Smart cities - course description

General information

Course name	Smart cities
Course ID	04.2-WE-BizElP-SC-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	E-business
Education profile	practical
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2021/2022

Course information

Semester	6
ECTS credits to win	3
Course type	optional
Teaching language	english
Author of syllabus	• dr inż. Tomasz Gratkowski

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Credit with grade
Project	15	1	-	-	Credit with grade

Aim of the course

Presentation of models for building information systems supporting the life of the computerized city. Solutions to help public institutions observe and analyze various areas of city management. Analyze specific areas of the city's functioning, such as crisis response, public safety, social welfare, transport and water management. Students will learn about methods that will allow them to design and build urban monitoring systems as well as systems for responding to events and incidents based on information provided by various institutions and units. As part of the course, rules will be presented on how to involve citizens and businesses in reporting incidents and respond to them through IT systems.

Prerequisites

Geographic information system, Internet resource exploration, Internet resource exploration, Cloud computing, Big data technologies, Internet technologies

Scope

Introduction to the idea of a smart city. Historical view. Theoretical foundations used to build solutions dedicated to the construction of a smart city. Integration of existing IT solutions systems with systems used in cities. Information generated by cities needed for their functioning. Data visualization methods from public institutions. Data modeling. Modeling of agent systems for the needs of urban agglomerations. Urban agglomeration information systems: from Small to Big Data. Virtual city. Symulacja i przewidywanie sytuacji w mieście. A city on the Internet.

As part of practical classes, students will learn about the most important issues related to building a IT for a smart city. In addition, they will become familiar with the tools that enable building elements of the smart city support system.

Teaching methods

Lecture - standard lecture using a video projector.

Project - practical classes in the computer laboratory.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
The student knows the methods of data mining and visualization for the city		• a pass - oral, descriptive, test and other	• Lecture
The student is able to prepare the elements included in the IT infrastructure of a smart city		• a project	• Project
The student knows the methods and technologies that enable simulation and prediction of the situation in an urban agglomeration		• a pass - oral, descriptive, test and other	• Lecture
The student is able to use technologies to build systems supporting the functioning of an intelligent city		• a pass - oral, descriptive, test and other	• Lecture
The student is able to solve the real problems of city infrastructure management		• a project	• Project

Assignment conditions

Lecture - writing and/or oral exam, carried out at the end of the semester

Project - the final grade is the weighted sum of the marks obtained for the implementation of individual project exercises and control tests verifying the substantive preparation for the exercises.

Final grade = 50% of the grade in the form of classes lecture + 50% of the grade in the form of project classes.

Recommended reading

1. Michael Batty; The New Science of Cities Hardcover, The MIT Press, 2013

Further reading

1. de Smith, Goodchild, Longley, Geospatial Analysis - 4th Edition http://www.spatialanalysisonline.com/HTML/index.html
2. Batty M.: Cities and Complexity - Understanding Cities with Cellular Automata, Agent-Based Models, and Fractals The MIT Press, 2007.
3. Singleton A.D., Spielman S., Folch D. - Urban Analytics (Spatial Analytics and GIS) First Edition, SAGE Publications Ltd; First edition (January 5, 2018)
4. Mohammed J. Zaki, Wagner Meira Jr, Data Mining and Analysis: Fundamental Concepts and Algorithms, Cambridge University Press, 2014.
5. Kluever C.A. - Dynamic Systems: Modeling, Simulation, and Control 1st Edition, Wiley; 1 edition (April 6, 2015)
6. Stone J.V. - Artificial Intelligence Engines: A Tutorial Introduction to the Mathematics of Deep Learning, Sebtel Press (March 28, 2019)

Notes

Modified by dr hab. inż. Marek Kowal, prof. UZ (last modification: 12-07-2021 11:41)

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