Civil and Environmental Engineering

Courses

CIVE 5082. Internship. 1-3 Credit Hours (Lecture: 0 Hours, Lab: 0 Hours).
Preapproved and supervised work experience consisting of a minimum of 240 hours (6 weeks) in a Civil and/or Environmental Engineering related position with public or private industries. Each credit hour of coursework is equivalent to 80 hours (2 weeks) of work experience. May be repeated for a total of 3 hours credit. Prerequisites: Graduate standing with approval of Program Coordinator.

CIVE 5088. Master's Thesis. 1-6 Credit Hours (Lecture: 0 Hours, Lab: 0 Hours).
Required each semester in which a student is working and receiving direction on a master's thesis. Minimum two semesters (6 hours) required for master's thesis option. Prerequisite: department head approval.

CIVE 5098. Research Project. 1-3 Credit Hours (Lecture: 0 Hours, Lab: 0 Hours).
Graduate students conduct original research on a variety of topics in the Civil and/or Environmental Engineering. Prerequisites: Graduate standing with approval of Program Coordinator.

CIVE 5301. Advanced Structural Analysis. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
The course covers advanced techniques on analysis of statically determinate and indeterminate structures using matrix method of analysis that form the basis of structural analysis software. Finite element analysis is introduced for shell elements. The emphasis of this course is to learn analytical techniques to analyze complex structural systems and verify the results using software tools. Prerequisite: Mastery in statics or undergraduate degree in civil engineering related field or department head approval.

CIVE 5304. Advanced Steel and Timber Design. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
The course covers topics on principles of the design of steel and wood structures using ASD/LRFD methods. Analysis and design of structural elements including steel beams, steel columns, and connections. Covers topics on types of wood, properties of wood, design criteria using structural lumber, glue laminated lumber and structural panels. Design bending and compression wood members, wood trusses and shear diaphragms. Emphasis is given to design steel and timber structures using building standards such as Steel Construction Manual, and National Design Specifications (NDS) for wood. Prerequisite: Mastery in solid mechanics or undergraduate degree in civil engineering related field or department head approval.

CIVE 5305. Advanced Reinforced Concrete Design. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Theory and practice of reinforced concrete design. Theory and design of high strength concrete mixtures. Design of reinforced concrete beams, slabs and columns using the ultimate strength design code of the American Concrete Institute. Prerequisite: Mastery in solid mechanics or undergraduate degree in civil engineering related field or department head approval.

CIVE 5309. Design of Buried and Earth Structures. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
The course covers fundamental concepts for the analysis and design of most commonly used earth retaining structures, including reinforced concrete cantilever walls, sheet pile walls, mechanically stabilized earth (MSE) walls, geosynthetic-reinforced earth structures, and engineered earth slopes. Prerequisite: Mastery in soil mechanics or undergraduate degree in civil/environmental engineering related field or department head approval.

CIVE 5310. Water Resources Engineering. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Fundamentals of hydraulics applicable to open channel flow, natural streams and waterways; irrigation flow characteristics; hydrologic analysis; fluid measurement methods; introduction to hydraulic models including HEC-RAS; and economic aspects of water resources. Prerequisites: Mastery in fluid mechanics or or undergraduate degree in civil/environmental engineering related field or department head approval.

CIVE 5311. Soil Improvement & Remediation. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Engineered ground improvement; slurry trenches, dewatering systems; grouting; deep dynamic compaction, vibro compaction; stone columns; wick and vertical sand drains; deep mixing; composite foundation. Emphasizes basic principles and design methodology. Prerequisite: Mastery in soil mechanics or undergraduate degree in civil/environmental engineering related field or department head approval.

CIVE 5315. Bridge Design. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Course topics include general considerations for design and load capacity evaluation of highway bridges. Introduction to load and resistance factor design (LRFD) philosophy in designing bridges. Covers topics on AASHTO bridge loads, load distribution, design of bridge deck, analysis & design of prestressed concrete girders, design of composite steel bridges, design of abutments and substructures. Prerequisite: Mastery in solid mechanics or undergraduate degree in civil engineering related field or department head approval.

CIVE 5318. Pavement Material & Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Principles and theoretical concepts of rigid and flexible pavements for highways and airfields; effects of traffic loads, natural forces, and material quality; Mechanistic-Empirical Design Guideline (MEPDG), current design practices (including bituminous mixture design and pavement foundation design), test methods of pavement materials; and pavement management systems. Prerequisites: Mastery in intermediate level probability & statistics or undergraduate degree in civil/environmental engineering related field or department head approval.

CIVE 5319. Unit Operations. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Physical operations in water and wastewater treatment are covered in this course. These include the design of lift stations and gravity sewers, screens, sedimentation tanks, clarifiers and holding basins. Prerequisites: Mastery in fluid mechanics or undergraduate degree in civil/environmental engineering related field or department head approval.

CIVE 5320. Chemical & Biological Processes in Water Treatment. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
This course examines the chemical and biological phenomena and processes that are related to water and wastewater treatment. Selection and design of the various secondary and tertiary treatment mechanisms are covered. Prerequisites: Mastery in intermediate level organic chemistry & environmental biotechnology; or undergraduate degree in environmental engineering related field; or department head approval.

CIVE 5322. Surface Water Hydrology. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Advanced study of the hydrologic cycle, including rainfall-runoff mechanisms, hydrographs, reservoir and channel routing and the application of modeling software in watershed analysis. Prerequisites: Mastery in fluid mechanics or undergraduate degree in civil/environmental engineering related field or department head approval.

CIVE 5323. Ground Water Hydrology. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Coverage of groundwater flow, well hydraulics, the exploration and management of groundwater resources, modeling of subsurface flow with software and the design of well fields. Prerequisites: Mastery in fluid mechanics or undergraduate degree in civil/environmental engineering related field or department head approval.

CIVE 5324. Surface water quality modeling. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Coverage of fate and transport of contaminants in surface water. The course includes modeling of occurrence and transport of dissolved oxygen, chemicals and other substances in surface water as well as the interphase movement of chemicals between water and sediments. Prerequisites: Mastery in fluid mechanics or undergraduate degree in civil/environmental engineering related field or department head approval.

CIVE 5325. Advanced Foundation Engineering. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Design of foundations with emphasis on reinforced concrete, footings, caissons, piles, retaining walls, and mat foundations. Effect of bearing pressure on foundations. Prerequisite: Mastery in soil mechanics or undergraduate degree in civil/environmental engineering related field or department head approval.

CIVE 5351. Environmental Biology and Bioremediation. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
This course presents information on the role of microorganisms in the design of treatment processes and explores the factors affecting biologically-mediated treatment of wastes in the surface and subsurface environments. Prerequisites: undergraduate degree in engineering related field or department head approval.

CIVE 5352. Green Engineering. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
This course covers the design and use of non-traditional, greener alternatives in the treatment of wastes in various environmental media as well as the theoretical, practical and regulatory implications of such design. Prerequisites: undergraduate degree in engineering related field or department head approval.

CIVE 5353. Environmental Case Studies. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Through case studies rooted in environmental issues, this course will offer a cross-disciplinary introduction to environmental studies. Environmental inquiry on political ecology, earth science, energy, economics, eco-literature, public health, ecological design, sustainability, policy, and environmental justice. Basic concepts—such as thermodynamics, biodiversity, cost-benefit analysis, contamination, governance, the Anthropocene, and the commons—are variously defined and employed within specific explorations of environmental challenges in the modern world. Prerequisites: undergraduate degree in engineering related field or department head approval.

CIVE 5360. Highway Planning & Design. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Basic concepts in highway planning and design. It includes highway planning process, rigid pavement design, flexible pavement design, and box culvert design. Students will apply the knowledge of estimating and scheduling to heavy construction projects such as highways, bridges, approaches, pipelines, or related structures. Prerequisites: Mastery in intermediate level probability & statistics or undergraduate degree in civil/environmental engineering related field or department head approval.