NJIT's New MS in Critical Infrastructure Systems

NJIT's new MS in Critical Infrastructure Systems is a unique multidisciplinary program designed to meet the demand for skilled professionals to upgrade, secure and manage the nation’s infrastructure. The program draws upon the full resources of New Jersey’s Science and Technology University with courses offered from civil engineering, industrial engineering, electrical and computer engineering, engineering management, information systems, architecture, and management. Courses in public health are also available in collaboration with the University of Medicine and Dentistry of New Jersey. The program covers all engineered public and private sector infrastructure (civil and engineered systems including buildings/urban development, transportation (highways/tunnels/bridges/airports), power plants/systems, environmental (water/wastewater/zoological), telecommunications, computer networks and cyber infrastructure), banking and finance, and public health infrastructure management.

Core Courses

| CE 671: Critical Infrastructure I: Performance and Risk Analysis of Infrastructure Systems | CE 602: Geographic Information Systems |
| CE 678: Environmental Impact Analysis | IE 314: Safety Engineering Methods |
| ABBCH 675: Elements of Infrastructure Planning | ABBCH 675: Elements of Infrastructure Planning |

Enabling System and Technologies

| MNS 648: Distributed Systems | MNS 648: Distributed Systems |
| MNS 649: Cybersecurity | MNS 649: Cybersecurity |
| TRT 655: Intelligent Transportation Systems | TRT 655: Intelligent Transportation Systems |
| MG 635: Data Mining and Analysis | MG 635: Data Mining and Analysis |
| MG 650: Knowledge Management | MG 650: Knowledge Management |
| CS 635: Database Management Systems | CS 635: Database Management Systems |
| CS 642: Advanced Data Management | CS 642: Advanced Data Management |
| CS 782: Pattern Recognition and Applications | CS 782: Pattern Recognition and Applications |
| IE 621: System Analysis and Simulation | IE 621: System Analysis and Simulation |

Areas of Concentration

**Planning and Facilities Management**
- CE 602: Geographic Information Systems
- CE 615: Infrastructure & Facilities Remodeling
- IE 465: Engineering Reliability
- IE 314: Safety Engineering Methods

**Em Provisioned Systems**
- TRAN 705: Mass Transportation Systems
- ECE 610: Power Systems Analysis
- CE 600: Urban Systems Engineering
- HCE 637: Introduction to Cyber Security
- HCE 683: Computer Network Design & Analysis
- HCE 673: Random Signal Analysis I
- HCE 682: Communication Systems
- HCE 683: Computer Network Design & Analysis

**Public Health Systems and Technologies (joint UMDNJ)**
- PECO 5012: Principle and Methods of Epidemiology
- PECO 5010: Introduction to Environmental Health
- ENG 435: Water Chemistry
- ENG 471: Environmental Impact Analysis
- ENG 430: Hazardous Site Operations
- EN 162: Site Remediation

**Research Opportunities**

- Current and future professionals from the engineering, computing, transportation, environmental engineering, geospatial engineering, and construction engineering and management. Research initiatives include:
  - Flood Detection: Warning - Response systems
  - Risk-based Integrated Maintenance and Security Model for Critical Infrastructure in Old and New Sector
  - Integrated Decision Support System for Planning Inter-dependent Urban Infrastructure for Resiliency and Sustainability

**Elective Areas**

The MS program in Critical Infrastructure Systems offers two complementary and synergistic perspectives:

- **Critical Infrastructure Life-cycle Management**, including sector-based and cross-sector life-cycle asset management, maintainability and safety engineering, vulnerability analysis, hazardous impact analysis and mitigation, infrastructure inter-dependencies, and rehabilitation technologies. Electives could include:
  - Planning and Strategic Asset Management: Geographic Information Systems, maintainability engineering, remote sensing, environmental monitoring networks, lifecycle building, and information management.
  - Engineered Systems: Water/wastewater, mass transportation systems, power systems analysis, urban systems engineering, Internet Engineering, and computer network design and analysis.
  - Program/Impact Management: Environmental impact, safety engineering, project planning and management.
  - Critical Infrastructure Security and Emergency Management, including emergency information and management systems, public health preparedness, enabling and protective technologies for homeland security and critical infrastructure. Electives could include:
    - Emergency and Preparedness Management: Design of emergency management information systems, command and control centers, health/risk communications, public health preparedness.
    - Enabling Systems and Technologies: Protective technologies, advanced database design, pattern recognition, data mining and analysis, traffic control, intelligent transportation systems, decision support systems.

**Employment Opportunities**

Private and Public Sectors: Practicing and future professionals who manage any elements of the nation’s critical infrastructure or are tasked with developing and implementing solutions for its rehabilitation and expansion.

- **Multi-industry**: Current and future professionals from the engineering, computing, transportation, public utility and other disciplines tasked with the operations and systems support aspects of lifecycle capital, maintenance and emergency management supporting the rehabilitation and protection of public and private infrastructure and the mitigation of possible event consequences.
- **Multi-function**: Facility managers, engineers, architects, emergency planners, state and local infrastructure and DHS officials and planners, DOH, Corps of Engineers and infrastructure engineers and managers in both the public and private sectors.

**Research Opportunities**

NJIT’s Department of Civil and Environmental Engineering has an extensive research program with focal areas including critical infrastructure, transportation, environmental engineering, geospatial engineering, and construction engineering and management. Research initiatives include:

- Flood Detection: Warning - Response systems
- Risk-based Integrated Maintenance and Security Model for Critical Infrastructure in Old and New Sector
- Integrated Decision Support System for Planning Inter-dependent Urban Infrastructure for Resiliency and Sustainability

We will build the roads and bridges, the electric grids and digital trees that feed our commerce and bind us together. We will restore science to its rightful place and wield technology’s wonders to raise health care’s quality and lower its costs. We will harness the sun and the winds and the soil to fuel our cars and run our factories. And we will transform our schools and colleges and universities to meet the demands of a new age. All this we can do. All this we will do.

*Barack Obama*, President of the United States.
Critical infrastructure represents one of the great technical challenges of the 21st century. America’s aging infrastructure is crumbling: bridges have collapsed, levees have burst and highways have fallen. Many of our ports, industries and transportation centers need to be better secured. The hurricane disasters along the Gulf Coast have underscored the critical role of infrastructure systems including the complex network of highways, bridges, tunnels, airports, seaports, railroads, public buildings, flood control structures, water supply, power grid, computer and communications systems, energy commodities networks, and waste disposal systems. The certainty of future extreme events – natural disasters, accidents and unintentional acts – demands skilled resources and intelligent investment to:

• create a robust and sustainable infrastructure that is resilient against multiple hazards.
• build operational, systems and programmatic capabilities for detection, protection, prevention, mitigation and response.

NJIT’s new MS in Critical Infrastructure System draws on the university’s expertise in civil, industrial and electrical engineering, information systems, architecture and management in a unique interdisciplinary curriculum designed to prepare skilled professionals to lead the effort to restore, upgrade and secure the nation’s infrastructure.

For more information, contact:
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To apply, contact:
Office of Graduate Admissions
1-800-925-NJIT
www.njit.edu/admissions/graduate/howtoapply

Gain the Edge in Knowledge at NJIT with

The New Masters of Science Program in Critical Infrastructure Systems