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Civil and Environmental Engineering

The Department of Civil and Environmental Engineering offers a Master of Science (M.S.) degree in Civil Engineering and a Master of Engineering degree (M.E.) in Civil Engineering.

Master of Science Degree in Civil Engineering

Graduate work leading to the Master of Science degree in civil engineering is offered by the Department of Civil and Environmental Engineering. The program provides advanced study in the areas of structural engineering, environmental engineering, geotechnical engineering, and hydraulic and water resources engineering.

Admission

The Department of Civil and Environmental Engineering requires that applicants to the master's program hold a bachelor's degree in civil or environmental engineering (or equivalent), or have completed all undergraduate degree requirements prior to registration, with minimum grade point average (GPA) of 3.0 (A = 4.0) for the last 60 hours of undergraduate work. Students having a GPA between 2.7 and 3.0 will be considered on a case-by-case basis. A student whose undergraduate training is deficient may be required to take additional coursework without graduate credit. All applicants are required to submit GRE scores in support of their applications for admission (minimum scores: 146 Verbal, 147 Quantitative, 3.5 Analytical Writing). The GRE scores must be less than five years old at the time of registration. Minimum requirements for GRE verbal and analytical writing may be waived if the student's TOEFL score is greater than 570 (test center), 230 (computer based) or 82 (Internet based), or IELTS score of 7.0 or higher, and he/she possesses good communication skills.

Students apply on-line at gradschool.siu.edu/apply. A nonrefundable \$65 application fee is required and must be paid by credit card. Applications cannot be processed until the fee is paid.

Requirements

A graduate student in the Department of Civil and Environmental Engineering is required to develop a program of study with a graduate adviser and establish a graduate committee of at least three members before the end of his/her first semester in the graduate program. Each student majoring in civil engineering may, with the approval of the graduate committee, also take graduate level courses in other branches of engineering or in areas of science and business, such as physics, geology, chemistry, mathematics, life science, administrative sciences, or computer science.

A minimum of 30 semester hours of acceptable graduate credit is required, including a minimum of three semester hours of CE 599, Thesis. Of this total, eighteen semester hours must be earned in the Department of Civil and Environmental Engineering. Furthermore, at least 50% of all semester hours must be 500-level and completed at Southern Illinois University Carbondale. Each candidate is also required to pass a comprehensive oral examination covering all of the student's graduate work, including a thesis.

Each student will select a minimum of three engineering graduate faculty members to serve as a graduate committee, subject to the approval of the Chair of the Civil and Environmental Engineering Department. The committee will:

1. approve the student's program of study;

2. approve the student's thesis topic;
3. approve the completed thesis;
4. administer and approve the comprehensive oral examination.

Teaching or research assistantships and fellowships are available for qualified applicants. Additional information about the program, courses, assistantships, and fellowships may be obtained from the College of Engineering or the Department of Civil and Environmental Engineering.

Master of Engineering Degree in Civil Engineering

The Master of Engineering degree (ME) in Civil Engineering is a non-thesis, course only, professional degree designed to provide advanced technical knowledge for professional practice. The program provides advanced study in the areas of structural engineering, environmental engineering, geotechnical engineering, and hydraulic and water resources engineering.

Admission

The Department of Civil and Environmental Engineering requires that applicants to the master's program hold a bachelor's degree in civil or environmental engineering (or equivalent), or have completed all undergraduate degree requirements prior to registration, with minimum grade point average (GPA) of 3.0 (A = 4.0) for the last 60 hours of undergraduate work. Students having a GPA between 2.7 and 3.0 will be considered on a case-by-case basis. The GRE is not required for students applying to the ME degree program.

Students apply on-line at gradschool.siu.edu/apply. A nonrefundable \$65 application fee is required and must be paid by credit card. Applications cannot be processed until the fee is paid.

Requirements

For graduation, the ME student is required to complete 30 semester hours of graduate level courses. Of this, 18 semester hours must be earned in the Civil Engineering department. Furthermore, at least 15 semester hours must be 500-level and completed at Southern Illinois University Carbondale. Students are required to take CE 593, Civil Engineering Project. However, this requirement is waived if a student takes an additional 500-level course, i.e., a total of 18 semester hours of 500-level courses. Students may, with the approval of the Department Chair, also take graduate level courses in other branches of engineering or in areas of science and business, such as physics, geology, chemistry, mathematics, life science, administrative sciences, or computer science.

The ME program permits students to complete an advanced degree in three semesters (12 credit hours Fall, 12 credit hours Spring, six credit hours Summer). This is a non-research degree; teaching or research assistantships are not available for students pursuing this degree, nor would this be a suitable track to pursue a Ph.D.

Civil and Environmental Engineering Courses

CE410 - Hazardous Waste Engineering 410-3 Hazardous Waste Engineering. (Same as CE 510) Analysis of hazardous waste generation, storage, shipping, treatment, and disposal. Source reduction methods. Government regulations. Remedial action. Prerequisite: CE 310.

CE412 - Contaminant Transport 412-3 Contaminant Fate, Transport and Remediation in Groundwater. Mathematics of flow and mass transport in the saturated and vadose zones; retardation and attenuation of dissolved solutes; flow of nonaqueous phase liquids; review of groundwater remediation technologies; review of flow and transport models. Prerequisite: CE 310 and 320, or consent of instructor for non CE majors.

CE413 - Collection Systems Design 413-3 Collection Systems Design. Design of waste water and storm water collection systems including installation of buried pipes. Determination of design loads and flows, system layout and pipe size. Prerequisite: CE 310 and ENGR 370A.

CE416 - Surface Water Quality 416-3 Surface Water Quality Modeling. Quantification of physical, biological, and chemical processes occurring in natural freshwater ecosystems. Mathematical analysis of the effects due to conservative and non-conservative pollutant loadings to lakes and rivers. Detailed study of dissolved oxygen mass balance modeling and eutrophication. Prerequisite: CE 310; concurrent enrollment allowed in CE 418 or GEOL 416 or GEOL 418.

CE418 - Water & Wastewater Treatment 418-3 Water and Wastewater Treatment. A study of the theory and design of water and wastewater treatment systems, including physical, chemical, and biological processes. Topics include sedimentation, biological treatment, hardness removal, filtration, chlorination and residuals management. Prerequisite: CE 310, ENGR 370A and completion of/concurrent enrollment in ENGR 351.

CE419 - Advanced Water Wastewtr Trtmt 419-3 Advanced Water and Wastewater Treatment. Advanced concepts in the analysis and design of water and wastewater treatment plants. Topics include advanced physical, chemical, and biological processes. Emphasis is on the treatment and disposal of sludges, design of facilities, advanced treatment principles, and toxics removal. Prerequisite: CE 418.

CE421 - Foundation Design 421-3 Foundation Design. Application of soil mechanics to the design of the foundations of structures; subsurface exploration; bearing capacity and settlement analysis of shallow foundations; lateral earth pressures and design of retaining walls; capacity and settlement of pile foundations for vertical axial loads. Prerequisite: CE 320.

CE422 - Environmental Geotechnology 422-3 Environmental Geotechnology. Geotechnical aspects of land disposal of solid waste and remediation, solute transport in saturated soils, waste characterization and soil-waste interaction, engineering properties of municipal wastes, construction quality control of liners, slope stability and settlement considerations, use of geosynthetics and geotextiles, cap design, gas generation, migration and management. Prerequisite: CE 310, 320.

CE423 - Geotechnical Engr Prof Practic 423-3 Geotechnical Engineering in Professional Practice. Application of principles of geotechnical engineering in a real-world setting; planning, managing and executing geotechnical projects; developing proposals and geotechnical project reports; interpreting and using recommendations developed by geotechnical engineers; total quality management, professional liability and risk management. Prerequisite: CE 320, 421 or concurrent enrollment or consent of instructor.

CE426 - Seepage and Slope Stability 426-3 Seepage and Slope Stability Analysis. (Same as CE 526) Seepage through soils; numerical and physical modeling of two-dimensional flow; basic mechanism of slope stability analysis; analytical methods in analyzing slopes; slope stabilization. Prerequisite: CE 320.

CE431 - Pavement Design 431-3 Pavement Design. Design of highway pavements including subgrades, subbases, and bases; soil stabilization; stresses in pavements; design of flexible and rigid pavements; cost analysis and pavement selection; and pavement evaluation and rehabilitation. Prerequisite: CE 320 and 330.

CE432 - CADD for Civil Engineers 432-3 Computer Aided Design and Drawing (CADD) for Civil Engineers. A study of civil engineering drawings and their relationship to engineering design in the CADD environment. Emphasis is on the skills associated with developing and understanding technical drawings, including construction plans and related documents, for engineering design. Computer based design and drawing techniques and related software. Includes 3 hours lab per week. Prerequisite: Completion of or concurrent enrollment in CE 263.

CE440 - Static Indeterminate Structure 440-3 Statically Indeterminate Structures. Analysis of trusses, beams, and frames. Approximate methods. Method of consistent deformations. Three-moment theorem. Slope deflection. Moment distribution. Column analogy. Plastic analysis. Matrix methods. Prerequisite: CE 340.

CE441 - Matrix Methods Structr! Analys 441-3 Matrix Methods of Structural Analysis. Flexibility method and stiffness method applied to framed structures. Introduction to finite elements. Prerequisite: CE 340.

CE442 - Structural Steel Design 442-3 Structural Steel Design. An introduction to structural steel design with an emphasis on buildings. Design of structural members and typical welded and bolted connections in accordance with the specifications of the Steel Construction Manual of the American Institute of Steel Construction (AISC). Design project and report required. Prerequisite: CE 340.

CE444 - Reinforced Concrete Design 444-3 Reinforced Concrete Design. Behavior and strength design of reinforced concrete beams, slabs, compression members, and footings. Prerequisite: CE 340.

CE445 - Earthquake Engineering 445-3 Fundamental Theory of Earthquake Engineering. The nature and mechanics of earthquakes. Plate tectonics, types of faulting, recording and measuring ground motion. Analysis of free and forced vibration of a single degree of freedom system. Steady state and transient response. Impulse response function. Dynamic amplification and resonance. Response to ground motion. Response spectrum analysis. Prerequisite: CE 320, 340, or consent of instructor.

CE446 - Prestressed Concrete Design 446-3 Prestressed Concrete Design. Fundamental concepts of analysis and design. Materials. Flexure, shear, and torsions. Deflections. Prestress losses. Composite beams. Indeterminate structures. Slabs. Bridges. Prerequisite: CE 444 or concurrent enrollment or consent of the instructor.

CE447 - Seismic Design of Structures 447-3 Seismic Design of Structures. Basic seismology, earthquake characteristics and effects of earthquakes on structures, vibration and diaphragm theories, seismic provisions of the International Building Code, general structural design and seismic resistant concrete and steel structures. Prerequisite: CE 442 or CE 444, concurrent enrollment or consent of instructor.

CE448 - Structural Design Hwy Bridges 448-3 Structural Design of Highway Bridges. Structural design of highway bridges in accordance with the specifications of the American Association of State Highway and Transportation Officials (AASHTO); superstructure includes concrete decks, steel girders, prestressed and post-tensioned concrete girders; substructure includes abutments, wingwalls, piers, and footings. Prerequisite: CE 442 or 444 or concurrent enrollment, or consent of instructor.

CE471 - Groundwater Hydrology 471-3 Groundwater Hydrology. Analysis of groundwater flow and the transport of pollution by subsurface flow; applications to the design of production wells and remediation of polluted areas; finite difference methods for subsurface analyses. Prerequisite: ENGR 370A or consent of instructor.

CE472 - Open Channel Hydraulics 472-3 Open Channel Hydraulics. Open channel flow, energy and momentum, design of channels, gradually varied flow computations, practical problems, spatially varied flow, rapidly varied flow, unsteady flow, flood routing, method of characteristics. Prerequisite: CE 474 or consent of instructor.

CE473 - Hydrologic Analysis & Design 473-3 Hydrologic Analysis and Design. Hydrological cycle, stream-flow analysis, hydrograph generation, frequency analysis, flood routing, watershed analysis, urban hydrology, flood plain analysis. Application of hydrology to the design of small dams, spillways, drainage systems. Prerequisite: ENGR 370A.

CE474 - Water Resources Engineering 474-3 Water Resources Engineering. Hydrological Cycle, Flow Estimation, Study of pipe flow, network systems, pump selection, open channel flow, uniform flow, critical flow, gradually varied flow, rapidly varied flow, Introduction to HEC-RAS, design of transitions, water surface profiles. Prerequisite: ENGR 370A.

CE486 - Nondestructive Eval Engr Matls 486-3 Nondestructive Evaluation of Engineering Materials. (Same as ME 486) Overview of common nondestructive evaluation (NDE) techniques, such as visual inspection, eddy current, X-ray, and ultrasonics, to measure physical characteristics of and to detect defects in engineering materials. Laboratory experiments include contact ultrasonic, magnetic particle, liquid penetrant, and infrared thermography methods of testing. Prerequisites: CE 320 and CE 330 with grades of C or better.

CE500 - Seminar 500-1 to 4 Seminar. Collective and/or individual study of selected issues and problems relating to various areas of civil engineering. Restricted to graduate standing.

CE510 - Hazardous Waste Engineering 510-3 Hazardous Waste Engineering. (Same as CE 410) Analysis of hazardous waste generation, storage, shipping, treatment, and disposal. Source reduction methods. Government regulations. Remedial action. Design projects and presentation required. Prerequisite: Graduate standing in the program or consent of instructor.

CE511 - Nanotechnology 511-3 Nanotechnology and Subsurface Remediation. Conventional and emerging nanotechnology-based remediation technologies for subsurface environment; review of current soil and groundwater remediation technologies; sediment remediation, nano-synthesis, characterization and nanotechnology-driven remediation technologies and materials. Special approval needed from the instructor.

CE512 - Contaminant Transport 512-3 Contaminant Fate, Transport and Remediation in Groundwater. (Same as CE 412) Mathematics of flow and mass transport in the saturated and vadose zones; retardation and attenuation of dissolved solutes; flow of nonaqueous phase liquids; review of groundwater remediation technologies; review of flow and transport models; modeling project. Special approval needed from the instructor.

CE514 - Environmental Engr Chemistry 514-3 Environmental Engineering Chemistry. Fundamentals as well as frontiers in aquatic chemistry, environmental organic chemistry, and environmental biochemistry. Topics include thermodynamics and kinetics of redox reactions, linear free energy relations, abiotic organic compound transformations, stoichiometry, energetics and kinetics of microbial reactions, biochemical basis of the transformation of key organic and inorganic pollutants in the environment. Prerequisite: CE 418 or consent of instructor.

CE516 - Surface Water Quality 516-3 Surface Water Quality Modeling (Same as CE 416). Quantification of physical, biological, and chemical processes occurring in natural freshwater ecosystems. Mathematical analysis of the effects due to conservative and non-conservative pollutant loadings to lakes and rivers. Detailed study of dissolved oxygen mass balance modeling and eutrophication. Design projects and presentation required. Restricted to graduate standing in the program or consent of instructor.

CE517 - Industrial Waste Trtmt 517-3 Industrial Waste Treatment. Theories and methods of treating industrial wastes. Case studies of major industrial waste problems and their solutions. Prerequisite: CE 418.

CE518 - Adv Biol Treatment Processes 518-3 Advanced Biological Treatment Processes. The biochemical and microbial aspects of converting substrate to bacterial cell mass or products and its use in various phases of industry (both fermentation and wastewater treatment). Design of activated sludge and trickling filter plants from lab data obtained on explicit wastes from both industry and municipalities. Prerequisite: CE 418.

CE519 - Sustainability 519-3 Triple E Sustainability - Environment Energy and Economy. Principles, goals, and practical applications of sustainable development; major theories and issues related to sustainability in the areas of environmental resource use, energy production, and process life cycle analysis; identify and design sustainable approaches on common areas of interest to the society, such as buildings, transportation, food, industry processes, and ecology. Special approval needed from the instructor.

CE520 - Advanced Soil Mechanics 520-3 Advanced Soil Mechanics. Advanced theories in soil mechanics, stress distribution in soils, seepage, consolidation, shear strength, settlement analysis and stability of slopes. Prerequisite: CE 320, ENGR 350A,B, CE 421 or concurrent enrollment.

CE521 - Soil Improvement 521-3 Soil Improvement. Methods of soil stabilization, compaction, dynamic compaction, chemical treatment, compaction piling, stone columns, dewatering, soil reinforcement with stirrups, geomembranes and geogrids, ground freezing, stabilization of industrial wastes. Prerequisite: CE 320, CE 421.

CE522 - Adv Foundation Engineering 522-3 Advanced Foundation Engineering. Case histories of foundation failure, bearing capacity theories, shallow foundations, deep foundations, piles under vertical and horizontal loads, pier foundations, foundations for difficult soil conditions, soil improvement. Prerequisite: CE 421.

CE523 - Soil Dynamics 523-3 Soil Dynamics. Problems in dynamic loading of soils, dynamic soil properties, liquefaction, dynamic earth pressure, foundations for earthquake and other dynamic loads. Prerequisite: CE 320 and CE 421.

CE524 - Advanced Soil Testing 524-3 Advanced Soil Testing. Review of basic laboratory tests on soils, hands-on training for performing advanced laboratory tests on soils such as: triaxial compression, flexible wall permeability, one-dimensional consolidation, and California bearing ratio, understanding ASTM standards, sample preparation, data reduction and interpretation, and development of detailed laboratory test reports. Prerequisite: CE 421, or consent of instructor.

CE525 - Foundations for Dynamic Loads 525-3 Foundations for Dynamic Loads. Dynamic loads due to natural and man-made phenomena, damage to humans and the environment, property loss, analytical models for response analysis of foundation-soil systems for steady state, seismic and impact loads, design criteria, determination of soil properties, stiffness and damping of foundation-soil systems, design of shallow and deep foundations for various types of dynamic loads, computer applications, case histories of damage. Prerequisite: CE 421 and CE 445 or consent of instructor.

CE526 - Seepage and Slope Stability 526-3 Seepage and Slope Stability Analysis. (Same as CE 426) Seepage through soils; numerical and physical modeling of two-dimensional flow; basic mechanism of slope stability analysis; analytical methods in analyzing slopes; slope stabilization. Additional project and presentation required for students taking this course instead of CE 426. Prerequisite: CE 320 or consent of instructor.

CE530 - Adv Materials Testing 530-3 Advances in Materials and Testing. An introduction to advances in concrete technology; High strength concrete; Light-weight concrete; Cement and polymer composites; and Non-destructive testing. Fundamental concepts, manufacture, performance, testing, design methodology and applications. Prerequisite: CE 330 or equivalent or consent of instructor.

CE540 - Structural Dynamics 540-3 Structural Dynamics. Analysis of the dynamic response of multidegree-of-freedom framed structures. Structural idealizations. Matrix formulation. Lagrange's equations. Response calculation by mode-superposition and direct integration methods. Analysis for earthquakes. Prerequisite: CE 340 or consent of instructor.

CE542 - Nonlinear Struct Analysis 542-3 Nonlinear Structural Analysis. Analysis of the nonlinear response of framed structures subjected to static and dynamic loads. Structural idealizations. Response calculation by incremental and iterative techniques. Instability phenomena of snap-through and bifurcation. Post-buckling behavior. Approximate formulations. Detection of instability under dynamic loads. Prerequisite: CE 441 or CE 551 or consent of instructor.

CE544 - Adv Des:Reinforced Concrete 544-3 Advanced Design of Reinforced Concrete. Deep beams, shear friction. Slab, beam, girder systems. Monolithic joints. Retaining walls. Deflections. Length effects on columns. Two-way floor systems. Yield line theory. Torsion. Seismic design. Prerequisite: CE 444.

CE545 - Advanced Steel Design 545-3 Advanced Steel Design. Economical use of high strength steel; behavior and design bolted and welded building connections, plate girders and composite steel-concrete beams; brittle fracture and fatigue; and low-rise and industrial-type buildings. Prerequisite: CE 442.

CE551 - Intro to Finite Elements 551-3 Introduction to Finite Elements in Engineering Applications. (Same as CE 451 and ME 565) An introduction to finite element techniques and computer methods in finite element applications. Theory and structure of algorithms for one-dimensional and multi-dimensional problems. Applications in solid mechanics, structural analysis, groundwater and fluid flow, and heat transfer, projects and presentations. Prerequisite: ENGR 351 or consent of instructor.

CE552 - Theory of Elasticity 552-3 Theory of Elasticity. Stress and strain equations of elasticity; equilibrium equations; compatibility equations; stress functions; applications of elasticity in solving engineering problems in two and three dimensions. Prerequisite: ENGR 350A,B and MATH 305.

CE553 - Theory of Plasticity 553-3 Theory of Plasticity. (Same as ME 513) Criteria for onset of yielding, isotropic and kinematic strain hardening; flow rules for plastic strains; elastic plastic bending and torsion, slip line field theory; plane stress problems; limit analysis. Prerequisite: ENGR 350A,B and MATH 305 or consent of instructor.

CE554 - Experimental Mechanics 554-3 Experimental Mechanics. An introduction of various experimental techniques that are commonly used to determine properties such as deformation, straining, surface contour, etc. The topics to be covered include the principles of strain gage technology, theory of photoelasticity, piezoelectric accelerometer, laser based interferometry, image processing and analysis, and reverse mechanics. The specific areas of practical application for each type of experimentation will be discussed. Prerequisite: ENGR 350A,B.

CE556 - Laminate Composites 556-3 Theory of Laminate Composite Structures. Orthotropic and Anisotropic Materials, Laminated Plate Theory, Ritz Method, Galerkin's Method, bending, buckling and vibration of laminated structures. Prerequisite: ENGR 350A,B and MATH 251.

CE557 - Advanced Mechanics-Materials 557-3 Advanced Mechanics of Materials. (Same as ME 566) Advanced topics in mechanics of materials including: elasticity equations; torsion of non-circular sections; generalized bending including curved beams and elastic foundations; shear centers; failure criteria including yielding, fracture and fatigue; axisymmetric problems including both thick and thin walled bodies; contact stresses; and stress concentration. Prerequisite: ENGR 350A,B.

CE558 - Reliability in Engr Apps 558-3 Reliability in Engineering Applications. An overview of principles and methods for quantifying the uncertainty in planning, design, testing and operation of engineering systems. Topics include probability theory, random variables, multivariate distributions, regression and correlation analyses, Monte Carlo simulations, and Bayesian approaches. Concepts are illustrated with examples from various areas of engineering, with particular emphasis on civil engineering applications. Prerequisite: ENGR 351 or consent of instructor.

CE570 - Sedimentation Engineering 570-3 Sedimentation Engineering. Introduction to the transport of granular sediment by moving fluids; analysis of regional degradation, aggradation and local scour in alluvial channels; investigation of sediment sources, yield and control. Prerequisite: CE 474 or consent of instructor.

CE571 - Water Resources Engr & Mgmt 571-3 Water Resources Systems Engineering and Management. Philosophy of water resources planning; economic, social and engineering interactions related to water quantity; quantitative optimal planning methodologies for the design and operation of hydrosystems; guest lecturers; projects/case studies. Prerequisite: CE 474 or consent of instructor.

CE572 - Advanced Hydraulic Design 572-3 Advanced Hydraulic Design. Design and analysis of stormwater control and conveyance systems, dams, spillways, outlet works, stilling basins, culverts and other complex hydraulic systems. Prerequisite: CE 474 or consent of instructor.

CE573 - Modeling of Hydrosystems 573-3 Modeling of Hydrosystems. Hydraulic and hydrologic modeling; theory and application of common surface and subsurface flow models such as HEC-RAS, HEC-6, FLDWAV, DAMBRK, MODFLOW and MODPATH. Prerequisite: CE 474 or consent of instructor.

CE592A - Spec Invest-Structural Engr 592A-1 to 5 Special Investigations in Civil Engineering. Advanced Civil Engineering Topics and/or problems in Structural Engineering. Restricted to graduate standing. Special approval needed from the instructor.

CE592B - Spec Invest-Hydraulic Engr 592B-1 to 5 Special Investigations in Civil Engineering. Advanced Civil Engineering Topics and/or problems in Hydraulic Engineering. Restricted to graduate standing. Special approval needed from the instructor.

CE592C - Spec Invest-Environmental Engr 592C-1 to 5 Special Investigations in Civil Engineering. Advanced Civil Engineering Topics and/or problems in Environmental Engineering. Restricted to graduate standing. Special approval needed from the instructor.

CE592D - Spec Invest-Geotech Engr 592D-1 to 5 Special Investigations in Civil Engineering. Advanced Civil Engineering Topics and/or problems in Geotechnical Engineering. Restricted to graduate standing. Special approval needed from the instructor.

CE592E - Spec Invest-Fluid Flow 592E-1 to 5 Special Investigations in Civil Engineering. Advanced Civil Engineering Topics and/or problems in Fluid Flow Analysis. Restricted to graduate standing. Special approval needed from the instructor.

CE592F - Spec Invest-Computat Mechanics 592F-1 to 5 Special Investigations in Civil Engineering. Advanced Civil Engineering Topics and/or problems in Computational Mechanics. Restricted to graduate standing. Special approval needed from the instructor.

CE592G - Spec Invest-Composite Material 592G-1 to 5 Special Investigations in Civil Engineering. Advanced Civil Engineering Topics and/or problems in Composite Materials. Restricted to graduate standing. Special approval needed from the instructor.

CE592H - Spec Invest-Stress Analysis 592H-1 to 5 Special Investigations in Civil Engineering. Advanced Civil Engineering Topics and/or problems in Stress Analysis. Restricted to graduate standing. Special approval needed from the instructor.

CE593 - C E Project 593-3 Civil Engineering Project. Advanced project on topics such as case studies, engineering design, testing and analysis methods, computer modeling, or any other topic focusing on engineering practice. Detailed project report is required. Restricted to graduate standing. Special approval needed from the instructor.

CE599 - Thesis 599-1 to 6 Thesis.

CE601 - Continuing Enrollment 601-1 per semester Continuing Enrollment. For those graduate students who have not finished their degree programs and who are in the process of working on their dissertation, thesis, or research paper. The student must have completed a minimum of 24 hours of dissertation research, or the minimum thesis, or research hours before being eligible to register for this course. Concurrent enrollment in any other course is not permitted. Graded S/U or DEF only.

Civil and Environmental Engineering Faculty

Bravo, Rolando, Associate Professor, *Emeritus*, Ph.D., University of Houston, 1990; 1991. Surface and subsurface hydrology, hydraulics and fluid mechanics.

Butson, Gary J., Associate Professor, *Emeritus*, Ph.D., University of Illinois at Urbana-Champaign, 1981; 1992. Mechanics of materials, vibrations, solid mechanics.

Chevalier, Lizette R., Professor and *Associate Provost for Academic Programs*, Ph.D., Michigan State University, 1994; 1995. Environmental restoration of groundwater aquifers, experimental investigation of immiscible flow, and numerical modeling of subsurface transport.

Cook, Echol E., Professor, *Emeritus*, Ph.D., Oklahoma State University, 1970; 1971.

DeVantier, Bruce A., Associate Professor, *Emeritus*, Ph.D., University of California-Davis, 1983; 1983. Water quality modeling, sediment transport, turbulence modeling, finite element methods.

Evers, James L., Associate Professor, *Emeritus*, Ph.D., University of Alabama, 1969; 1969.

Fakhraei, Habibollah, Assistant Professor, Ph.D., Syracuse University, 2016; 2019. Environmental engineering, environmental modeling, biogeochemistry, aquatic chemistry, water quality modeling, air pollution effects, GIS, geostatistical analysis, hydrology, numerical optimization.

Hsiao, J. Kent, Professor, Ph.D., University of Utah — Salt Lake City, 2000; 2001. Structural earthquake engineering, structural reliability, structural design of buildings and bridges using steel, reinforced or prestressed concrete, masonry, and wood.

Kalra, Ajay, Assistant Professor, Ph.D., University of Nevada, 2011; 2015. Hydraulics and Water Resources Engineering, hydro-climatology, urban sustainability, water-energy-climate nexus, probabilistic forecasting and downscaling, surface water and groundwater interactions.

Kassimali, Aslam, Professor and *Distinguished Teacher*, Ph.D., University of Missouri, 1976; 1980. Structural engineering, nonlinear structural analysis, structural dynamics and stability.

Kolay, Prabir, Associate Professor, Ph. D., Indian Institute of Technology, IIT BoM.B.A.y, 2001; 2010. Geotechnical Engineering, Soil Stabilization, utilization of recycled concrete aggregate (RCA) and coal ash, unsaturated soil, thermal properties of soil, and numerical modeling.

Kumar, Sanjeev, Professor, *Distinguished Teacher, Chair, and Interim Associate Dean*. Ph.D., University of MissouriRolla, 1996; 1998. Dynamic soil-structure interaction, piles under lateral loads, settlement

prediction of landfills, hydraulic conductivity of clay barriers, seismic analysis and design of landfills, ground motion amplification in soils, liquefaction of silts and sands and machine foundations.

Liu, Jia, Assistant Professor, Ph.D., University of Houston, 2014; 2015. Environmental Engineering, renewable energy production, microbial fuel cell, water/wastewater treatment and groundwater/soil remediation, material development for energy safety and environmental pollution detection.

Puri, Vijay K., Professor, Ph.D., University of Missouri-Rolla, 1984; 1986. Geotechnical engineering, soil dynamics, machine foundations, liquefaction of soils.

Ray, Bill T., Associate Professor, *Emeritus*, Ph.D., University of Missouri-Rolla, 1984; 1985.

Rubayi, Najim, Professor, *Emeritus*, Ph.D., University of Wisconsin, 1966; 1966.

Sami, Sedat, Professor, *Emeritus*, Ph.D., University of Iowa, 1966; 1966.

Tezcan, Jale, Professor, Ph.D., Rice University, 2005; 2005. Non-linear structural behavior, neural networks In system Identification and structural control, rehabilitation, and retrofitting of structures damaged by earthquakes.

Warwick, John J., Professor and *Dean*, Ph.D., The Pennsylvania State University, 1983; 2011. Numerical modeling of the transport and fate of contaminants in surface water systems, impacts of nutrients on stream algal growth, transport of sediment and associated mercury in fluvial systems, and simulating the effects of non-point source pollutants on instream water quality.

Yen, Max Shing-Chung, Professor, *Emeritus*, Ph.D., Virginia Polytechnic Institute, 1984; 1984.

Last updated: 02/04/2020

Southern Illinois University

Carbondale, IL 62901

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Catalog Year Statement:

Students starting their collegiate training during the period of time covered by this catalog (see bottom of this page) are subject to the curricular requirements as specified herein. The requirements herein will extend for a seven calendar-year period from the date of entry for baccalaureate programs and three years for associate programs. Should the University change the course requirements contained herein subsequently, students are assured that necessary adjustments will be made so that no additional time is required of them.