recommended.

**Learning Activities:** Lecture 3 hour(s).

**Grade Mode:** Letter.

## SSC 219 – Ecosystem Biogeochemistry (4 units)

**Course Description:** Multidisciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies.

**Prerequisite(s):** Introductory courses in ecology/biology and soils recommended; undergraduates accepted with consent of instructor.

**Learning Activities:** Lecture 3 hour(s), Discussion/Laboratory 2 hour(s).

**Cross Listing:** ECL 219.

**Grade Mode:** Letter.

## SSC 220 – Pedology (3 units)

**Course Description:** Topics selected from studies of soil-forming processes, soil-geomorphic relations, mineral weathering, new developments in soil classification, and development of pedologic theory. Topics vary from year to year.

**Prerequisite(s):** Consent of instructor; SSC 120 recommended.

**Learning Activities:** Lecture 3 hour(s).

**Repeat Credit:** May be repeated 1 time(s).

**Grade Mode:** Letter.

## SSC 222 – Global Carbon Cycle (3 units)

**Course Description:** Global carbon cycle from Phanerozoic epoch to modern times. Examination of long and short-term carbon cycles. Transfer of carbon among ocean, land and life with emphasis on humic substance formation, methods of characterization, reactions with organics and soil carbon stabilization.

**Prerequisite(s):** MAT 016A; MAT 016B; CHE 008A; CHE 008B; SSC 100; or the equivalent of SSC 100.

**Learning Activities:** Lecture 3 hour(s).

**Grade Mode:** Letter.

## SSC 229Y – Soil Minerals in the Environment (5 units)

**Course Description:** Describing and identifying soil minerals commonly found in the Critical Zone; Origin, occurrence, and properties of soil minerals in relation to chemical, pedologic, and environmental conditions. Research applications of mineral identification techniques including X-ray diffraction, electron microprobe analysis, and electron microscopy.

**Learning Activities:** Web Virtual Lecture 4 hour(s), Laboratory 3 hour(s).

**Grade Mode:** Letter.

**SSC 290 – Special Topics in Soil Science (1-4 units)**

*Course Description:* Seminars and critical review of problems, issues, and research in soil science.

*Prerequisite(s):* Graduate standing.

*Learning Activities:* Seminar 1-4 hour(s), Variable.

*Repeat Credit:* May be repeated.

*Grade Mode:* Satisfactory/Unsatisfactory only.

**SSC 298 – Group Study (1-5 units)**

*Course Description:* Group study.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Variable 1-5 hour(s).

*Repeat Credit:* May be repeated when topic differs.

*Grade Mode:* Satisfactory/Unsatisfactory only.

**SSC 299 – Research (1-12 units)**

*Course Description:* Research.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Variable.

*Grade Mode:* Satisfactory/Unsatisfactory only.

**SSC 396 – Teaching Assistant Training Practicum (1-4 units)**

*Course Description:* Teaching assistant training practicum.

*Prerequisite(s):* Graduate standing.

*Learning Activities:* Variable.

*Repeat Credit:* May be repeated.

*Grade Mode:* Pass/No Pass only.