Environmental Science and Engineering PhD Program

**ESE 6107 Graduate Seminar (1-0)**
Presentation and discussion of topics in environmental science and engineering by graduate students, faculty, and visitors.

**ESE 6301 Environmental Law and Policy (3-0)**
Focus on the formulation, implementation, enforcement, and evaluation of environmental policies. A review of the legal and administrative environmental systems of both the United States and Mexico will be included. Questions of environmental risk and equity will be addressed.

**ESE 6303 Transport, Fate, and Treatment of Contaminants in the Environment (3-0)**

**ESE 6306 Principles of Experimental & Engineering Design (3-0)**
Students with different backgrounds examine experimental and engineering design principles with special application to the solution of energy and environmental problems. Student teams will be formed to define an interdisciplinary environmental problem of regional interest.

**ESE 6307 Interdisciplinary Environmental and Energy Problem-Solving (3-0)**
Students with different backgrounds will work in teams to examine interdisciplinary energy and environmental issues specific to the Far West Texas Border region and prepare team reports with recommendations, which consider scientific, political, economic and social aspects.

**ESE 6312 Energy Policy Analysis and Economic Modeling (3-0)**
The role of energy issues and policy options in economic and social development. Integrated national energy planning: conceptual framework, subsectoral analysis, sectoral integration, and implementation. Economic tools for energy systems.

**ESE 6314 Energy Systems Engineering (3-0)**
System level analysis of technological, environmental aspects of energy conversion and Utilization engineering. Discussion of latest technologies within each energy systems area, the opportunities and challenges of current and emerging energy technologies, and the energy vision for sustainable future.

**ESE 6316 Sustainable Energy (3-0)**
Concepts of sustainable development. Economic development and economic growth. Discussion of energy resources, extraction, conversion, and end use with an emphasis in meeting regional and global energy needs. Discussion of renewable energy technologies (solar, wind, biomass, and geothermal) in the context of political, social, economic, and environmental goals.

**ESE 6318 Energy Use and Climate Change (3-0)**

**ESE 6320 Advanced Topics in Energy Engineering (3-0)**
Contemporary advanced energy topics, such as secure and reliable energy supplies, clean power generation, hydrogen economy, energy efficiency, and critical infrastructure assurance.
ESE 6396 Doctoral Research (3-0)
Directed research on topics in environmental science and engineering related to the dissertation or conducted as component of the student's overall graduate program.

ESE 6398 Dissertation I (3-0)
Taken when preparation of the dissertation is begun. One enrollment required. Prerequisites: Admission to the ESE program and passage of the comprehensive examination.

ESE 6399 Dissertation II (3-0)
Taken continuously during preparation of the dissertation. Prerequisites: ESE 6398.

ESE 6402 Environmental Chemistry (3-0)
Review of classification and properties of chemical materials of environmental interest. Study of chemical principles pertaining to acidity, basicity, redox properties, solubility, partitioning and transport in the environment. Chemical reactions in aqueous, soil/sediment and atmospheric phases. Environmental analytical techniques. The laboratory emphasizes analytical protocols utilized in environmental laboratories.

ESE 6404 Environmental Biology (3-0)
An examination of the theoretical and experimental aspects of the relationship between biological and physical environments at the individual, population, community, and ecosystem levels. This includes microbial ecology and biogeochemical cycling of nutrients.

ESE 6405 Environmental Geoscience (3-0)
Application of earth science principles and processes to environmental issues. Topics will include fundamentals of physical geology and their applications to geohazards, engineering geology, surface and ground water, erosion, and environmental geochemistry. Atmospheric and climate topics will include global change issues. Labs will feature hands-on experience with earth materials, maps, analytical techniques, and environmental problem solving.