

M.A. with a Major in Sustainability and Development

Candidates must satisfy a total of 30 credit hours (CH) with a minimum G.P.A. of 3.000 on a 4.000 scale.

All students must complete 15 credit hours (CH) of the core curriculum.

CEE 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 guest lecturers will provide a series of multiple viewpoints and areas of specific expertise.

Prerequisite: Graduate standing or permission of instructor.

CEE 7329 Methods and Technology for Sustainability

This course covers technologies and methods used 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.

CEE 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.

CEE 8326 Sustainable Development

A land development constructed for sustainability must work within multiple sets of existing regulations, and then go beyond business as usual to address issues not commonly considered. This course will lead students through the combination of issues which lead toward sustainability within a project, including financial projections, legal issues and municipal regulations. The concept of a truly sustainable development will be examined and challenged.

CEE 8327 Policy Impacts on Sustainability

The idea of a truly sustainable society is either encouraged or negated by its policies. This course will examine policies at multiple levels to assess their impact on our society's ability to become a sustainable one. Guest lecturers from the city, regional and state level will be included, as well as examinations of policies at the national level from around the world.

All students must complete a depth component of 9 credit hours (CH) in one concentration area.

Environmental Resources

CEE 7313 Environmental Chemistry and Biology

Chemical and biochemical processes; controlling fate and transport of hazardous materials with emphasis on chemical equilibria; chemical thermodynamics; acid-base equilibria; precipitation and dissolution; oxidation-reduction processes; environmental transformations of organic materials; introductory taxonomy; microbial growth and kinetics; energy transfer; microbial ecosystems.

CEE 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, fate and 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.

CEE 7334 Fate and Transport of Contaminants

Development and application of fate and transport models for hazardous substances with focus on water-sediment, water-soil, and water-air interfaces; material balance principle; mass transport and transformation processes; modeling of lakes and reservoirs; stream modeling; general flow case; groundwater models; multiphase and integrated modeling approaches; case studies.

CEE 7353 Environmental Epidemiology

Introduction to the science of epidemiology. Design and conduct of studies examining health effects of environmental exposures. Strengths and limitations of research strategies and interpretation of study results. Areas of interest include air and water pollution, lead and biological marker outcomes.

CEE 8328 Defining the Future of Global Sustainability

To discuss the long-term of global sustainability, what that term includes must be defined. This course will examine the national and international drivers of change, both current and trends towards the future that can be identified.

CEE 8329 Global Resource Use

The globalization of the world's economy and politics has resulted in a globalization of resource use. Materials and services are routinely sourced from any spot in the world that can be competitive. The results of this situation are different in different hemispheres. This course will examine the global distribution of energy use and energy production, and the resulting impact on air quality. Also considers goods production and transit, especially in the area of food production and availability. Other considerations will be ocean use and impact, the results of global climate change, and the availability of housing for all.

Urban Development and Design

CEE 7363 Architectural and Structural Engineering

The basic principles of structural analysis and mechanics of deformable bodies are introduced. Structural systems and principles are presented with an emphasis on architectural design. Students will be provided with a conceptual introduction to structures emphasizing the integration of structural and architectural design. Case studies of buildings are presented and discussed.

CEE 7370 Facility Planning

The overall planning process for construction projects is presented. The three divisions of planning: program planning, project planning, and activity planning are presented in an integrated manner. Included are different modeling approaches for the planning process.

CEE 7378 Transportation Planning and Traffic Engineering

This course is concerned mainly with the analysis and modeling of urban transportation systems. The course consists of three main parts: 1) an overview of main definitions and terminologies involved in the planning and modeling of urban transportation systems, 2) the concept of urban transportation planning systems along with an overview of various models used in travel demand forecasting, and 3) the principles of traffic operations, analysis and control. *Prerequisites:* Basic principles of probability and statistics.

CEE 7384 Energy Management for Buildings

Procedures to select energy saving options for buildings are examined with emphasis on practical aspects of the subjects. Space planning, architectural considerations, cost and environmental impact of the mechanical and electrical systems are considered along with optimizing the life cycle cost of the proposed alternative. Software for life cycle cost and energy analysis is used to calculate energy consumption and compare energy features of proposed, audit-determined feasible changes to a building.

CEE 8325 The Sustainable Urban Plan

This course introduces the student to basic concepts in sustainable urban design and planning. Utilizing a group exercise, students are introduced to the factors shaping urban developments: financial projections, design concepts, marketability, public perception and municipal incentives and requirements. Additional information will be provided by lectures, discussions of the text, and guest speakers from the real estate community. The effects of urban design theory meeting economic reality, and the resulting options for sustainability will be thoroughly examined.

CEE 8330 Engineering Sustainability for the Future

Solving the global challenges of the future will require innovative engineering of problems we understand now, and those that we have not yet faced. This course will examine the current status of cutting edge technologies and analyze what issues will need to be addressed for the future survival of the planet.

All students must complete three credit hours (CH) of breadth courses. This may be satisfied by taking one course from another concentration. Students will receive depth in one track, while building breadth in the overall field by taking an advanced course in another. Three credit hours (CH) of capstone experience is required. This may be satisfied by any one of the following.

CEE 7391 Special Projects

Intensive study of a particular subject or design project, not available in regular course offerings, under the supervision of a faculty member approved by the department chair.

CEE 7(0,1,2,3,6)96 Master's Thesis

Variable credit, but no more than six term hours in a single term, and not more than four in a summer term. Registration in several sections may be needed to obtain the desired number of thesis hours. For example, four term hours of thesis would require enrollment in CEE 7196 and CEE 7396.