

# URBAN INFRASTRUCTURE SYSTEMS (MS)

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 an area of specialization 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

Admission to graduate programs in the Tandon School of Engineering requires the following minimum components:

- Résumé/CV
- Statement of Purpose
- Letters of Recommendation
- Transcripts
- Proficiency in English

The NYU Tandon Graduate Admissions website (<https://engineering.nyu.edu/admissions/graduate/apply/requirements/>) has additional information on school-wide admission.

Some programs may require additional components for admissions.

See the program's How to Apply (<https://engineering.nyu.edu/admissions/graduate/how-apply/>) for department-specific admission requirements and instructions.

## Requirements

This program is open to professionals with BS or BA degrees and backgrounds in 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

The program requires the completion of 30 credits, and students may choose one of the concentrations listed below.

| Course  | Title  | Credits |
|---|--|---------|
| <b>Core Courses</b> <sup>1</sup>  |  |         |
| CE-GY 7813  | Infrastructure Planning, Engineering and Economics           | 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 <sup>2</sup> | 3       |
| <b>Minor, Technical and Free Electives</b>  |  |         |
| Select three to four courses related to infrastructure management strategies for selected urban sectors, including: Urban Transportation Planning & Management, Urban Water Supply & Environmental Systems management, Smart Building & Energy Supply, Urban Construction Engineering & Management and Infrastructure Systems Planning & Management. <sup>3</sup> |  | 9-12    |
| Transportation Systems Management (TSM)   |  |         |
| Construction Management (CM)  |  |         |

## Environmental Systems Management (ESM)

Civil Infrastructure Systems Management (CISM)<sup>4</sup>**Capstone Experience**

Complete an independent case study in urban infrastructure systems 3-6 (three credits) or a master's thesis on a topic of independent study (six credits).<sup>5</sup>

**Total Credits** 30

1

Core courses can be substituted by other selected courses upon approval of the academic advisor.

2

Course is part of the Exec 21 program; special requirements (see Construction Management Program ([http://bulletin.engineering.nyu.edu/preview\\_entity.php?catoid=17&ent\\_oid=1253](http://bulletin.engineering.nyu.edu/preview_entity.php?catoid=17&ent_oid=1253))) or permission of adviser required.

3

The number of technical electives is influenced by whether the student elects to do a 3-credit case study report or a 6-credit MS thesis, as described in a later section.

4

Because of course content, students selecting the CISM minor should hold a BS in Civil Engineering or the equivalent.

5

All course descriptions for Urban Infrastructure Systems are found in the Civil Engineering section of this catalog.

## Minor Areas of Concentration

Each minor area of study includes: (1) three minor courses, required for the minor; and (2) two to three technical electives, available to all program students.

Students may elect not to take a specified minor area. They may, instead, take five or six technical electives from the approved list in any specified area. The number of technical electives is influenced by whether the student elects to do a 3-credit case study report or a 6-credit MS thesis, as described in a later section.

## Transportation Systems Management

| Course   | Title   | Credits   |
|--|---|-----------|
| <b>Required Courses</b>                          |   |           |
| 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         |
| <b>Approved Technical Electives</b> <sup>1</sup> |   |           |
| TR-GY 6133                                       |   | 3         |
| TR-GY 7123                                       | MANAGEMENT OF URBAN TRAFFIC CONGESTION                    | 3         |
| <b>Total Credits</b>                             |   | <b>15</b> |

1

Additional electives may be approved by the adviser.

## Construction Management

| Course   | Title   | Credits   |
|--|---|-----------|
| <b>Required Courses</b>                          |   |           |
| CE-GY 8253                                       | Project Management for Construction                   | 3         |
| CE-GY 8713                                       | Construction and the Law <sup>1</sup>                 | 3         |
| CE-GY 8723                                       | How to Succeed in Construction <sup>1</sup>           | 3         |
| <b>Approved Technical Electives</b> <sup>2</sup> |   |           |
| CE-GY 8273                                       | Contracts and Specifications                          | 3         |
| CE-GY 8783                                       | Construction Management and Planning <sup>1</sup>     | 3         |
| CE-GY 8703                                       | Managing and Leading in the 21st Century <sup>1</sup> | 3         |
| <b>Total Credits</b>                             |   | <b>18</b> |

1

Course is part of the Exec 21 program; special requirements (see Construction Management ([http://bulletin.engineering.nyu.edu/preview\\_entity.php?catoid=17&ent\\_oid=1253](http://bulletin.engineering.nyu.edu/preview_entity.php?catoid=17&ent_oid=1253)) Program) or permission of adviser required.

2

Additional electives may be approved by the adviser.

## Environmental Systems Management

| Course   | Title  | Credits   |
|--|--|-----------|
| <b>Required Course</b>                           |  |           |
| CE-GY 7753                                       | ENVIRONMENTAL SYSTEMS MANAGEMENT                       | 3         |
| <b>Approved Technical Electives</b> <sup>1</sup> |  |           |
| CE-GY 7473                                       | Modeling Fate and Transport of Surface Water Pollution | 3         |
| CE-GY 7523                                       | AIR POLLUTION  | 3         |
| CE-GY 6053                                       | MONITORING CITIES                                      | 3         |
| <b>Total Credits</b>                             |  | <b>12</b> |

1

Additional electives may be approved by the adviser.

## Civil Infrastructure Systems Management

| Course   | Title  | Credits   |
|--|--|-----------|
| <b>Recommended Courses</b> <sup>1</sup>          |  |           |
| CE-GY 7863                                       | INFRASTRUCTURE MONITORING AND PERFORMANCE ASSESSMENT | 3         |
| CE-GY 6063                                       | Bridge Engineering                                   | 3         |
| CE-GY 8433                                       | URBAN GEOTECHNOLOGY                                  | 3         |
| <b>Approved Technical Electives</b> <sup>2</sup> |  |           |
| CE-GY 6143                                       | Steel Structures                                     | 3         |
| CE-GY 8433                                       | URBAN GEOTECHNOLOGY                                  | 3         |
| CE-GY 8493                                       | Environmental Geotechnology                          | 3         |
| <b>Total Credits</b>                             |  | <b>18</b> |

1

Can be substituted upon approval of the academic advisor.

2

Additional electives may be approved by the adviser.

## Sample Plan of Study

| Course                       | Title | Credits   |
|------------------------------|-------|-----------|
| <b>1st Semester/Term</b>     |       |           |
| Core Course 1                |       | 3         |
| Core Course 2                |       | 3         |
| Core Course 3                |       | 3         |
| <b>Credits</b>               |       | <b>9</b>  |
| <b>2nd Semester/Term</b>     |       |           |
| Core Course 4                |       | 3         |
| Core Course 5                |       | 3         |
| Minor Concentration Course 1 |       | 3         |
| <b>Credits</b>               |       | <b>9</b>  |
| <b>3rd Semester/Term</b>     |       |           |
| Minor Concentration Course 2 |       | 3         |
| Minor Concentration Course 3 |       | 3         |
| Minor Concentration Course 4 |       | 3         |
| <b>Credits</b>               |       | <b>9</b>  |
| <b>4th Semester/Term</b>     |       |           |
| Capstone Course              |       | 3         |
| <b>Credits</b>               |       | <b>3</b>  |
| <b>Total Credits</b>         |       | <b>30</b> |

## 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.
2. 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.
3. 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/>).

### Tandon Policies

Additional academic policies can be found on the Tandon academic policy page (<https://bulletins.nyu.edu/graduate/engineering/academic-policies/>).