PROGRAM DESCRIPTION
The Department of Civil and Materials Engineering has programs of study in structural engineering and structural mechanics leading to the Master of Science and Doctor of Philosophy in Civil Engineering degrees. Graduate study and research in structural engineering and structural mechanics includes static and dynamic analysis of linear and nonlinear structures including modal analysis, behavior of structural materials, and the design of structural systems in concrete and steel. The curriculum provides a strong basis for advanced work in professional practice, research, and teaching.

Education in structural engineering and structural mechanics at UIC addresses both current and potential problems. Research is focused on the failure process of concrete structures; bridge rehabilitation and rating; health monitoring system; linear and nonlinear finite element analysis; structural dynamics and seismic response of structures; concrete fracture, damage, and creep; and microstructures of materials.

DEGREE REQUIREMENTS
The specific M.S. and Ph.D degree requirements are the same for all civil engineering students. Refer to the Departmental and Graduate College Degree requirements for details. Generally, M.S. students require completion of 36 semester hours of coursework (9-10 courses). Some students elect the thesis option that requires a minimum 24 hours of course work (6-7 courses, three at 500-level) and 12 hours of thesis credits. Beyond the M.S degree, Ph.D students require a minimum of 28 semester hours (7 courses) of course work and 36 semester hours of dissertation research. The specific research topic for M.S thesis or Ph.D dissertation is selected under the guidance of a faculty advisor. Commonly, the graduate students select their courses under the guidance of a faculty advisor. Courses are offered in the late afternoon/evening to accommodate working professionals in the Chicago area.

COURSES
Graduate students majoring in structures must select their courses from the following list:

Structural Engineering Design Courses:
CME 400 Advanced Design of Reinforced Concrete Structures
CME 401 Advanced Design of Metal Structures
CME 405 Foundation Analysis & Design
CME 406 Bridge Design
CME 409 Structural Analysis II
CME 410 Design of Prestressed Concrete Structures
CME 454 Design of Tall Buildings
CME 500 Design of Concrete Plate and Shell Structures
CME 502 Bridge Design II
CME 510 Advanced Design of Prestressed Concrete Structures
CME 520 Earthquake Engineering of Concrete Structures

Structural Mechanics and Dynamics Courses:
CME 434 Finite Element Analysis I (Required)
CME 435 Theory of Vibrations I
CME 532 Theory of Plates
CME 534 Finite Element Analysis II
CME 536 Nondestructive Testing of Concrete
CME 539 Elastic Instability I
CME 544 Structural Dynamics (Req’d. for Ph.D.)
CME 554 Nonlinear Finite Element Analysis

Solid Mechanics Courses:
CME 430 Theory of Elasticity I
CME 431 Continuum Mechanics I
CME 433 Fracture Mechanics and Failure Analysis I
CME 530 Theory of Elasticity II
CME 531 Nonlinear Continuum Mechanics
CME 533 Fracture Mechanics and Failure Analysis II
CME 537 Plasticity I
CME 541 Mechanics of Composite Materials

**DEFICIENCY COURSES FOR OTHER MAJORS**

For students who do not hold a Bachelor Degree in civil engineering must take the minimum list of deficiency courses listed below. One course of the 400 level courses may count towards the student's Master Degree depending on the student's background:

- CME 201 Statics
- CME 203 Strength of Materials
- CME 205 Structural Analysis I
- ME 210 Engineering Dynamics
- CME 300 Composition & Properties of Concrete
- CME 301 Behavior & Design of Metal Structures
- CME 310 Design of Reinforced Concrete
- CME 315 Soil Mechanics & Laboratory
- CME 400 Advanced Design of Reinforced Concrete Structures
- CME 401 Advanced Design of Metal Structures

If these students have deficiencies and/or do not have enough courses in mathematics and physics courses, they must take some or all of the courses listed below to fulfill the requirements:

- Math 180 Calculus I
- Math 181 Calculus II
- Math 210 Calculus III
- Math 220 Introduction to Differential Equations
- Physics I General Physics I (Mechanics)

**RESEARCH**

The University of Illinois-Chicago is a Research I University with over $250 million in annual research expenditures. The research facilities in Structural Engineering at UIC are state of the art. The laboratories are outfitted with the latest research instrumentation. All students doing a thesis option are required to perform research in their chosen area under the supervision of their faculty advisor. Research programs of the faculty are outlined in their respective webpages.

**FINANCIAL ASSISTANCE**

Financial support from traineeships and research assistantships are available. Some full-time graduate students, typically doctoral students, are supported by external grants from structural engineering faculty.

**FACULTY**

- **Farhad Ansari**, Ph.D., Professor and Department head: Structural health monitoring (SHM), smart sensors, and nondestructive testing.
- **Sheng-Wei Chi**, Ph.D., Assistant Professor: Meshfree methods, Extended Finite Element Methods, Computational mechanics, Musculoskeletal mechanics, Image-based modeling for biological systems, Multi-scale material modeling, Blast and penetration modeling
- **Alexander Chudnovsky**, Ph.D., Professor: Theoretical and experimental fracture mechanics, critical phenomena, probability and statistics in engineering applications, reliability and failure analysis.
- **Craig Foster**, Ph.D., Assistant Professor: Computer modeling of deformation in solid materials with an emphasis on geomatics such as rocks, soils, and concrete, finite elements analysis, plasticity and damage, fracture, and shear banding and other types of localized deformation.
- **Mohsen A. Issa**, Ph.D., S.E., Professor: Analysis and design of building and bridge structures, damage assessment of structures, bridge rating and rehabilitation, structural monitoring systems, fast track construction of bridges, high performance concrete, advanced composites, size effect, and surface fractal characterization in fracture of cementitious materials.
- **Eduard Karpov**, Ph.D., Associate Professor: Functional nanomaterials, energy harvesting and conversion at the nanometer scale, computational mechanics, and multiphysics modeling methods.


**Didem Ozevin**, Ph.D., Assistant Professor: Acoustic emission, damage algorithm development, nondestructive evaluation of civil infrastructures and mechanical components, acoustic MEMS sensors, strengthening techniques and monitoring of aging structures.

**Chien H. Wu**, Ph.D., Professor: Configurational evolutions and forces in material structures, diffusion in solids, phase transformations and interfacial phenomena, eshelby stress and its thermodynamic conjugate, elasticity, stability and fracture mechanics, Continuum mechanics, nonlinear elasticity and very large deformations of nonlinear membranes, and linear and nonlinear vibrations, and theory of plates and shells.

For further information, please contact:

**Professor Mohsen A. Issa**

Tel: 312-996-3432

e-mail: missa@uic.edu

**University of Illinois at Chicago**

Department of Civil and Materials Engineering

2005 Engineering Research Facility
842 West Taylor St., (M/C 246)
Chicago, IL 60607-7023

www.uic.edu/depts/cme/