University of Thessaly

Department of Business Administration

UNIVERSITY OF THESSALY

Smart and Sustainable Cities

Hellenic Open University

School of Science and Technology

HELLENIC OPEN UNIVERSITY

COURSE OUTLINE

(1) GENERAL

Faculty			
Department			
Level			
COURSE CODE		**SEMESTER OF STUDY**	
COURSE TITLE	IoT and cloud computing for smart cities		

INDEPENDENT TEACHING ACTIVITIES *In case ECTS credits are awarded in distinct parts of the course e.g. Lectures, Laboratory Exercises, etc. If the credits are awarded uniformly for the entire course, indicate the ly teaching hours and the total number of credits*	**LY CONTACT HOURS**	**ECTS**
	2x13=26	5
Add rows if needed. The organization of teaching and the teaching methods used are described in detail in (d).		

COURSE TYPE *general background, specific background, specialization, general knowledge, skills development*	
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION AND EXAMINATIONS:	English
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
ONLINE COURSE PAGE (URL)	

(2) LEARNING OUTCOMES

Learning Outcomes

The learning outcomes of the course are described, the specific knowledge, competences and skills of an appropriate level that students will acquire after the successful completion of the course.

Consult Appendix A
- *Description of the Level of Learning Outcomes for each study cycle according to the EQF*
- *Descriptors of Levels 6, 7 & 8 of the EQF for Lifelong Learning and Annex B*
- *Summary Guide for writing Learning Outcomes*

The learning outcomes for "IoT and cloud computing for smart cities" module, include:

- Understanding the concepts and principles of IoT and cloud computing technologies and their applications in smart cities.
- Developing an understanding of the architecture of IoT and cloud computing systems and their role in smart city ecosystems.
- Understanding the challenges and opportunities associated with the deployment of IoT and cloud computing systems in smart cities.
- Understanding the ethical and social implications of IoT and cloud computing technologies

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in smart cities.
- Developing skills in designing and developing IoT and cloud computing solutions for smart city applications.
- Developing skills in evaluating and selecting appropriate IoT and cloud computing technologies for smart city projects.
- Understanding the role of standards and interoperability in IoT and cloud computing systems for smart cities.
- Understanding the economic and policy considerations for the deployment of IoT and cloud computing systems in smart cities.
- Understanding the cybersecurity and data privacy issues associated with IoT and cloud computing systems in smart cities.

By the end of the module, students should be able to apply their knowledge and skills to design and implement IoT and cloud computing solutions for smart city applications, and be able to evaluate the feasibility and effectiveness of such solutions. They should also be able to critically evaluate the ethical, social, economic, and policy implications of these technologies in the context of smart and resilient cities.

General Skills

Taking into account the general competencies that the graduate must have acquired (as listed in the Diploma Supplement and listed below) which of them is the subject aimed at?.

Search, analysis and synthesis of data and information, using the necessary tools.
Adapting to new situations
Decision-making
Autonomous work
Teamworking
Working in an international environment
Work in an interdisciplinary environment
Production of new research ideas

Project planning and management
Respect for diversity and multiculturalism
Respect for the natural environment
Demonstrate social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Promotion of free, creative and inductive thinking
......
Other...
....

Overall, the module can help students develop a wide range of skills that are in high demand in the rapidly evolving field of smart city technology.
- Problem-solving skills: Students will learn how to identify problems related to IoT and cloud computing in the context of smart cities and develop strategies to solve them.
- Analytical skills: Students will learn how to collect and analyze data from IoT devices and cloud computing platforms to make informed decisions related to smart city applications.
- Communication skills: Students will learn how to effectively communicate technical concepts related to IoT and cloud computing to different stakeholders, including city officials, businesses, and citizens.
- Teamwork and collaboration: Students will work in teams to design and implement IoT and cloud computing solutions for smart city applications, developing their teamwork and collaboration skills.
- Project management skills: Students will learn how to plan, execute, and manage projects related to IoT and cloud computing for smart cities, developing their project management skills.
- Ethical and social responsibility: Students will learn about the ethical and social implications of IoT and cloud computing in the context of smart cities, developing their ability to make responsible decisions that take into account the impact on society and the environment.
- Entrepreneurial mindset: Students will develop an entrepreneurial mindset by identifying

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opportunities for IoT and cloud computing in the context of smart cities and developing innovative solutions to address urban challenges.

(3) COURSE CONTENT

The course content is the following:

1: Introduction to IoT and cloud computing for smart cities
- Overview of IoT and cloud computing concepts and technologies
- Smart cities use cases and examples
- IoT and cloud computing challenges and opportunities for smart cities

2: IoT technologies for smart cities
- Sensors and actuators
- Communication protocols and networks
- Data collection and processing

3: Cloud computing for smart cities
- Cloud infrastructure and services
- Cloud deployment models
- Cloud security and privacy

4: IoT and cloud integration for smart cities
- IoT cloud platforms and architectures
- IoT cloud integration challenges and solutions
- Case studies of IoT cloud integration for smart cities

5: Smart city applications and use cases
- Smart energy and utilities
- Smart transportation and mobility
- Smart buildings and homes

6: Edge computing for smart cities
- Edge computing concepts and architectures
- Edge computing use cases for smart cities
- Edge computing challenges and solutions

7: Security and privacy in smart cities
- Smart city security challenges and risks
- Smart city privacy challenges and risks
- Smart city security and privacy solutions

8: Smart city standards and interoperability
- Smart city standards and frameworks
- Smart city interoperability challenges and solutions

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● Smart city standardization organizations and initiatives

10: Future directions for IoT and cloud computing in smart cities
   ● Emerging IoT and cloud technologies and trends
   ● Smart city innovation and entrepreneurship
   ● Smart city policy and governance

(4) TEACHING AND LEARNING METHODS - ASSESSMENT

HOW TO DELIVER *Face-to-face, Distance learning, etc.*	Distance Learning
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in Teaching, Laboratory Education, Communication with students*	**Use of Moodle, eclass LMS**
TEACHING ORGANIZATION *The way and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliography Study & Analysis, Tutorial, Work based placement, Clinical Practice, Artistic Workshop, Interactive teaching, Educational visits, Project preparation, Assignments, Artistic creation, etc.* *Indicate the student's study hours for each learning activity as well as the hours of unguided study in accordance with the principles of ECTS*	<table><tr><th>Activity</th><th>Semester Workload</th></tr><tr><td>Online lectures – webinars</td><td>26</td></tr><tr><td>Study hours</td><td>50</td></tr><tr><td>Assignments</td><td>50</td></tr><tr><td>**Course Total**</td><td>*126*</td></tr></table>
STUDENT EVALUATION *Description of the evaluation process* *Assessment Language, Assessment Methods, Formative or Inferential, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Report/Report, Oral Exam, Public Presentation, Laboratory Work, Clinical Patient Examination, Artistic Interpretation, Other/Other* *Explicitly defined evaluation criteria are mentioned and if and where they are accessible to students.*	Written assignment. Students should research and propose an IoT and cloud computing solution for a specific urban challenge faced by a city of their choice. Students would need to identify the problem, research existing solutions, and propose an innovative and feasible IoT and cloud computing solution that addresses the challenge. The proposal should also consider the economic, social, and environmental impacts of the solution, as well as the potential risks and ethical considerations. This assignment would assess students' ability to apply their knowledge and skills in a real-world context, as well as their research and critical thinking abilities. Presentation of the assignment at the classroom

(5) RECOMMENDED-BIBLIOGRAPHY

- Suggested Bibliography:

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Rodrigues, J., Agarwal, P., & Khanna, K. (Eds.). (2022). *IoT for Sustainable Smart Cities and Society*. Springer.

Ejaz, W., & Anpalagan, A. (2019). *Internet of things for smart cities: technologies, big data and security* (pp. 1-15). Berlin/Heidelberg, Germany: Springer International Publishing.

- Related scientific journals:
Smart Cities, https://www.mdpi.com/journal/smartcities
Sustainable Cities and Society, https://www.sciencedirect.com/journal/sustainable-cities-and-society
Cities, https://www.sciencedirect.com/journal/cities