New Spring 2020 course – CIV_ENV_395-0-27

Framework and motivation

Buildings contribute to approximately 40% of the primary energy consumption of the United States. 50% percent of this energy is used for space conditioning and hot water production. As it is now, non-renewable energy sources meet most of the thermal energy requirements of buildings. This contributes to 20% of the energy-related greenhouse gas emissions, leading to extreme weather and environmental pollution.

A breakthrough solution to avoid the previous issues involves the harvesting of shallow geothermal energy from the subsurface via energy geostructures and geosystems: novel earth-contact technologies that can provide renewable energy supply and structural support to all built environments.

Targeted audience

Undergraduate and graduate students interested in energy, environmental sustainability, structures, geosystems, and urban planning.

Future civil, environmental, energy and mechanical engineers.

Course content & objectives

This course focuses on the analysis and design of energy geostructures and geosystems from energy, geotechnical and structural perspectives. It includes theoretical and practical sessions. In practical sessions, a project to characterize the subsurface of cities for energy harvesting will be performed, considering the Loop district in Chicago as a case study. A field visit to install wireless sensors in underground tunnels and parking is foreseen. This activity will establish a subsurface sensing network that will serve the project and represent a world first.

Learning objectives of this course are as follows:

- Understand the phenomena governing the performance of energy geostructures
- Master the performance-based design of energy geostructures
- Envision future urban planning strategies making geosystems a resource

Further info

Class hours: Tues. & Thurs., 12:30-1:50 pm
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