Course Name:
Urban Infrastructure Sustainability Principles

<table>
<thead>
<tr>
<th>Course Number: 20-023</th>
<th>Credit: 3</th>
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<tr>
<td>Program: Undergraduate</td>
<td>Course Type: Technical elective</td>
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<tr>
<td>Prerequisite: Engineering Probability and Statistics</td>
<td>Corequisite: -</td>
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Course Description (Objectives):
This course aims to provide students with the critical knowledge and technical expertise to analyze, plan, and design future urban systems as livable, integrated, and low-carbon entities. More specifically, students should be able to understand what sustainability means and how it can be applied for urban infrastructure systems. These urban infrastructure systems include: electricity, water, transport, buildings, and solid waste management. Emphasis is put on infrastructure integration and carbon accounting using principles of sustainability and resilience.

Course Content (outline):
- Understand what sustainability means and how it can be applied for engineering projects.
- Understand the role that cities can play in future and use various techniques to forecast population (Short-term/Long-term population forecast techniques).
- Introduce urban infrastructure systems: electricity, water, transport, buildings, and solid waste management with focus on sustainable supply and demand changes.
- Introduce the concept of Urban Metabolism and identify inter-dependencies between each infrastructure system and plan an entire urban environment that is both livable and sustainable.
- Analyze and calculate energy use and greenhouse-gas (GHG) emissions of most urban systems, including electricity, water, transport, buildings, and solid waste management.
- Get familiar with the new Science of Cities and the famous laws related to this field.
- Learn new Machine Learning techniques and how to use them in complicated urban problems (e.g., K-means Clustering, Decision Tree Learning, Neural Networks).
References: