# URBAN INFRASTRUCTURE SYSTEMS (MS)

Civil and Urban Engineering Department (https://engineering.nyu.edu/ academics/departments/civil-and-urban-engineering/)

NYSED: 26501 HEGIS: 0206.00 CIP. 14.0803

### **Program Description**

With the fast growth of urban population, local governments, public service agencies, and urban utilities presently face increasing public demand for greater reliability, safety, affordability and resiliency of the aging urban infrastructure systems. These systems have to be continuously adapted and upgraded (often with technology-driven solutions) to efficiently support the essential public services, urban development and economic growth.

The infrastructure systems support a variety of urban sectors, including transportation, energy & water supply, sanitation & wastewater management, public buildings, district heating, public health & safety, waste management, telecommunication and other essential services. Their sustainable development engages a wide variety of public and private sector stakeholders and greatly depends on a broad range of institutional, environmental, economic, societal and operational factors. Such factors include public policy objectives, land use and geophysical system characteristics, regulatory requirements, environmental issues, availability of renewable resources, customers' awareness and culture, management capabilities, and other operational state variables. With rising societal concerns with regard to climate change impact, environmental sustainability and economic viability of the fast-growing urban centers, both Government and Industry presently face increasing needs for innovative capabilities of dynamic monitoring and "smart" system control to effectively meet the challenge of upgrading the aging urban infrastructure systems.

Facing these urban sustainability challenges, recent developments of Information Technology based "smart" infrastructure monitoring and control capabilities have been increasingly integrated in operation system optimization, early incident detection and proactive mitigation, for upgrading the operational efficiency, safety and service quality of the infrastructure systems. These innovative solutions are currently driving a significant paradigm shift from reactive to preemptive engineering and management of these urban systems, across the wide array of public service sectors that they support. The infrastructure industry development goal is to provide the engineers and managers of the urban systems with upgraded decision making capabilities to better cope with the growing environmental risks, economic constraints, and complex operational uncertainties and effectively respond to the growing societal demand.

The interdisciplinary MS Program in Urban Infrastructure Systems targets the development of a broad understanding of the infrastructure management challenges facing metropolitan governments and urban utilities. Cutting across different disciplines of engineering, infrastructure financing, environmental policy and planning, the program is focused on the needs and methodologies for integrating policy decision making, intelligent technology solutions, and risk-based system analysis in urban infrastructure systems management to effectively meet the emerging challenges of sustainable urban developments. Following five core courses, students may select a track in a specific urban sector, as indicated in the list of proposed majors. They are also required to complete a 3-credit Capstone project or a 6-credit Master Thesis.

With specialized faculty members from Government, Industry and Academia, the program is designed for professionals, with both engineering and non-engineering backgrounds, who are involved and/ or interested in the fast growing interdisciplinary field of urban systems management and career opportunities with government agencies, public and private sector utilities, and service industries across the wide array of the metropolitan sectors.

### **Admissions**

To apply for admission to any Tandon graduate program, please contact the Office of Graduate Admissions (https://engineering.nyu.edu/ admissions/graduate/).

#### Requirements

This program is open to professionals with BS or BA degrees and backgrounds including engineering, science, public policy, management, economics, and/or finance. Necessary mathematics background, usually including undergraduate calculus, is required, as is an undergraduate GPA of 3.0 or better.

All applicants for this MS program must additionally show evidence of general quantitative analytic ability, including a minimum of 2 years of college mathematics and a college-level course in statistics.

### **Program Requirements**

Course	Title	Credits
Core Courses <sup>1</sup>		
CE-GY 6053	Monitoring Cities	3
CE-GY 7843	Urban Infrastructure Systems Management	3
CE-GY 7853	Infrastructure Asset Management	3
CE-GY 7673	Environmental Impact Assessment	3
CE-GY 8733	Infrastructure Financing: Structuring of a Deal	3
Tracks and Electiv	ves	
Select 3 courses	from the Track Options below:	9
Transportation	Systems Management (TSM)	
Construction N	lanagement (CM)	
Environmental Systems Management (ESM)		
Civil Infrastruc	ture Systems Management (CISM)	
Capstone Experience		
Students may select either an MS Project or an MS Thesis for the capstone $^{2}$		
CE-GY 997X	MS Thesis in Civil & Urban Engineering Dept	
CE-GY 9963	MS Project in Civil & Urban Engineering Department	
Additional Elective		
Select one additional elective from the Track Options below <b>or</b> complete the second section of CE-GY 997X for students completing the MS Thesis		3 ing
Total Credits		30

Core courses can be substituted by other selected courses upon approval of the academic adviser. <sup>2</sup> The MS Thesis requires 6 credits typically completed in two semesters.
3 credits are counted toward the Capstone Experience, and the remaining 3 credits are counted toward the Additional Elective.

### **Track Options**

Tracks are an optional way students may arrange their electives. Students may take classes from one track or mix and match. Other electives may be chosen with the approval of the academic adviser.

#### **Transportation Systems Management**

Course	Title	Credits
TR-GY 7223	Management of Transit Maintenance and Operations	3
TR-GY 6223	Intelligent Transportation Systems and Their Applications	3
TR-GY 7133	Urban Public Transportation Systems	3

#### **Construction Management**

Course	Title	Credits
CE-GY 8253	Project Management for Construction	3
CE-GY 8713	Construction and the Law	3
CE-GY 8273	Contracts and Specifications	3
CE-GY 8703	Managing and Leading in the 21st Century	3

#### **Environmental Systems Management**

Course	Title	Credits
CE-GY 7753	Environmental Systems Management	3
CE-GY 7473	Modeling Fate and Transport of Surface Water Pollution	3
CE-GY 7523	Air Pollution	3
CE-GY 6053	Monitoring Cities	3

#### **Civil Infrastructure Systems Management**

Course	Title	Credits
CE-GY 6063	Bridge Engineering	3
CE-GY 6143	Steel Structures	3
CE-GY 8493	Environmental Geotechnology	3

## **Sample Plan of Study**

	Credits	9
CE-GY 8733	Infrastructure Financing: Structuring of a Deal	3
Additional Elective		3
Track Course 3		3
3rd Semester/Term		
	Credits	9
CE-GY 7673	Environmental Impact Assessment	3
Track Course 2		3
Track Course 1		3
2nd Semester/Term		
	Credits	9
CE-GY 7853	Infrastructure Asset Management	3
CE-GY 7843	Urban Infrastructure Systems Management	3
CE-GY 6053	Monitoring Cities	3
1st Semester/Term		
Course	Title	Credits

#### 4th Semester/Term Capstone

e	
	Credits

Total Credits

### **Learning Outcomes**

Upon successful completion of the program, graduates will:

1. Have the development of a broad understanding of the infrastructure management challenges facing metropolitan governments and urban utilities.

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- Have the understanding of the needs and methodologies for integrating policy decision making, intelligent technology solutions, and risk-based system analysis in urban infrastructure systems management to effectively meet the emerging challenges of sustainable urban developments.
- Be prepared for career opportunities with government agencies, public and private sector utilities, and service industries across the wide array of the metropolitan sectors related to urban systems management.

# Policies

### **NYU Policies**

University-wide policies can be found on the New York University Policy pages (https://bulletins.nyu.edu/nyu/policies/).

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