The Courses (ENCE)

7317. Environmental Organic Chemistry. This course will examine the fundamental processes that govern transformations of organic chemicals in natural and engineering systems. The course will be divided into three parts: (1) organic chemistry overview, (2) physical transformations of organic compounds and (3) organic chemical reactions in the environment. The organic chemistry overview will provide knowledge regarding basic properties of organic compounds such as nomenclature and structures. Physical transformation of organic compounds will provide an understanding in processes (such as sorption and volatilization) that control the distribution of organic chemicals between different phases (such as air, water, and soil). Environmentally-mediated reactions (such as hydrolysis and photolysis) that control the breakdown of organic chemicals will be the focus of chemical reactions.

7327. Optimization and Reliability for Infrastructure and Environmental Systems. This course introduces the concepts of engineering systems optimization, reliability and risk assessment, and applies them to civil and environmental engineering systems. Topics include an introduction to engineering systems definition, classical methods of optimization, linear programming, integer programming, dynamic programming, nonlinear optimization, and reliability and risk concepts in engineering planning and design. Engineering applications will include transportation networks, fleet assignment, supply chain management, environmental engineering systems, fluid transport and water reservoir operation and structural engineering systems. Advanced topics will include an introduction to chance-constrained optimization and basic decomposition approaches and their application to real-world problems. *Prerequisite:* Graduate standing, or permission of instructor.

7328. Introduction to Sustainability. This course introduces the student to basic concepts in sustainability. Drawing on a range of sources, including selected books and readings, the course explores the idea of total connectedness of resource use globally, with particular emphasis on the situation in north Texas. The course will address the issues of air quality and energy supply, sustainable construction, water use, transit and other related areas of resource use, and waste generation. The inclusion of multiple guest lecturers will provide a series of multiple viewpoints and areas of specific expertise. *Prerequisite:* Graduate standing, or permission of instructor.

7329. Methods and Technology for Sustainability. This course covers technologies and methods using in sustainable design and analysis. Areas covered include the scientific understanding of alternative energy systems, water reuse and supply, and state-of-the-art materials created for sustainability. Also discussed are methods for assessing sustainability, including life cycle assessment and the development of sustainable indicators. *Prerequisite:* Graduate standing, or permission of instructor.

7330. Design for Sustainability. This course introduces the student to the issues involved in creating a sustainable built environment. The course will address issues of resource use at the regional and project specific level. Specific techniques for designing and constructing sustainable buildings will be addressed. Systems of measurement for sustainable properties will be discussed on a comparative level, and the USGBC's LEED system will be specifically addressed. *Prerequisite:* Graduate standing, or permission of instructor.

7331. Air Pollution Management and Engineering. This course covers the science, engineering, public health, and economic aspects of air quality. Students will develop in-depth understanding and broad knowledge of the sources and properties of air pollutants, air quality management, transport of pollutants in the environment, regulations of air quality, and the operation and design of air pollution control systems. In addition, the class will

review the current status of science, policy, and regulations on several selected topics such as urban smog, regional haze, greenhouse gas and global climate change, stratospheric ozone depletion, and mercury emissions and control. *Prerequisites:* CHEM 1304 General Chemistry, MATH 1337 Calculus with Analytic Geometry I or equivalent, and PHYS 1303 Introductory Mechanics or equivalent.

7335. Aerosol Mechanics. Fundamental and advanced principles of airborne particles, including their physical properties, aerodynamic behavior, and their collection, measurement, and analysis. The course emphasizes the origins and properties of atmospheric aerosols and the design of air pollution equipment. *Prerequisites:* ENCE 3431 Fundamentals of Air Quality I, or ENCE 2342 Fluid Mechanics or equivalent.