INFRASTRUCTURE MANAGEMENT AND SECURITY AREA OF STUDY
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INTRODUCTION
Large-scale, distributed infrastructure systems such as communications, power, water supply, flood control, waste management, industrial, commercial, recreational, transportation, other public facilities, commercial facilities, and industrial facilities form the basis for much of modern society. Planning and managing these systems of systems presents a major challenge for Civil Engineers. In addition to understanding the behavior of infrastructure components individually (e.g., understanding a single bridge), we must understand how they interact and behave as a system (e.g., the Texas highway system). This requires an understanding of not only the technical aspects of infrastructure at which Civil Engineers excel, but also an understanding of the social, economic, and political context within which infrastructure problems exist and the management methods that can be useful within this context.

VISION
The vision of the infrastructure management and security area within the Department of Civil Engineering at Texas A&M University is to educate the next generation of engineers and researchers who will plan for and manage the infrastructure systems that civil engineers design, construct, and operate and who will lead the research efforts needed to improve infrastructure planning and management within Texas, the U.S., and the rest of the world.

MISSION STATEMENT:
The mission of the infrastructure management and security area within the Department of Civil Engineering at Texas A&M University is to:

• prepare graduate students so they will be able to plan for, operate, and manage the facilities and public works that civil engineers typically design and construct within the organizations responsible for funding such work;
• prepare graduate students so they will be equipped to lead the international research effort to improve society’s understanding of and capability for planning and managing infrastructure systems;
• educate graduate students so they are capable of completing appropriate information management and decision support activities required to support infrastructure management;
• educate graduate students so they are capable of assessing the vulnerability of infrastructure systems to human-induced and natural hazards, planning preparedness measures for infrastructure systems facing these hazards, and leading the engineering response to restore infrastructure services after these disasters;
• educate graduate students so they are capable of defining the condition of existing facilities through inspection techniques, analyzing citizen contact data, and using appropriate non-destructive testing and remote sensing techniques; and
• develop the knowledge required to address civil engineering infrastructure facilities and public works problems for the State of Texas.

AREA GOALS:
To meet these goals, the faculty will:

• provide courses that integrate scientific and engineering knowledge together with constraints from social, economic, and political factors;
• conduct the highest quality research in non-destructive testing, remote sensing, infrastructure assessment, infrastructure asset management, and infrastructure security;
• provide mentoring and educational opportunities to prepare students in the Ph.D. program to pursue research careers within academia, private corporations, and government agencies;
• promote the highest academic scholarship.
MAIN FOCUS AREAS OF THE PROGRAM:
- Non-destructive testing
- Remote sensing
- Geographic Information Systems
- Infrastructure reliability analysis
- Probabilistic Risk Analysis for complex infrastructure networks
- Decision support systems for complex systems
- Management in government agencies
- Contracting for and managing engineering and design services
- Funding and investment analysis in public agencies

DEGREE PROGRAMS
The following pages outline the degree programs in the Infrastructure Management and Security area. The Master’s of Engineering degree is intended to be a terminal, professionally-oriented degree for those seeking specialization in infrastructure management and security before entering the workforce. The Master’s of Science degree is intended for those who wish to conduct research in infrastructure management and security, either in preparation for entering a Ph.D. program or as preparation for entering the workforce. The Ph.D. degree is intended for those who plan to pursue a research career in the area of infrastructure management and security. This degree requires the completion of a dissertation in which original, rigorous research is completed. The Doctor of Engineering degree is intended for individuals preparing for professional engineering careers in business, industry and the public sector who seek education beyond the master’s degree level. The D.Eng. Program emphasizes engineering practice, public service and the development of leadership potential, not basic research. The Doctor of Engineering degree program is administratively managed by the Academic Dean's office in the Dwight Look College of Engineering.
Focus: Infrastructure Management and Security

General
A minimum of 30 semester credit hours of approved courses is required for the Master of Engineering degree (MEng). The university places limitations on these credit hours in addition to the requirements of the infrastructure management and security program that are listed below. A complete discussion of all university requirements is found in the current Texas A&M University Graduate Catalog under the heading “The Degree of Master of Engineering.” For example, university requirements include a final examination and one or two written reports. The Department of Civil Engineering requires that the examination focus on at least one of the written reports. The report(s), however, need not involve results of research conducted by the candidate. It is the student’s responsibility to propose a degree plan that meets all university, department, and program requirements.

Degree Plan
The student’s advisory committee, in consultation with the student, will develop the proposed degree plan. The proposed degree plan must be typed on the official form as it appears on the Internet at http://ogs.tamu.edu/OGS/pdf/plan.pdf and submitted to the infrastructure management and security graduate chair with endorsements by the student’s advisory committee. The plan should be submitted before the student has completed nine (9) of the semester credit hours that will be applied toward the 30-semester credit hour requirement. The Office of Graduate Studies blocks the student from further registration if a degree plan is not filed before the end of the second semester of study. The degree plan must also conform to the Department’s MEng degree requirements (dated April 13, 2001).

Prerequisites (cannot apply toward 30 semester credit hour requirement)
A B.S. degree in engineering from an ABET-accredited institution is required. Additional pre-requisites may be required if this degree is not in Civil Engineering.

Core Courses (must take all three)
CVEN 624: Infrastructure Engineering & Management
CVEN 689: Risk and Decision Analysis for Civil Engineers
CVEN 689/658: Civil Engineering Applications of GIS

Infrastructure Systems Courses (Choose at least 2 of the following):
CVEN 603: Environmental Management
CVEN 632: Transportation System Engineering Management
CVEN 641: Construction Engineering Systems
CVEN 644: Project Risk Management
CVEN 664: Water Resource Planning and Management
CVEN 665: Water Resource Systems Engineering
CVEN 668: Advanced EPC Project Development

Public Policy Courses (Choose at least 1 of the following):
BUSH 623: Politics of Public Budgeting
BUSH 634: Public Management

Optional (but encouraged) Courses:
INEN 627: Engineering Analysis for Decision Making
INEN 667: Engineering Economics

The remaining credit hours are to be used for additional courses chosen in consultation with your graduate committee. Additionally, the “Texas A&M Business Certificate” can be earned by taking the following courses. Only 2 of these may be counted toward the required 30-credit hours.

ACCT 640: Accounting Concepts and Procedures
FNC 635: Financial Management for Non-Business
MGMT 655: Survey of Management
MKTG 621: Survey of Marketing
Example Course Plan for 12-month ME in Infrastructure Management & Security

<table>
<thead>
<tr>
<th>Fall Semester (12 hours)</th>
<th>Spring Semester (12 hours)</th>
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</thead>
<tbody>
<tr>
<td>CVEN 624 (Infrastructure Eng &amp; Mng)</td>
<td>CVEN 689 (Uncertainty Modeling)</td>
</tr>
<tr>
<td>CVEN 658 (GIS)</td>
<td>*CVEN 641 (Construction Systems)</td>
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<tr>
<td>ISEN 627 or ISEN 667 (Decision/Econ)</td>
<td>*CVEN 632 (Transportation Systems)</td>
</tr>
<tr>
<td>BUSH 661 (Personnel Administration)</td>
<td>Technical elective (CVEN course)</td>
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<tr>
<td><strong>Summer Semester (6 hours)</strong></td>
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</tr>
<tr>
<td>MNG 655 (Survey of Management)</td>
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</tr>
<tr>
<td>MKT 621 (Survey of Marketing)</td>
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</tbody>
</table>

The plan outlined above is an example of how the ME in Infrastructure Management and Security can be completed in 12 months. The courses in italics are required, and the course proceeded by a * come from the list from which 2 courses must be taken. The remaining courses are to be decided in consultation with the student’s committee. The program can be completed in 1 academic year (2 semesters) by taking 5 courses each semester. This may be advantageous for students more interested in the technical aspects of infrastructure than the management aspects because there are more Civil Engineering courses offered during Fall and Spring semesters than during the summer.