CIV—CIVIL AND ENVIRONMENTAL ENGINEERING

COLLEGE OF ENGINEERING

CIV U221 Statics and Strength of Materials  4 SH
Introduces solid mechanics including properties of areas and volumes (centroidal axes, moments of inertia, and so on), equilibrium of particles and rigid bodies in two and three dimensions, analysis of internal forces in trusses and simple frames, shear and moment diagrams in beams, computation of stresses induced by moment, shear and torque, and mechanical properties of materials. Coreq. CIV U222. Prereq. PHY U151, MTH U242; MTH U341 should be taken concurrently.

CIV U222 Recitation for CIV U221  0 SH
Accompanies CIV U221. Covers problem solving and topics related to the course. Coreq. CIV U221.

CIV U260 Civil Engineering Materials  3 SH
Introduces the physical, mechanical, and chemical properties of materials of importance to civil engineers. Offers an overview of the ways in which these properties affect the material selection process, material behavior, and the design process. Coreq. CIV U261 and CIV U264. Prereq. CHM U151, MTH U242, and PHY U151.

CIV U264 Recitation for CIV U260  0 SH
Provides problem-solving sessions to support CIV U260. Coreq. CIV U260 and CIV U264.

CIV U261 Materials and Measurements Lab  2 SH
Involves the use of standard lab test methods and equipment to determine properties of materials common to civil engineering practice. Also introduces students to land surveying, site layout, and the measurement of distance, elevation, and direction. Coreq. CIV U260 and CIV U264.

CIV U320 Structural Analysis I  4 SH
Covers shear stresses in beams, combined stress analysis (bars with axial load plus shear and bending), introduction to buckling, influence lines (application to statically determinate systems), computation of deflections (statically determinate systems), and analysis of indeterminate structures using the flexibility method and moment distribution. Coreq. CIV U321. Prereq. CIV U221.

CIV U321 Recitation for CIV U320  0 SH
Accompanies CIV U320. Covers problem solving and topics related to the course. Coreq. CIV U320.

CIV U324 Reinforced Concrete Design  4 SH

CIV U331 Fluid Mechanics  4 SH
Introduces the principles of fluid mechanics and the applications in basic hydraulic engineering systems. Topics include properties of fluids; pressure and force on surfaces and submerged bodies; continuity, momentum, and energy conservation principles; dimensional analysis and hydraulic similitude; flow in closed conduits; steady flow in pipe networks; unsteady flow in pipes; flow in open channels; hydraulic machines; and hydraulic structures. The laboratory component includes demonstrations and experiments to show the applicability of fluid mechanics and hydraulics principles. Prereq. CIV U221.

CIV U334 Environmental Engineering I  4 SH
Focuses on protection and management of the environment. Topics include assessment of environmental quality; introduction to water and wastewater treatment technologies; air pollution control; and solid waste management. Prereq. CHM U151.

CIV U340 Soil Mechanics  4 SH
Studies soil classification, soil-water phase relations, water in soil, seepage, consolidation theory, and strength properties of soils. Coreq. CIV U341. Prereq. CIV U221 or CIV U260.

CIV U341 Lab for CIV U340  1 SH
Accompanies CIV U340. Introduces standard laboratory procedures for characterizing the physical, hydraulic, and mechanical properties of soils as well as data reduction and analysis methods for various test methods. Laboratory methods and determinations include moisture content, Atterberg limits, permeability, compaction, consolidation, and direct shear. Includes the use of computer-based data acquisition systems and measurement transducers. Coreq. CIV U340.

CIV U425 Steel Design  4 SH
Concentrates on design of steel members subject to tension, compression, bending, and combinations of loading, and design of connections, braced frames, and rigid frames. Design is based on the latest load resistance factor specifications of the American Institute for Steel Construction code. The theoretical basis of code formulas is also emphasized.
CIV U464 Probability and Engineering Economy 4 SH
for Civil Engineering
Introduces engineering probability and statistics, as well as engineering economic analysis for project or design evaluation. Case studies are used to illustrate the integration of these areas in the design/system analysis process. Topics in engineering probability and statistics include descriptive statistics, expected value of random variables, and hypotheses testing. Statistical process control and sampling methods are introduced. Reliability methods for the analysis and improvement of system/design performance are discussed. Also covers fundamental concepts of time value of money and economic evaluation of alternatives, including the effects of depreciation and taxes. Prereq. MTH U341.

CIV U500 Professional Issues in Engineering 1 SH
Provides students with an opportunity to reflect on both academic and co-op experiences in the context of planning for the senior year and beyond. Issues include professional and ethical issues, resolving ethical conflicts, awareness of engineers as professionals in a diverse world, strengthening decision-making skills, career portfolio, and lifelong learning needs, goals, and strategies. Students reflect upon issues of diversity from their experience in the University and in their cooperative education placements. Explores the role of different work and learning styles and diverse personal characteristics on the workplace and the classroom. Professional issues include impact of the cultural context, both in the United States and around the world, on the client, government relations, and workplace. Prereq. Junior or senior standing.

CIV U522 Structural Analysis 2 4 SH

CIV U523 Recitation for CIV U522 0 SH
Accompanies CIV U522. Includes demonstrations of classroom principles, computational exercises to familiarize students with structural engineering software, and experiments with which to compare theoretical predictions with observed structural behavior. Coreq. CIV U522.

CIV U530 Solid and Hazardous Waste Management 4 SH
Introduces various aspects of integrated solid waste management systems and hazardous waste management practices. Includes both engineering principles as well as socioeconomic and regulatory issues surrounding solid and hazardous waste management. Provides sufficient background to enable the student to understand, evaluate, and critique the design of and the decisions in various waste management alternatives. Prereq. Senior standing.

CIV U532 Environmental Protection and Management 4 SH
Examines public and private environmental quality management and resource protection systems including consideration of regulatory issues, risk management approaches, local vs. regional impacts, long-term sustainability, and economic/financial issues. Covers selected current topics and a broad range of specific environmental issues. Prereq. Senior standing.

CIV U534 Environmental Engineering 2 3 SH
Continues CIV U334. Concentrates on unit operations, unit processes, and related fundamental design of physical, chemical, and biological water and wastewater treatment systems, using both lectures and laboratory instruction. Topics include aeration systems, activated sludge, fixed-film biological treatment, gas transfer, reaction kinetics, reactor modeling, coagulation, flocculation, sedimentation, filtration, and subsurface disposal system design. Coreq. CIV U535. Prereq. CIV U331 and CIV U334.

CIV U535 Lab for CIV U534 1 SH
Accompanies CIV U534. Covers topics from the course through various experiments. Coreq. CIV U534.

CIV U536 Hydrologic Engineering 4 SH
Introduces principles of engineering hydrology. Covers the hydrologic cycle; rainfall-runoff relationships; hydrologic flood routing; and ground water hydraulics. Applies these concepts to issues such as water supply and storm water management. Includes project component. Prereq. CIV U331.

CIV U542 Foundation Engineering 4 SH
Explores soil-bearing capacity determination, design of shallow foundations and pile foundations, and design of retaining walls and excavation support systems. Prereq. CIV U340.

CIV U545 Geoenvironmental Engineering 4 SH
Introduces the student to various design problems and options for waste containment (including landfill liners, barriers, and cutoff walls); site remediation; and the fundamental considerations behind those designs. Examines definitions and regulations; soil composition, mineralogy, geohydrologic conditions, and contaminant interactions that need to be considered in the design; reactive transport in soils; and hydraulic conductivity measurements in the lab and field. Prereq. Senior standing.

CIV U553 Transport Analysis and Planning 4 SH
Introduces urban transportation planning and transportation engineering. Covers travel demand forecasting for both short term and long term, including simple elasticity models, and the four-step model system of trip generation, trip distribution, modal split, and network assignment. Presents transit service analysis and design, traffic engineering, software tools for transportation planning, airport planning, design basics, and alternatives analysis. Prereq. MTH U241.
CIV U554 Highway Engineering 4 SH
Concentrates on highway design including route selection, geometric design, foundation and pavement design, drainage design, and construction issues. Analyzes highway traffic including traffic flow fundamentals and capacity and level of service analysis for freeways and rural highways. Covers the environmental impact and public review process for highway construction. Includes project component. Prereq. CIV U261.

CIV U556 Traffic Engineering 4 SH
Covers traffic flow theory and measurement, capacity and level of service analysis for intersections, arterials, and highways, intersection design, traffic analysis and design software, and transportation systems management. Prereq. Permission of instructor.

CIV U566 Sustainable Design of Buildings and Urban Transportation Systems: U.S./European Perspectives 4 SH
Covers principles, practice, and policy for sustainable design of buildings and urban transportation systems from U.S. and European perspectives. Topics include resource-efficient site planning; building systems; construction; current issues and practices, including LEED certification; transportation planning; facility design; and policies for promoting walking, bicycling, transit use, and developing sustainable and livable cities. Taught in study-abroad format with site visits showcasing European sustainable design practice. Prereq. Permission of instructor.

CIV U575 Construction Management 3 SH
Surveys the construction industry and tasks that must be addressed by construction management including resource allocation, construction environment, organization, contracts, funding, cash flow, productivity, conceptual and detailed cost estimating, labor relations, network planning and scheduling, construction accounting, and project control. Prereq. Junior or senior standing.

CIV U699 Special Topics in Civil Engineering 4 SH
Covers special topics in civil engineering initiated by the appropriate discipline committee and approved by the department. Prereq. Permission of instructor.

CIV U700 Civil Engineering Research 4 SH
Offers independent work for students in the University Honors Program under the direction of members of the department on a chosen topic. Course content depends on instructor. Prereq. Permission of the department.

CIV U765 Senior Design Project—Environmental 5 SH
Using teams, students design a civil engineering project that primarily involves the environmental subdiscipline. Design teams are advised by a faculty member and engineering practitioners. Lectures cover supplemental technical background specific to the project, as well as cross-disciplinary aspects of project development, value engineering, aesthetics, and constructability. Integrates project design with further development of student communications skills; students present the design to practicing engineers and interested parties such as community groups. Prereq. CIV U536 and ENG U302.

CIV U766 Senior Design Project—Geotechnical 5 SH
Using teams, students design a civil engineering project that primarily involves the geotechnical subdiscipline. Design teams are advised by a faculty member and engineering practitioners. Lectures cover supplemental technical background specific to the project, as well as cross-disciplinary aspects of project development, value engineering, aesthetics, and constructability. Integrates project design with further development of student communications skills; students present the design to practicing engineers and interested parties such as community groups. Prereq. CIV U542 and ENG U302.

CIV U767 Senior Design Project—Structural 5 SH
Using teams, students design a civil engineering project that primarily involves the structural subdiscipline. Design teams are advised by a faculty member and engineering practitioners. Lectures cover supplemental technical background specific to the project, as well as cross-disciplinary aspects of project development, value engineering, aesthetics, and constructability. Integrates project design with further development of student communications skills; students present the design to practicing engineers and interested parties such as community groups. Prereq. CIV U425, CIV U522, and ENG U302.

CIV U768 Senior Design Project—Transportation 5 SH
Using teams, students design a civil engineering project that primarily involves the transportation subdiscipline. Design teams are advised by a faculty member and engineering practitioners. Lectures cover supplemental technical background specific to the project, as well as cross-disciplinary aspects of project development, value engineering, aesthetics, and constructability. Integrates project design with further development of student communications skills; students present the design to practicing engineers and interested parties such as community groups. Prereq. CIV U554, ENG U302, and CIV U553 or CIV U556.
CIV U921 Directed Study 1 SH
CIV U922 Directed Study 2 SH
CIV U923 Directed Study 3 SH
CIV U924 Directed Study 4 SH
Offers independent work under the direction of members of the department on a chosen topic. Course content depends on instructor. **Prereq. Permission of instructor.**

CIV U931 Independent Study 1 SH
CIV U932 Independent Study 2 SH
CIV U933 Independent Study 3 SH
CIV U934 Independent Study 4 SH
Offers theoretical or experimental work under individual faculty supervision. **Prereq. Permission of instructor.**

CIV U970 Junior/Senior Honors Project 1 4 SH
Focuses on in-depth project in which a student conducts research or produces a product related to the student’s major field. Culminating experience in the University Honors Program. Combined with Junior/Senior Project 2 or college-defined equivalent for 8 credit honors project. **Prereq. Honors program participation.**

CIV U971 Junior/Senior Honors Project 2 4 SH
Focuses on second semester of in-depth project in which a student conducts research or produces a product related to the student’s major field. Culminating experience in the University Honors Program. **Prereq. CIV U970 and honors program participation.**