<table>
<thead>
<tr>
<th>Module Code</th>
<th>CS7NS4</th>
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<tbody>
<tr>
<td>Module Name</td>
<td>Urban Computing</td>
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<tr>
<td>ECTS weighting</td>
<td>5</td>
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<tr>
<td>Term</td>
<td>HT</td>
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<tr>
<td>Contact Hours</td>
<td>2 lecture hours per week</td>
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<tr>
<td>Module Personnel</td>
<td>Assistant Professor Mélanie Bouroche</td>
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</tbody>
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### Learning Outcomes
On successful completion of this module a student will be able to:

- NS4LO1 Describe the purpose, scope, and challenges associated with urban computing
- NS4LO2 Describe and reason about cyber-physical systems, including closing the feedback loop
- NS4LO3 Describe, compare and contrast existing approaches and associated challenges to data collection and management, including participatory and opportunistic sensing
- NS4LO4 Contrast, select and apply state of the art city-scale intelligent optimization techniques
- NS4LO5 Analyse, specify, design, implement and test a complete smart city application

### Module Learning Aims
This module aims to provide both a theoretical and practical understanding of urban computing and associated cyber-physical concepts, principles, challenges and solutions. Urban computing is a process of acquisition, integration, analysis of and actuation upon, big and heterogeneous data generated by a diversity of sources in urban spaces, to improve the management of constrained urban resources, thereby enhancing the urban environment, human life quality, and city operation.

Students will be exposed to the wide range of principles and challenges associated with urban computing, and how ubiquitous sensing, advanced data management and analytic models, and autonomic computing need to come together to address those.

The module also aims to highlight some of the relevant ongoing research and innovation in the space taking place within Ireland and internationally.

### Module Content
Specific topics addressed in this module include:

- Gathering urban data, resources (environment/pollution/energy, human mobility and vehicular traffic, water) monitoring and data mining
- Urban big data management and heterogeneous data management, knowledge fusion across heterogeneous data,
- Closing the feedback loop, model/analyse/plan/execute loop and associated requirements and challenges
- Citizen engagement, including participatory and opportunistic sensing
- Urban data visualization and decision support systems
- Anomaly detection and event discovery in urban areas
- Urban-scale ubiquitous/pervasive intelligent systems

### Assessment Details
Examination: 60%
Coursework 40%