

# SOIL AND WATER SCIENCES

## **AGG 5607 Communicating in Academia 3 Credits**

**Grading Scheme:** Letter Grade

Teaching graduate students about academic writing, specifically focused on research proposals, theses, dissertations, manuscripts, grant proposals, and CVs. Also teaching students about aspects of academic writing that are not normally part of graduate curriculum but are necessary to succeed.

## **AGG 6503 Nanotechnology in Food, Agriculture, and Environment 3 Credits**

**Grading Scheme:** Letter Grade

Application of nanotechnology in crop production, food processing and preservation, and environmental remediation; behavior of engineered nanoparticles in plant, soil and the environment, and environmental toxicology and regulations of engineered nanoparticles.

## **ALS 5155 Global Agroecosystems 3 Credits**

**Grading Scheme:** Letter Grade

Focusing on the principles of agroecology and presentation of topics that integrate ecological with agricultural principles to optimize resource conservation, productivity, societal benefit, and profitability.

**Prerequisite:** SWS 3022 or SWS 5050 & ALS 3153 & AGR 4214C or equivalents.

## **CWR 6537 Contaminant Subsurface Hydrology 3 Credits**

**Grading Scheme:** Letter Grade

Physical-chemical-biological concepts and modeling of retention and transport of water and solutes in unsaturated and saturated media. Applications of environmental aspects of soil and groundwater contamination.

**Prerequisite:** None.

## **SWS 5050 Soils for Environmental Professionals 3 Credits**

**Grading Scheme:** Letter Grade

Fundamentals of soil properties and processes that explain the central role soils play in the environment. Geared to environmental professionals with little knowledge of soil science. Also offered as a distance education course.

## **SWS 5050L Soils for Environmental Professionals Laboratory 1 Credit**

**Grading Scheme:** Letter Grade

Hands-on laboratory experience with many tools and techniques used in soil and water science, in relation to the environment.

**Corequisite:** SWS 5050: Soils for Environmental Professionals or consent of instructor.

## **SWS 5115 Environmental Nutrient Management 3 Credits**

**Grading Scheme:** Letter Grade

Consumption, manufacture, properties, and reserves of fertilizer materials. Methods of application, effects on soil reaction, and plant requirements of fertilizer nutrients. Understanding specific fertilizer reactions. Also offered as a distance education course.

**Prerequisite:** SWS 3022 or SWS 5050: Soils for Environmental Professionals.

## **SWS 5132 Tropical Soil Management 3 Credits**

**Grading Scheme:** Letter Grade

Characteristics and management of tropical soils. Technologies that minimize industrial inputs.

**Prerequisite:** SWS 3022 or SWS 5050.

## **SWS 5182 Earth System Analysis 3 Credits**

**Grading Scheme:** Letter Grade

Analysis of global-scale interdependences between climate, biogeochemical cycles and humans using a systems approach.

**Prerequisite:** None MAC 2233, PHY 2048, or Similar Would Be Useful But Not A Requirement.

## **SWS 5208 Sustainable Agricultural and Urban Land Management 3 Credits**

**Grading Scheme:** Letter Grade

Studying agricultural and urban water quality issues in Florida, their bases, land and nutrient management strategies, and the science and policy behind Best Management Practices (BMPs). Students will learn to evaluate BMP research and analyze its role in determining practices and policies that protect water quality.

**Prerequisite:** SWS 3022 or equivalent course or with instructor approval.

## **SWS 5224 Environmental Biogeochemistry 3 Credits**

**Grading Scheme:** Letter Grade

Overviewing of the biogeochemical processes affecting elemental cycling (carbon, nitrogen, phosphorus, sulfur) in global environmental systems.

**Prerequisite:** BSC 2009 and BSC 2009L or equivalent courses, OR BSC 2010 and BSC 2010L or equivalent courses, OR CHM 2045 and CHM 2045L or equivalent courses.

## **SWS 5234 Environmental Soil, Water, and Land Use 3 Credits**

**Grading Scheme:** Letter Grade

Suitability of soils for different uses. Proper use of soil survey reports, topographic maps, and related information. Relationships between land uses and water behavior in soils and landscapes. Water use and allocation. Also offered as a distance education course.

## **SWS 5246 Water Resource Sustainability 3 Credits**

**Grading Scheme:** Letter Grade

Quantitative description of human impacts on hydrologic ecosystems (aquifers, watersheds, coastal zones, lakes, and wetlands). Case studies show the detrimental effects of unsustainable resource use and beneficial management strategies. Also offered as a distance education course.

## **SWS 5247 Hydric Soils 2 Credits**

**Grading Scheme:** Letter Grade

Concepts, field identification, and delineation of hydric soils. Instruction in accordance with the National Technical Committee for Hydric Soils and with regulatory agencies. Also offered as a distance education course.

## **SWS 5248 Wetlands and Water Quality 3 Credits**

**Grading Scheme:** Letter Grade

Introduction to natural and constructed wetland ecosystems. Problems associated with eutrophication and water quality. Hydrology, soils, and biogeochemistry. Also offered as a distance education course.

**Prerequisite:** CHM 2040.

## **SWS 5305C Soil Microbial Ecology 3 Credits**

**Grading Scheme:** Letter Grade

Occurrence and activities of soil microorganisms and their influence on soil productivity and environmental quality. Also offered as a distance education course.

**Prerequisite:** SWS 3022 or SWS 5050, MCB 2000C.

**SWS 5308 Ecology of Waterborne Pathogens 3 Credits****Grading Scheme:** Letter Grade

Modern methods for molecular and cultivation-dependent identification of soil- and waterborne pathogens. Risk assessment. Survival strategies, gene regulation, and metabolism of waterborne pathogens outside of their mammalian hosts. Also offered as a distance education course.

**Prerequisite:** MCB 3020, or MCB 3023, or MCB 4203, or equivalent.**SWS 5406 Soil and Water Chemistry 3 Credits****Grading Scheme:** Letter Grade

Theoretical background and current approaches to agricultural and environmental problems. Also offered as a distance education course.

**Prerequisite:** SWS 3022 or SWS 5050; CHM 3120.**SWS 5424C Soil Chemical Analysis 3 Credits****Grading Scheme:** Letter Grade

Practical and theoretical aspects of instrumentation and techniques commonly used in analyzing soils and plants.

**Prerequisite:** CHM 3120.**SWS 5551 Soils, Water, and Public Health 3 Credits****Grading Scheme:** Letter Grade

Highlights important instances where soil and water science and public health overlap. Develops skills required for competency in both disciplines.

**Corequisite:** Graduate status.**SWS 5605C Environmental Soil Physics 3 Credits****Grading Scheme:** Letter Grade

Transport processes for water, solutes, gases, and heat in the root zone. Important soil properties (physical, chemical, and biological) that influence the transfer processes characterized in the field and laboratory. Also offered as a distance education course.

**Prerequisite:** CHM 2040, MAC 2312, PHY 2004, SWS 5050.**SWS 5716C Environmental Pedology 4 Credits****Grading Scheme:** Letter Grade

Soils in the environment. Heavily oriented toward field applications of pedological principles and processes. Also offered as a distance education course.

**Prerequisite:** SWS 3022, SWS 5050, or consent of instructor.**SWS 5721C GIS in Land Resource Management 3 Credits****Grading Scheme:** Letter Grade

Introduction to basic concepts and use of "Arc GIS" to address land resource management issues. Also offered as a distance education course.

**SWS 5805 Environmental Soil and Water Monitoring Techniques 3 Credits****Grading Scheme:** Letter Grade

Introducing students to the principles, objectives, and practices in environmental monitoring. Students will learn the proper techniques in planning for monitoring projects, sampling design, sample collection, basic principles of laboratory analysis, and basic data analysis. Quality assurance and quality control requirements are introduced and emphasized.

**Prerequisite:** BSC 2010 & BSC 2010L; CHM 2045 & CHM 2045L**SWS 6117 Fertilizer Technology and Use 3 Credits****Grading Scheme:** Letter Grade

Presents the basic concepts of fertilizer technology as tools for effective agricultural crop nutrient management. Provides information on a wide range of fertilizer technologies and application methods from nationally and internationally known researchers and industry experts. Detailed understanding of how to produce different fertilizer components and how to use them properly to improve plant use efficiency.

**SWS 6134 Soil Quality 3 Credits****Grading Scheme:** Letter Grade

State-of-the-art studies/knowledge on soil quality. Principle assessment of soil quality with respect to biological production, plant and animal health, food security, and environmental quality. Also offered as a distance education course.

**Prerequisite:** SWS 5050 or consent of instructor.**SWS 6136 Soil and Nutrient Diagnostics for Agricultural Production 3 Credits****Grading Scheme:** Letter Grade

Field nutrient management using basic soil fertility concepts with scientific diagnostic techniques in various soils and cropping systems will be discussed. Nutrient budgeting for effective agricultural best management practices for agricultural and environmental sustainability will be included.

**SWS 6209 Urban Soil and Water Systems 3 Credits****Grading Scheme:** Letter Grade

Issues and opportunities related to soil and water quality in urban systems. Students will learn and discuss consequences of human population growth on soil and water systems in urban areas.

**Prerequisite:** SWS 5050**SWS 6323 Advanced Microbial Ecology 3 Credits****Grading Scheme:** Letter Grade

Phylogeny and evolution; diversity of habitat; genetic exchange.

**Prerequisite:** SWS 5305C or consent of instructor.**SWS 6366 Biodegradation and Bioremediation 3 Credits****Grading Scheme:** Letter Grade

Principles of biodegradation of toxic organic chemical; practices in conducting biodegradation studies in soils and water, and in microbial aspects of bioremediation of contaminated soils and water.

**SWS 6406 Soil Health and Data 3 Credits****Grading Scheme:** Letter Grade

Examine the concept, history, and underlying science of soil health; Apply basic statistical methods to analyze soil data and assess soil health in the R programming environment; Compare and select soil health indicators; Discuss the management practices for enhancing soil health.

**SWS 6448 Biogeochemistry of Wetlands and Aquatic Systems 3 Credits****Grading Scheme:** Letter Grade

Biogeochemical cycles of carbon, nitrogen, phosphorus, sulfur, and redox reactions in wetland soils and sediments, as related to their agronomic, ecological, and environmental significance. Also offered as distance education course.

**SWS 6454 Advanced Soil and Water Chemistry 3 Credits****Grading Scheme:** Letter Grade

Fundamental principles of surface chemistry as applied to soil and subsurface materials in natural waters. Chemical equilibria in natural systems, aqueous geochemistry, interfacial properties of soil and sedimentary colloids, and sorption of pollutants.

**Prerequisite:** CHM 3400, or equivalent.**SWS 6456 Advanced Biogeochemistry 3 Credits****Grading Scheme:** Letter Grade

Global elemental cycles in terrestrial, wetland, and aquatic systems as related to water quality, carbon sequestration, and climate change.

**SWS 6722 AI Modeling in Soil and Ecosystem Sciences 3 Credits****Grading Scheme:** Letter Grade

AI Modeling to Understand the Properties and Functions of Soils and Ecosystems.

**Prerequisite:** GEO 6160 OR GEO 6938 - Intro to Programming and Remote Sensing with R OR STA 6093 OR STA 6166 & SWS 5721C, or equivalent, or consent of instructor.**SWS 6804 Modeling Soil, Water, and Ecosystem Processes 3 Credits****Grading Scheme:** Letter Grade

An introduction into predictive modeling of soil, water, and ecosystem processes. Students learn from the ground up how to transform a conceptual model into a mathematical framework that then will be coded up in a simulation model. This hands-on experience serves the students to recognize how data can best serve models and how models can be used to interpret real world data.

**SWS 6813C Modeling Land Biogeochemistry 3 Credits****Grading Scheme:** Letter Grade

Modeling the flow of water, carbon and nutrients from an Earth system perspective.

**Prerequisite:** BSC 3307C or COP 3272 or MAC 2233 or PHY 2048 or SWS 4180 or ABE 5643C or PCB 5358 or SWS 5182 or SWS 5224.**SWS 6905 Special Problems 1-4 Credits, Max 8 Credits****Grading Scheme:** Letter Grade

Laboratory, library, and/or field study and research in a particular aspect of soils. Also offered as a distance education course.

**Prerequisite:** 15 credits of soil science.**SWS 6910 Supervised Research 1-5 Credits, Max 5 Credits****Grading Scheme:** S/U

Also offered as a distance education course.

**SWS 6920 Journal Colloquium in Environmental Science 1 Credit, Max 3 Credits****Grading Scheme:** Letter Grade

A discussion-based course to help graduate students in environmental science fields develop skills for critical analysis of literature while exploring current literature topics.

**Prerequisite:** Environmental science/earth system science course or consent of the instructor.**SWS 6931 Seminar 1 Credit, Max 3 Credits****Grading Scheme:** Letter Grade

Presentation of literature, methods of proposed thesis research, and selected topics.

**SWS 6932 Topics in Soils 1-4 Credits, Max 8 Credits****Grading Scheme:** Letter Grade

Also offered as a distance education course.

**Prerequisite:** SWS 3022.**SWS 6940 Supervised Teaching 1-5 Credits, Max 5 Credits****Grading Scheme:** S/U

Also offered as a distance education course.

**SWS 6950 Professional Development in Soil, Water, and Ecosystem Sciences 2 Credits****Grading Scheme:** Letter Grade

This course serves as a professional development component to graduate coursework in soil and water sciences and related fields. Topics include common skills and challenges in academia and professional employment. This course is available to both MS and PhD students and is offered every fall and spring semester.

**SWS 6971 Research for Master's Thesis 1-15 Credits****Grading Scheme:** S/U

Also offered as a distance education course.

**SWS 6992 Aquatic Toxicology: Science and Applications 3 Credits****Grading Scheme:** Letter Grade

Introduces foundational knowledge and concepts of the field of aquatic toxicology. Examines how environmental and chemical properties influence the fate and bioavailability of contaminants in aquatic environments; introduces principles of toxicology and methods used to study aquatic toxicology, as well as applications of knowledge gained from aquatic toxicology studies.

**Prerequisite:** [(BSC 2005 and BSC 2005L) or (BSC 2010 and BSC 2010L)] and [(CHM 2045 and CHM 2045L) or (CHM 2046 and CHM 2046L)].**SWS 7979 Advanced Research 1-12 Credits****Grading Scheme:** S/U

Research for doctoral students before admission to candidacy. Designed for students with a master's degree in the field of study or for students who have been accepted for a doctoral program. Not appropriate for students who have been admitted to candidacy. Also offered as a distance education course.

**SWS 7980 Research for Doctoral Dissertation 1-15 Credits****Grading Scheme:** S/U

Also offered as a distance education course.