ABOUT CIVIL SYSTEMS GRADUATE PROGRAM

The goal of the University of Maryland Civil Systems program is to provide M.S. and Ph.D. level education in interdisciplinary engineering systems typically found in civil infrastructure settings. The related research will concentrate on how to optimize system efficiency, reliability, cost, and other factors. The Civil Systems program encourages applications from the existing branches in engineering and science.

M.S. REQUIREMENTS

The Masters coursework is composed of two parts: the core and specialty areas. All Masters students need to take one course in each of the core areas (specific suggested courses are indicated in parentheses). Additionally, three courses from the six specialty areas can be taken, plus two approved electives. A plan of study submitted to the faculty in advance is needed to make sure that the required 30 credits are satisfied.

Thesis Option. 24 credits of coursework plus 6 credits of thesis research, OR
Non-Thesis Option. 30 credits of coursework plus a scholarly paper.

PH.D. REQUIREMENTS

The Ph.D. coursework is composed of two parts: **the core** and **specialty areas**. All doctoral students need to take one course in each of the core areas (specific suggested courses are indicated in parentheses). Additionally, students should take one course in three of the six specialty areas. To ensure that all requirements will be met, students must submit a plan of study to the faculty. Normally the plan of study will include 12 credits of dissertation research and 18 credits of coursework beyond the M.S.

CIVIL SYSTEMS COURSEWORK

CORE AREAS (COMPULSORY)

- Systems (ENSE621 or ENSE622)
- Operations Research/Optimization (ENCE603 or ENCE677)
- Sensing and control (ENCE688A)

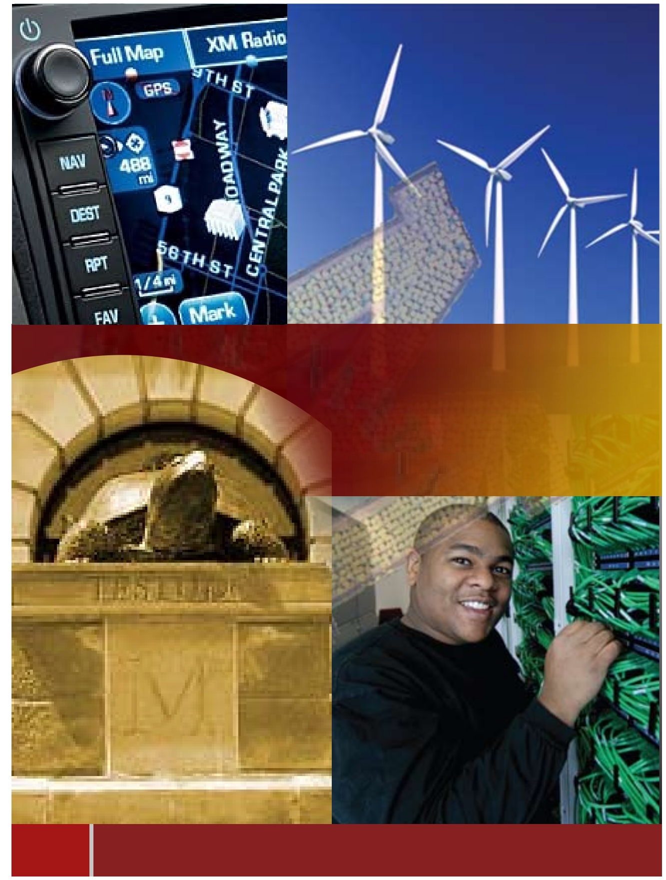
SPECIALTY AREAS (CHOOSE 3 COURSES)

- Energy Systems (ENCE688)/Environmental Systems (ENCE630, ENCE730, AREC785, ENCE688J)
- Transportation Systems (ENCE688T Transportation Network Algorithms and Implementation)
- Emergency Preparedness/Response and Infrastruc ture Security (ENCE688W, ENCE688V)
- Civil Information Systems
- Sustainable Engineering (ENCE688I - Advanced Topics in Civil Engineering: Sustainable Transportation)
- Operations Research/Management Science Methodologies (ENCE 722, ENCE 724, ENCE 725, ENME610, ENME625, ENME 608, BMGT830, BMGT833, BMGT834, BMGT835)

APPLY NOW

Apply now for part-time or full-time study. Visit our web site at http://www.civilsystems.umd.edu/

UNIVERSITY OF MARYLAND
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING



CIVIL SYSTEMS

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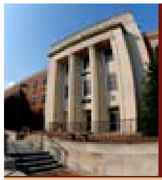
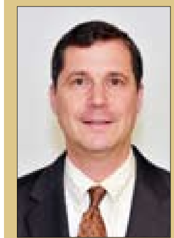
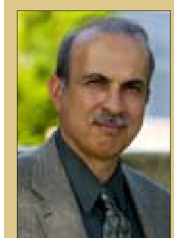


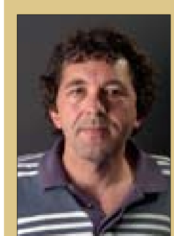
WHAT OUR FACULTY SAY



STEVEN GABRIEL (*Group Coordinator*): With the rise of interconnected systems in the 21st century in energy, transportation, smart buildings, and other important civil infrastructure, there is an ever-increasing need for practicing engineers and researchers who understand the total system under study. Our program in Civil Systems seeks to train such individuals and make research advances in these areas to optimize investment and operations, reliability, efficiency, and social welfare through the study of sophisticated modeling and sensors-based methods.



ALI HAGHANI (*Chairman of Department*): The Civil Systems graduate program is an exciting new program in the department of civil and environmental engineering. The students in this program will learn about the interactions within and among complicated civil infrastructure systems and gain valuable knowledge about operations, maintenance and management of these systems. We are very fortunate to have a strong cadre of faculty with research focus in structures, environmental engineering, water resources, transportation systems and engineering project management whose collaboration has made it possible for us to offer this outstanding graduate program.



MARK AUSTIN: For the past decade I have been teaching graduate-level classes and conducting research in Systems Engineering. I am excited about the Civil Systems program because it provides a unique opportunity for understanding ways in which the design and operation of modern civil infrastructure systems can benefit from systems engineering techniques and, conversely, how the demands of modern civil systems development can drive the development of new methods in systems engineering.

WHY CIVIL SYSTEMS?

Recent advances in computing, communications, sensing, and materials science are enabling the design of a new generation of large-scale civil engineering systems. Signature applications that are new to Civil Engineering due to these advances include:

- The next generation power grid that will link time-sensitive demand from home appliances, electric power cars, renewable energy sources, and other features for efficiency gains
- The Pearl River Tower Complex will be the most energy efficient skyscraper ever built (scheduled for completion in 2010)
- A Next Generation air traffic control and management system that incorporates advanced new vehicles, modernized avionics, and increasing levels of autonomy
- Modernization of waterways such as the Panama Canal and Bosporus Straights
- Global natural gas and other energy supply chains (e.g., oil, coal) which involve a combination of engineering challenges as well as market, national, or regional goals
- Sustainable development for high-density urban areas

These systems will be required to support new functionality such as new

types of interaction between infrastructure and people, have levels of performance that were previously unobtainable (e.g., in energy usage), and be economically efficient. In many cases, enhanced functionality and performance will be achieved through an improved ability to anticipate demand, monitor the surrounding (natural) environment, control system responses, and look ahead and anticipate events. Sometimes automation will replace some operations currently handled by humans. Future CEE systems will be far more heterogeneous and agile than their predecessors, and may be connected to other types of systems in completely new ways. This makes the task of system design, analysis and integration of multi-disciplinary concerns (e.g., reliability, efficiency, and system tradeoffs) much more difficult than in the past.

Civil infrastructure systems are unique in their strong linkage to and dependency upon public policy and/or societal goals. Consider challenges in energy management and transportation or energy networks. If we want to reduce carbon emissions in the power and other sectors, how much do we need to change our current power grid in light of:

- Increased renewable generation (e.g., wind) and transmission expansion to connect the supply in less populated areas to where the load is in more populated regions
- The strong interaction between vehicle usage and carbon emissions (e.g., the role of electric cars on the current power grid)
- Using natural gas or other less carbon intense fossil fuels for the nation's fleet of vehicles