Urban Science and Planning with Computer Science (Course 11-6)

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

Department of Electrical Engineering and Computer Science (http://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.

<table>
<thead>
<tr>
<th>Summary of Subject Requirements</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Requirement</td>
<td>6</td>
</tr>
<tr>
<td>Humanities, Arts, and Social Sciences (HASS)</td>
<td>8</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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]</td>
<td>2</td>
</tr>
<tr>
<td>Laboratory Requirement (12 units) [can be satisfied from among 6.1010, 6.3800, and 11.188 in the Departmental Program]</td>
<td>1</td>
</tr>
<tr>
<td>Total GIR Subjects Required for SB Degree</td>
<td>17</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Computer Science Requirements</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.100A Introduction to Computer Science Programming in Python</td>
<td>6</td>
</tr>
<tr>
<td>6.100B Introduction to Computational Thinking and Data Science</td>
<td>6</td>
</tr>
<tr>
<td>or 16.C20[J] Introduction to Computational Science and Engineering</td>
<td></td>
</tr>
<tr>
<td>6.1010 Fundamentals of Programming</td>
<td>12</td>
</tr>
<tr>
<td>6.1210 Introduction to Algorithms</td>
<td>12</td>
</tr>
<tr>
<td>Select one of the following options:</td>
<td>12-24</td>
</tr>
<tr>
<td>Option 1 (12 units)</td>
<td></td>
</tr>
<tr>
<td>6.3800 Introduction to Inference</td>
<td></td>
</tr>
<tr>
<td>Option 2 (24 units)</td>
<td></td>
</tr>
<tr>
<td>18.06 Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>or 18.C6[J] Linear Algebra and Optimization</td>
<td></td>
</tr>
<tr>
<td>6.3900 Introduction to Machine Learning</td>
<td></td>
</tr>
</tbody>
</table>

Urban Planning Requirements

<table>
<thead>
<tr>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.001[J] Introduction to Urban Design and Development</td>
</tr>
<tr>
<td>11.188 Introduction to Spatial Analysis and GIS Laboratory (CI-M)</td>
</tr>
<tr>
<td>Select one of the following options:</td>
</tr>
<tr>
<td>11.002[J] Making Public Policy</td>
</tr>
<tr>
<td>11.011 The Art and Science of Negotiation</td>
</tr>
<tr>
<td>11.165 Urban Energy Systems and Policy</td>
</tr>
</tbody>
</table>

Urban Technology Workshop

<table>
<thead>
<tr>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.007 Urban and Environmental Technology Implementation Lab</td>
</tr>
<tr>
<td>11.138 Crowd Sourced City: Civic Tech Prototyping</td>
</tr>
<tr>
<td>11.154 Big Data, Visualization, and Society</td>
</tr>
<tr>
<td>11.C35[J] Interactive Data Visualization and Society</td>
</tr>
</tbody>
</table>

Senior Thesis/Project

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

<table>
<thead>
<tr>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1</td>
</tr>
<tr>
<td>No more than 6 units of any MIT UROP</td>
</tr>
<tr>
<td>6.UAR Seminar in Undergraduate Advanced Research (CI-M)</td>
</tr>
<tr>
<td>Option 2</td>
</tr>
<tr>
<td>11.THU Undergraduate Thesis</td>
</tr>
</tbody>
</table>

Electives
Select Computer Science Electives for a minimum of 27 units from the list below

<table>
<thead>
<tr>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

| Total | 27 |

Select Urban Science Electives for a minimum of 30 units from the list below

**Units in Major** | 183-195
---|---
**Unrestricted Electives** | 48-57
**Units in Major That Also Satisfy the GIRs** | (48-60)
**Total Units Beyond the GIRs Required for SB Degree** | 180-195

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

1. 6.4590[J] and 11.165 can count towards either the Urban Planning Requirements or the Urban Science Electives, but not both.
2. 11.007, 11.138, 11.154, and 11.C35 can count towards the Urban Technology Workshop or the Urban Science Electives, but not both.
3. 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1020</td>
<td>Software Construction</td>
<td>15</td>
</tr>
<tr>
<td>6.1040</td>
<td>Software Design</td>
<td>15</td>
</tr>
<tr>
<td>6.1060</td>
<td>Software Performance Engineering</td>
<td>18</td>
</tr>
<tr>
<td>6.1100</td>
<td>Computer Language Engineering</td>
<td>12</td>
</tr>
<tr>
<td>6.1120</td>
<td>Dynamic Computer Language Engineering</td>
<td>12</td>
</tr>
<tr>
<td>6.1120[J]</td>
<td>Design and Analysis of Algorithms</td>
<td>12</td>
</tr>
<tr>
<td>6.1600</td>
<td>Foundations of Computer Security</td>
<td>12</td>
</tr>
<tr>
<td>6.1800</td>
<td>Computer Systems Engineering</td>
<td>12</td>
</tr>
<tr>
<td>6.1850</td>
<td>Computer Systems and Society</td>
<td>12</td>
</tr>
<tr>
<td>6.1910</td>
<td>Computation Structures</td>
<td>12</td>
</tr>
<tr>
<td>6.1920</td>
<td>Constructive Computer Architecture</td>
<td>12</td>
</tr>
<tr>
<td>6.3260[J]</td>
<td>Networks</td>
<td>12</td>
</tr>
<tr>
<td>6.3720</td>
<td>Introduction to Statistical Data Analysis</td>
<td>12</td>
</tr>
<tr>
<td>6.4130[J]</td>
<td>Principles of Autonomy and Decision Making</td>
<td>12</td>
</tr>
<tr>
<td>6.4210</td>
<td>Robotic Manipulation</td>
<td>15</td>
</tr>
<tr>
<td>6.4400</td>
<td>Computer Graphics</td>
<td>12</td>
</tr>
<tr>
<td>6.4510</td>
<td>Engineering Interactive Technologies</td>
<td>12</td>
</tr>
<tr>
<td>6.4530[J]</td>
<td>Principles and Practice of Assistive Technology</td>
<td>12</td>
</tr>
<tr>
<td>6.5081</td>
<td>Multicore Programming</td>
<td>12</td>
</tr>
<tr>
<td>6.5151</td>
<td>Large-scale Symbolic Systems</td>
<td>12</td>
</tr>
<tr>
<td>6.5831</td>
<td>Database Systems</td>
<td>12</td>
</tr>
<tr>
<td>6.5931</td>
<td>Hardware Architecture for Deep Learning</td>
<td>12</td>
</tr>
<tr>
<td>6.7201</td>
<td>Optimization Methods</td>
<td>12</td>
</tr>
<tr>
<td>6.8301</td>
<td>Advances in Computer Vision</td>
<td>15</td>
</tr>
<tr>
<td>6.8371</td>
<td>Digital and Computational Photography</td>
<td>12</td>
</tr>
<tr>
<td>6.8611</td>
<td>Quantitative Methods for Natural Language Processing</td>
<td>15</td>
</tr>
<tr>
<td>6.C01</td>
<td>Modeling with Machine Learning: from Algorithms to Applications</td>
<td>6</td>
</tr>
<tr>
<td>1.C01</td>
<td>Machine Learning for Sustainable Systems</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>or 2.C01 Physical Systems Modeling and Design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or 3.C01 Machine Learning for Molecular Engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or 22.C01 Modeling with Machine Learning: Nuclear Science and Engineering Applications</td>
<td></td>
</tr>
</tbody>
</table>

### Urban Science Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00A</td>
<td>Designing for the Future: Earth, Sea, and Space</td>
<td>9</td>
</tr>
<tr>
<td>4.032</td>
<td>Design Studio: Information Design and Visualization</td>
<td>12</td>
</tr>
<tr>
<td>4.432</td>
<td>Modeling Urban Energy Flows for Sustainable Cities and Neighborhoods</td>
<td>12</td>
</tr>
<tr>
<td>11.007</td>
<td>Urban and Environmental Technology Implementation Lab</td>
<td>12</td>
</tr>
<tr>
<td>11.024</td>
<td>Modeling Pedestrian Activity in Cities</td>
<td>12</td>
</tr>
<tr>
<td>11.029[J]</td>
<td>Mobility Ventures: Driving Innovation in Transportation Systems</td>
<td>12</td>
</tr>
<tr>
<td>11.074</td>
<td>Cybersecurity Clinic</td>
<td>12</td>
</tr>
<tr>
<td>11.100</td>
<td>Introduction to Computational Thinking in Cities</td>
<td>3</td>
</tr>
<tr>
<td>11.113</td>
<td>The Economic Approach to Cities and Environmental Sustainability</td>
<td>12</td>
</tr>
<tr>
<td>11.123</td>
<td>Big Plans and Mega-Urban Landscapes</td>
<td>9</td>
</tr>
<tr>
<td>11.137</td>
<td>Financing Economic Development and Housing</td>
<td>12</td>
</tr>
<tr>
<td>11.138</td>
<td>Crowd Sourced City: Civic Tech Prototyping</td>
<td>12</td>
</tr>
<tr>
<td>11.148</td>
<td>Environmental Justice: Law and Policy</td>
<td>12</td>
</tr>
<tr>
<td>11.149</td>
<td>Decarbonizing Urban Mobility</td>
<td>12</td>
</tr>
<tr>
<td>11.C35[J]</td>
<td>Interactive Data Visualization and Society</td>
<td>12</td>
</tr>
</tbody>
</table>

1. Students cannot receive credit without simultaneous completion of a 6-unit Common Ground disciplinary module. See subject description for more information.
2. Students cannot receive credit without simultaneous completion of 6.C01.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.154</td>
<td>Big Data, Visualization, and Society</td>
<td>12</td>
</tr>
<tr>
<td>11.155[J]</td>
<td>Data and Society</td>
<td>12</td>
</tr>
<tr>
<td>11.156</td>
<td>Healthy Cities: Assessing Health Impacts of Policies and Plans</td>
<td>12</td>
</tr>
<tr>
<td>11.158</td>
<td>Behavioral Science, AI, and Urban Mobility</td>
<td>12</td>
</tr>
<tr>
<td>11.165</td>
<td>Urban Energy Systems and Policy</td>
<td>12</td>
</tr>
<tr>
<td>11.169</td>
<td>Global Climate Policy and Sustainability</td>
<td>12</td>
</tr>
<tr>
<td>12.010</td>
<td>Computational Methods of Scientific Programming</td>
<td>12</td>
</tr>
<tr>
<td>15.276</td>
<td>Communicating with Data</td>
<td>12</td>
</tr>
<tr>
<td>IDS.012[J]</td>
<td>Statistics, Computation and Applications</td>
<td>12</td>
</tr>
<tr>
<td>IDS.060[J]</td>
<td>Environmental Law, Policy, and Economics: Pollution Prevention and Control</td>
<td>12</td>
</tr>
</tbody>
</table>

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