

## URBAN SCIENCE AND PLANNING WITH COMPUTER SCIENCE (COURSE 11-6)

Department of Urban Studies and Planning (<https://catalog.mit.edu/schools/architecture-planning/urban-studies-planning>)

Department of Electrical Engineering and Computer Science (<https://catalog.mit.edu/schools/engineering/electrical-engineering-computer-science>)

### Bachelor of Science in Urban Science and Planning with Computer Science

#### General Institute Requirements (GIRs)

The General Institute Requirements include a Communication Requirement that is integrated into both the HASS Requirement and the requirements of each major; see details below.

| Summary of Subject Requirements  | Subjects  |
|--|-----------|
| Science Requirement  | 6         |
| Humanities, Arts, and Social Sciences (HASS) Requirement [two subjects satisfied by 11.001[J] and the required Policy/Ethics subjects (all HASS); additional HASS units may be included in urban science electives]; at least two of these subjects must be designated as communication-intensive (CI-H) to fulfill the Communication Requirement. | 8         |
| Restricted Electives in Science and Technology (REST) Requirement [can be satisfied from among 6.100A and 6.100B or 16.C20[J] and 6.1200[J] (if taken under joint number 18.062[J]) in the Departmental Program]   | 2         |
| Laboratory Requirement (12 units) [can be satisfied from among 6.1010, 6.3800, and 11.188 in the Departmental Program]   | 1         |
| <b>Total GIR Subjects Required for SB Degree</b>   | <b>17</b> |

#### Physical Education Requirement

Swimming requirement, plus four physical education courses for eight points.

#### Departmental Program

Choose at least two subjects in the major that are designated as communication-intensive (CI-M) to fulfill the Communication Requirement.

| Computer Science Requirements                                  | Units |
|--|-------|
| 6.100A Introduction to Computer Science Programming in Python  | 6     |
| 6.100B Introduction to Computational Thinking and Data Science | 6     |

or 16.C20[J] Introduction to Computational Science and Engineering

|           |                                  |    |
|-----------|----------------------------------|----|
| 6.1010    | Fundamentals of Programming      | 12 |
| 6.1200[J] | Mathematics for Computer Science | 12 |
| 6.1210    | Introduction to Algorithms       | 12 |

Select one of the following options: 12-24

Option 1 (12 units)

6.3800 Introduction to Inference

Option 2 (24 units)

18.06 Linear Algebra

or 18.Co6[J] Linear Algebra and Optimization

6.3900 Introduction to Machine Learning

#### Urban Planning Requirements

11.001[J] Introduction to Urban Design and Development 12

11.188 Introduction to Spatial Analysis and GIS Laboratory (CI-M) 12

Select one of the following options: 12

6.4590[J] Foundations of Information Policy

11.002[J] Making Public Policy

11.011 The Art and Science of Negotiation

11.165 Urban Energy Systems and Policy<sup>1</sup>

#### Urban Technology Workshop

Select one of the following options: 12

11.007 Urban and Environmental Technology Implementation Lab<sup>2</sup>

11.138 Crowd Sourced City: Civic Tech Prototyping<sup>2</sup>

11.154 Big Data, Visualization, and Society<sup>2,3</sup>

11.C35[J] Interactive Data Visualization and Society<sup>2,3</sup>

#### Senior Thesis/Project

Majors are required to write a senior thesis or complete a senior project. Select one of the following options: 18

Option 1

No more than 6 units of any MIT UROP; AND

6.UAR[J] Seminar in Undergraduate Advanced Research (CI-M)

or 11.UAR[J] Climate and Sustainability Undergraduate Advanced Research

Option 2

11.THT[J] Thesis Research Design Seminar (CI-M)

11.THU Undergraduate Thesis

#### Electives

URBAN SCIENCE AND PLANNING WITH COMPUTER SCIENCE (COURSE 11-6)

|   |                |
|---|----------------|
| Select Computer Science Electives for a minimum of 27 units from the list below | 27             |
| Select Urban Science Electives for a minimum of 30 units from the list below    | 30             |
| <b>Units in Major</b>   | <b>183-195</b> |
| <b>Unrestricted Electives</b>   | <b>48-57</b>   |
| Units in Major That Also Satisfy the GIRs                                       | (48-60)        |
| <b>Total Units Beyond the GIRs Required for SB Degree</b>                       | <b>180-195</b> |

The units for any subject that counts as one of the 17 GIR subjects cannot also be counted as units required beyond the GIRs.

- <sup>1</sup> 6.4590[*J*] and 11.165 can count towards either the Urban Planning Requirements or the Urban Science Electives, but not both.
- <sup>2</sup> 11.007, 11.138, 11.154, and 11.C35 can count towards the Urban Technology Workshop or the Urban Science Electives, but not both.
- <sup>3</sup> If you take both 11.154 and 11.C35, you may only count one of the classes towards all your major requirements.

**Computer Science Electives**

|                    |   |    |
|--------------------|---|----|
| 6.1020             | Software Construction                           | 15 |
| 6.1040             | Software Design                                 | 18 |
| 6.1060             | Software Performance Engineering                | 18 |
| 6.1100             | Computer Language Engineering                   | 12 |
| 6.1120             | Dynamic Computer Language Engineering           | 12 |
| 6.1220[ <i>J</i> ] | Design and Analysis of Algorithms               | 12 |
| 6.1600             | Foundations of Computer Security                | 12 |
| 6.1800             | Computer Systems Engineering                    | 12 |
| 6.1820[ <i>J</i> ] | Mobile and Sensor Computing                     | 12 |
| 6.1850             | Computer Systems and Society                    | 12 |
| 6.1910             | Computation Structures                          | 12 |
| 6.1920             | Constructive Computer Architecture              | 12 |
| 6.3260[ <i>J</i> ] | Networks  | 12 |
| 6.3720             | Introduction to Statistical Data Analysis       | 12 |
| 6.3730[ <i>J</i> ] | Statistics, Computation and Applications        | 12 |
| 6.4130[ <i>J</i> ] | Principles of Autonomy and Decision Making      | 12 |
| 6.4210             | Robotic Manipulation                            | 15 |
| 6.4400             | Computer Graphics                               | 12 |
| 6.4510             | Engineering Interactive Technologies            | 12 |
| 6.4530[ <i>J</i> ] | Principles and Practice of Assistive Technology | 12 |
| 6.5081             | Multicore Programming                           | 12 |
| 6.5151             | Large-scale Symbolic Systems                    | 12 |
| 6.5831             | Database Systems                                | 12 |

|                      |  |    |
|----------------------|--|----|
| 6.5931               | Hardware Architecture for Deep Learning                                      | 12 |
| 6.8301               | Advances in Computer Vision  | 15 |
| 6.8371               | Digital and Computational Photography  | 12 |
| 6.8611               | Quantitative Methods for Natural Language Processing                         | 15 |
| 6.Co1                | Modeling with Machine Learning: from Algorithms to Applications <sup>1</sup> | 6  |
| 1.Co1                | Machine Learning for Sustainable Systems <sup>1,2</sup>                      | 6  |
| or 2.Co1             | Physical Systems Modeling and Design Using Machine Learning                  |    |
| or 3.Co1[ <i>J</i> ] | Machine Learning for Molecular Engineering                                   |    |
| or 22.Co1            | Modeling with Machine Learning: Nuclear Science and Engineering Applications |    |

<sup>1</sup> Students cannot receive credit without simultaneous completion of a 6-unit Common Ground disciplinary module. See subject description for more information.

<sup>2</sup> Students cannot receive credit without simultaneous completion of 6.Co1.

**Urban Science Electives**

|                    |  |    |
|--------------------|--|----|
| 2.00A              | Designing for the Future: Earth, Sea, and Space                      | 9  |
| 4.032              | Design Studio: Information Design and Visualization                  | 12 |
| 4.432              | Modeling Urban Energy Flows for Sustainable Cities and Neighborhoods | 12 |
| 6.4590[ <i>J</i> ] | Foundations of Information Policy <sup>1</sup>                       | 12 |
| 11.007             | Urban and Environmental Technology Implementation Lab <sup>2</sup>   | 12 |
| 11.008             | Undergraduate Planning Seminar                                       | 6  |
| 11.024             | Modeling Pedestrian Activity in Cities                               | 12 |
| 11.029[ <i>J</i> ] | Mobility Ventures: Driving Innovation in Transportation Systems      | 12 |
| 11.074             | Cybersecurity Clinic   | 12 |
| 11.100             | Introduction to Computational Thinking in Cities                     | 3  |
| 11.111[ <i>J</i> ] | Leadership in Negotiation: Advanced Applications                     | 12 |
| 11.113             | The Economic Approach to Cities and Environmental Sustainability     | 12 |
| 11.123             | Big Plans and Mega-Urban Landscapes                                  | 9  |
| 11.137             | Financing Economic Development and Housing                           | 12 |
| 11.138             | Crowd Sourced City: Civic Tech Prototyping <sup>2</sup>              | 12 |

|            |  |    |
|------------|--|----|
| 11.148     | Environmental Justice: Law and Policy                                      | 12 |
| 11.149     | Decarbonizing Urban Mobility   | 12 |
| 11.C35[J]  | Interactive Data Visualization and Society <sup>2,3</sup>                  | 12 |
| 11.154     | Big Data, Visualization, and Society <sup>2,3</sup>                        | 12 |
| 11.155[J]  | Data and Society   | 12 |
| 11.156     | Healthy Cities: Assessing Health Impacts of Policies and Plans             | 12 |
| 11.158     | Behavioral Science, AI, and Urban Mobility                                 | 12 |
| 11.165     | Urban Energy Systems and Policy <sup>1</sup>                               | 12 |
| 11.169     | Global Climate Policy and Sustainability                                   | 12 |
| 12.010     | Computational Methods of Scientific Programming                            | 12 |
| 15.276     | Communicating with Data  | 12 |
| IDS.012[J] | Statistics, Computation and Applications                                   | 12 |
| IDS.060[J] | Environmental Law, Policy, and Economics: Pollution Prevention and Control | 12 |

<sup>1</sup> 6.4590[J] or 11.165 can count towards the Urban Planning Requirements or the Urban Science Electives, but not both.

<sup>2</sup> 11.007, 11.138, 11.154, and 11.C35 can count towards the Urban Technology Workshop or the Urban Science Electives, but not both.

<sup>3</sup> If you take both 11.154 and 11.C35, you may only count one of them towards all your major requirements.