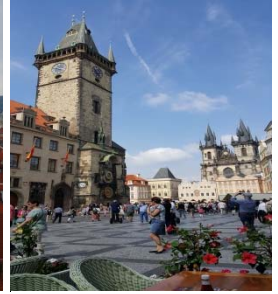


## **Study Abroad - Short Term Summer Course, Prague, Czech Republic**

### **Sustainability & Smart Cities (ENCE489C – 3 credits)**



Charles Bridge, Prague Castle, Town Center, Astronomical Clock, Prague

#### **Program Dates:**

**May 18 – May 31, 2018**

#### **Program Director:**

Dr. Dimitrios Goulias, Associate Professor, Director Undergraduate Studies

#### **Course Description**

With the significant increase of people in large cities the implementation of concepts and principles of “Sustainable Infrastructure” and “Smart Cities” are vital for the survival of urban settlements and the development of healthy living conditions, along with economic prosperity. Prague, in the Czech Republic, and more specifically the Czech Technical University in Prague has been in the forefront of the development of “Smart Cities” initiatives within the European Union. The specific history and cultural challenges of the city provides unique challenges and complexity in such effort. First the different approaches to the development of smart cities will be covered. An overview of what smart cities are and what are their major challenges will be covered as well. The development of “smart cities” will be addressed from both the i) the broad and complex “system” point of view, as well as, ii) focus on system engineering, system decomposition, and design/technical aspect. Smart cities’ building blocks, such as “smart streets” or “smart buildings” will be discussed as a matter of pragmatic and feasible level of details. Additionally, selected tools needed for developing real projects focusing on smart cities (such as multi-agent systems, sensor fusions, and other pertinent tools), will be covered along with specific case studies demonstrating the challenges and success of smart cities development.

#### **Theoretical Framework**

This study abroad course will expose students to the theoretical principles, framework, and techniques required to address the development of sustainable and smart cities, complex spatial systems encompassing mobility, environment, energy, and social well-being. The course will deal with the identification of a set of qualitative/quantitative indicators and methodologies for developing smart cities. The course will first address with key faculty experts speakers from the US, Czech Republic, the principles of technical, cultural and social approaches used in the design of sustainable smart cities, including among other:

- System-Oriented Approach to Smart Cities;
- Smart City Strategies: impact, perception, measures and diagnostic methods;
- Smart Cities Information Systems, Telecommunications and Evacuation Strategies;
- Smart Cities and Ecosystem based Approach: global warming, climate change, emission modeling and air quality;
- Smart Cities Components: infrastructure and transportation, safety, energy consumption, human factors, other.
- Sustainability Requirements for green infrastructure (buildings, roads, other)
- Principles & Design of Sustainable Green Urban Roads: life cycle analysis, pavement design, “green” materials;
- Sustainable Rehabilitation Strategies for roads and buildings: rehabilitation methods, recycling techniques, reclaimed materials; Permeable and impermeable surfaces and materials.

## **Case Studies**

The study abroad students will be involved in the development of alternative “smart cities” solutions incorporating “sustainability” principles and analysis related to alternative city conditions. The alternative case studies for developing student projects will be identified in cooperation with the faculty of the Czech Technical University (CTU) in Prague and City Officials, and will involve interaction with graduate and undergraduate students of CTU specializing in “Smart Cities.”

## **Site Visits (tentative)**

The following site visits are included in the course including both technical and cultural landmarks:

- UCEEB, University Centre for Energy Efficient Buildings, Labs.
- Dancing House Office Complex
- Prague Castle -Pražský hrad- complex and large system of historical palaces, offices, church, fortification buildings, and green spaces.
- Charles Bridge - Karlův most - oldest bridge with fortified towers (Lesser Town Bridge Towers, Old Town Bridge Tower);
- Old Town Hall, complex with Gothic tower, administration offices, underground areas, a bay chapel, and unique astronomical clock – known as the Orloj;
- Other historic, cultural and architectural landmarks and monuments representing Romanesque chapels, Gothic cathedrals, Baroque palaces and gardens, worldly Art Nouveau buildings, and unique Cubist architecture buildings; Dancing House office complex.

## Instructors

### University of Maryland (UMD)

*Department of Civil and Environmental Engineering.*

- Dr. Dimitrios Goulias, Associate Professor. (Program Director).

### Czech Technical University in Prague (CTU)

*Department of Applied Mathematics & Transportation Sciences, Center for “Smart Cities.”*

- Dr. Ondřej Přibyl, Associate Professor, Associate Dean for International Relations; (on site Co-instructor)
- Dr. Tomas Horak, Associate Professor;
- Ing. Petra Skolilová, Deputy Vice-Dean for Strategy & International Relations

## Course Schedule (tentative)

- May 9, 2018      Pre-departure meeting/ orientation and travel information.
- May 18, 2018      Departure from US.
- May 19, 2018      Arrival in Prague, airport transfer to hotel  
On-site orientation, downtown sightseeing & dinner
- May 20, 2018:      Prague Downtown walking city tour & site visits: Prague Castle - Pražský hrad, Charles Bridge - Karlův most, Prague Old Town Hall; Prague City center.
- May 21, 2018:      Workshop logistics & lectures: Theoretical framework, strategies, and tools for the development of “Smart Cities and Sustainability”. Case studies and formation of project teams with CTU students.
- May 22, 2018:      Site Visit: University Center for Energy Efficient Buildings (UCEEB)  
Lectures: Energy Efficient Buildings - Materials, Technology, Research
- May 23, 2018:      Workshop logistics & lectures: Theoretical framework, strategies, and tools for the development of “Smart Cities and Sustainability”.  
Team Design Projects: Smart Cities & Sustainability
- May 24, 2018:      SCSP18 Smart Cities Symposium Workshop & lectures: Theoretical framework, strategies, and tools for the development of “Sustainability & Smart Cities.”  
River Boat Cruise & Gala Dinner
- May 25, 2018:      SCSP18 Smart Cities Symposium Workshop & lectures: Theoretical framework, strategies, and tools for the development of “Sustainability & Smart Cities.”
- May 26, 2018:      Team Design Projects: Smart Cities & Sustainability  
Site Visit: Dancing House Office Complex
- May 27, 2018:      Site Visit/Free time

-May 28, 2018	Team Design Projects: Smart Cities & Sustainability Preparation of Team Project Presentations
-May 29, 2018	Morning: Team Design Projects Presentations Workshop Assessment & Concluding Remarks Reflection summary Farewell Dinner
-May 30, 2018	Airport Transfer & Return to the US.

## **Course Location & Access**

Students will be housed at a hotel in Prague and will be using CTU facilities. The workshop and coursework activities will take place at the Czech Technical University in Prague, under the auspices of the “Smart Cities” Center.

## **Learning Objectives**

Students in this course will:

- gain knowledge on the principles and techniques for “smart cities,” and design of sustainability based infrastructure alternatives;
- be exposed to the complex and multi-disciplinary analysis required for such projects and account for the physical characteristics of the space, the historic and cultural identity of cities, as well as the environmental aspects;
- be exposed to and learn of the set of qualitative and quantitative indicators used in the design of “smart cities” and “green infrastructure;”
- apply principles and techniques on case studies.

## **Learning Outcomes**

By the end of the course, students should have attained competency (ABET) in the following areas:

- participatory decision making within a team;
- creating design alternatives based on community needs assessment, and cultural identity;
- creating and analyzing multiple design alternatives;
- determining appropriate techniques and methods to be used in solving societal needs mingled with engineering and environmental principles;
- determining metrics for a design project;

## Participation.

The students will be working in teams with CTU students to conduct their design projects. Students are expected to: i) attend all of the workshop/ lecture and site visit sessions associated with this course; ii) actively participate in the design project developed by each team.

## Program Assessment

### 1. Program & Team Participation (15%)

This component will assess the interest, participation and interaction of each student in the different phases of this study abroad course (lectures, project design of case studies, site visits). Throughout the program, the faculty will assess through one to one interaction and discussions the following: student knowledge of the principles of developing smart cities and green infrastructure design alternatives; their ability to recognize the complex and multi-disciplinary analysis required for such projects; their knowledge and ability to identify the set of qualitative and quantitative indicators for the design of “smart cities” and “green infrastructure.”

Participants will be asked to select one of the technical /cultural site visits included in the program, prepare explanatory material and present their findings and explanation to the rest of the team during the actual visit.

### 2. Design Project Report & Presentation (70%)

Each student and team will be assessed based on the level of performance in regards to the following list of outcomes:

- participatory decision making within a team;
- ability to create and administer design alternatives based on community needs assessment, and cultural identity;
- ability to create and analyze multiple design alternatives;
- ability to determine appropriate techniques and methods to be used in solving societal needs mingled with engineering and environmental principles;
- ability to define evaluation metrics for the design project.

### 3. Reflection Summary (15%)

At the conclusion of the program a “Reflection” summary will be prepared from each student which will highlight:

- cultural immersion experience pinpointing both social and professional differences between US and CZ;
- Details and impressions from a technical /cultural visit site of choice.

## Academic Integrity

Students will be reminded of the academic integrity expectations and the [Honor Code](#).