

# MASD

## MA in Sustainability and Development

a specialty in global sustainable design

*Candidates must satisfy a total of 30 credit hours (CH) with a minimum G.P.A. of 3.00 on a 4.00 scale. All students must complete 9 credit hours (CH) of the core curriculum.*

### **CEE 7306 Sustainable Urban Development & Design**

The classroom is the research base for an actual sustainable development & design project. The work will build on an immersion into the primary historical texts of sustainable urban development with readings covering the range of issues central to sustainable development: ecological, economic and social. Practical workshop lab exercises will introduce a number of the tools developers of sustainable projects need to draw upon, from research and data analysis, to GIS mapping, and financial brackets, which will be tested in the project-based portion of the course.

### **CEE 7330 Design for Sustainable Buildings & Infrastructure**

This course covers basic methods of sustainable building and environmental design to assure minimal and efficient resource & energy use. Students will undertake a design project, and work to integrate green strategies into their proposal. The course covers technical methods for assessing predictive resource use, including energy modeling, water-balance calculations, daylight modeling and energy generation estimations. Emphasis is placed on passive, non-mechanical building systems. Defining occupant comfort as a balance of multiple factors is addressed, as well as methods for effective use of water management, and land use. Sustainable infrastructure will be addressed, including integrated storm water management, water quality and runoff management, and passive water systems. The USGBC's LEED system will be specifically addressed.

EITHER

### **CEE 7307 Infrastructure Design for the Developing World**

Engineering design in the developed world takes for granted the availability of several key resources, namely construction material, water and electricity. This class will examine engineering design in the absence of these resources. The course will focus on the development of shelter and sanitation in an efficient manner. Understanding the total energy cycle of a structure will be emphasized, as well as multiple alternative energy solutions. Additional material on topics such as developing solutions for extreme low cost, high population densities and ecological sustainability will also be covered. Specifically, water and soil environmental contamination and sustainable management will be emphasized. The course will look at urban and rural settings. Further, the course will integrate with other coursework in development leadership on certain topics such as natural resource management. This course involves a heavy lab component. Students will work on interdisciplinary teams to assess and re-design projects related to, for example, built structures, energy systems and water systems.

OR

### **CEE 7309 Global Resource Assessment & Management**

The globalization of the world's economy and politics has resulted in a globalization of resource use, in both materials and service terms. This course will provide an understanding of how the management of global resources have an inter-related impact on the resilience of our environment and civilization, and explore ways to assess resource use in global development projects. Students will examine global energy distribution and production, and its impact on air quality; goods production and transit, food availability; ocean use and impact, climate change, and global housing. Alongside the lectures, a series of practical workshop lab exercises will introduce hands-on tools for global resource management, including food security indicators, environmental justice, risk management, and metrics for sustainable policy assessment.

*Three credit hours (CH) of capstone experience is required.*

### **CEE 7128/7228 MASD Capstone 1A and 1B**

Intensive study of a particular subject or design project, not available in regular course offerings, under the supervision of a faculty mentor approved by the department. The study must include a research and a project based element.

Specialty Electives in Sustainable Global Design (at least 6 credits):

### **CEE 7324 GIS & Mapping**

This course will introduce the basic structures and tools of GIS software covering geospatial concepts, basic map design, geodatabases, importing spatial and attribute data, geocoding, spatial data processing, and simple spatial analysis. Focusing on ArcGIS Pro, the course will also introduce ArcMap, Q-GIS, and AGOL. Through a Dallas project-based focus, the study of GIS becomes a tool for interdisciplinary research, precipitating creative thinking in design and research. In collaboration with local stakeholders, we will model of tangible spatial systems to uncover sustainable urban systems: infrastructural, ecological, political, and social, developing the use of GIS as a support system for innovation and community based practice. Students will develop basic GIS skills, and engage in participatory research through spatial analysis.

### **CEE 7326 Sustainable Transportation**

Covers planning and operations management of sustainable transportation systems with a focus on energy efficiency. Provides an integrated overview of main concepts and issues related to developing sustainable transportation systems for urban areas, freight transportation, and aviation. Also, advanced topics related to vehicle technologies, alternative energy, and smart cities. Presents findings from national and international case studies.

### **CEE 7329 Methods and Technology for Sustainability**

This course covers technologies and methods used in sustainable design and analysis. Areas covered include methods for assessing sustainability; ENVISION Rating System for Sustainable Infrastructure, technologies for resource application, technologies for green infrastructure and natural systems, water reuse and supply, and sustainable return on investment analysis. Also discussed are life cycle assessment and other sustainability indicators. The course provides a quantitative and qualitative understanding of the technologies which underlay sustainable practices and teaches students to use tools which measure and assess sustainability and to engage in the site based sustainable design of a local infrastructure system project.

### **CEE 8325 The Sustainable Urban Plan**

Focusing on the strategic role of an urban plan in the sustainable environment, this course contrasts the inventive and critical aspects of creating and developing a sustainable urban plan, exploiting the potentials and limits given by the interaction of government, finance, landowners and neighborhoods, local stakeholders, and the combined planning tools of code and urban design. Two project-based exercises introduce contrasting limits on sustainable urbanism. The UrbanPlan project, administered through local working professionals from the Dallas chapter of the Urban Land Institute (ULI) teaches development role conflict through a team based exercise with a computer modeled market simulation of financial returns, absorption rates of new build, and affordable housing, modeled over a 5 year period. The second exercise introduces site planning & design processes through an individual site design, documentation & policy proposal. Lectures and readings will support design exercises and workshops, resulting in project-based proposals developed for specific DFW developers/ planners.

### **CEE 7326 Sustainable Transportation**

### **CEE 7356 Civil Infrastructure Systems**

### **CEE 8328 Defining the Future of Global Sustainability**

Sustainable design is not only a participatory and collective practice, but emerges from a complex interaction of physical, social and political systems, integrated through planning, policy and spatial site-design processes. This course will study key models for contemporary sustainable development applied to specific sites in the Global South. Through hands-on design-based exploration, students will develop their capacity as interdisciplinary practitioners. Students will analyze, document, visualize and design strategic site development proposals, gaining interdisciplinary creative confidence. Proposals will be assessed through the critical framework of resource limits and the challenges of inequality, environmental degradation, and population growth.

### **CEE 8327 Policy Impacts on Sustainability**

### **CEE 7327 Optimization & Reliability for Infrastructure & Environmental Systems**

### **DSIN 7303 Human Centered Design**

Specialty Elective in Sustainable Management (at least 6 credits):

**CEE 7302 Leadership in the Development Sector**

This international based course examines issues, strategies, and techniques related to leadership and management of third-sector organizations. Designed to provide future global development professionals with an overview of a range of concerns and practices while honing their analytic skills, this course employs a heavy applied field component through an internship with local governmental ministries and NGOs.

**CEE 7312 Risk Assessment & Health Effects**

**CEE 7303 Leadership Innovation Hub**

**CEE 7327 Optimization & Reliability for Infrastructure & Environmental Systems**

**CEE 8327 Policy Impacts on Sustainability**

**CEE 8330 Engineering Sustainability for the Future**

**CEE 7323 Project Management**

**CEE 7380 Management Of Ind. & Mission Critical Facilities**

**EMIS 8361 Engineering Economics and Decision Analysis**

Additional Electives (up to 12 credits including any listed above or other approved):

**CEE 7314 Environmental Regulations And Compliance**

**CEE 7325 Disaster Management**

**CEE 7353 Environmental Epidemiology**

**CEE 7331 Air Pollution Management And Engineering**

**CEE 7332 Groundwater Hydrology And Contamination**

**CEE 7333 Laboratory Methods in Environmental Engineering**

**CEE 7351 Introduction To Environmental Toxicology**

**CEE 7365 Introduction To Construction Management**

**CEE 7378 Transportation Planning and Traffic Engineering**

**CEE 7313 Environmental Chemistry**

**CEE 7381 Site Selection of. Ind. & Mission Critical Facilities**

**EMIS 7365 Project Management**

**DSIN 7301 The Context & Impact of Design**

**ANTH 6345 Creating Global and Public Health Impact**

**ANTH 6348 Toxic Topics: Anthropology, Environment, and Health**