

Internet of Things

COURSE OUTLINE

(1) GENERAL

SCHOOL	Science and Technology		
ACADEMIC UNIT	Science and Technology		
PROGRAMME OF STUDIES	Msc in Cybersecurity		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	CE05	SEMESTER	2
COURSE TITLE	Internet of Things		
COURSE TYPE <i>Elective, compulsory</i>	Elective		
INSTRUCTOR(S)	Theory: Prof. Stavros Stavrinides Lab: Prof. Stavros Stavrinides		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	WEEKLY TEACHING HOURS	CREDITS	
	30h/13w=2.31	6	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
TEACHING ACTIVITIES BREAKDOWN	WEEKLY HOURS		
Theory	0.50		
Lab	1.81		
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background Skills development		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://www.ihu.gr/ucips/postgraduate-programmes/cybersecurity		

(2) LEARNING OUTCOMES

<p>Learning outcomes</p> <p><i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>
<p>On completing the course students will:</p> <ul style="list-style-type: none"> • Develop knowledge of embedded systems & sensor networks. • Acquire a solid overview of the forthcoming technologies on the Internet of Things. • Understand the challenges faced by IoT devices in various application domains. • Familiarize with different technologies and standards.
General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management
Adapting to new situations	Respect for difference and multiculturalism
Decision-making	Respect for the natural environment
Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues
Team work	Criticism and self-criticism
Working in an international environment	Production of free, creative and inductive thinking
Working in an interdisciplinary environment
Production of new research ideas	Others...

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Decision Making
- Teamwork
- Production of free, creative, and inductive thinking

(3) SYLLABUS

The course is an introduction to fundamental concepts and tools of the Internet of Things. Students are provided with the necessary mathematical, computational and programming background, as well as the use of the Python programming language. Finally, basic knowledge of electronics is provided, adapted to the technological environment of the Internet of Things, including an extensive laboratory part. The topics covered include:

- Introduction to the IoT.
- IoT operating systems.
- Basic Applied Electronics.
- Sensor and actuator connectivity methodology.
- Sensor networks and Protocols.
- Lab based on Raspberry and Arduino.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Hybrid: Face to face and synchronous distance learning	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	<p>Use of ICT in Teaching</p> <p>During the educational process, various machine learning and programming tools are used, along with the material available at the e-learning platform.</p> <p>The hybrid teaching method involves synchronous learning with the support of the videoconferencing tool Zoom.</p> <p>Students are taught a variety of tools related to the course content and material.</p> <p>Use of ICT in Communication with students</p> <ul style="list-style-type: none"> ● The course material (slides, scientific articles, exercises, etc.) is posted on the course page at the e-learn platform (Moodle). ● Use of Moodle Forums announcements. ● Live video meetings via Zoom/Teams. ● Contact via email. 	
TEACHING METHODS <i>The manner and methods of teaching are described in detail. Lectures, recitation, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical</i>	Activity	Semester workload
	Lectures	8 hrs.
	Lab	22 hrs.
	Project	10 hrs.

<p><i>practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i></p>	Exams	3 hrs.
	Non-Directed Study	107 hrs.
	Course total	150 hrs.
COURSE MATERIAL ARRANGEMENT	Theory/Recitation	
	The IoT	1 hr.
	Sensors and basic electronic circuits	5 hrs.
	Sensor networks	4 hrs.
	IoT protocols	
	Operating systems for the IoT	
	Lab	
	Basics of Electronics – Sensor and actuator circuits	3 hrs.
	Introduction to Python and NumPy programming	3 hrs.
	Introduction to the Arduino programming environment - Connecting sensors	3 hrs.
	Introduction to the Raspberry Pi programming environment - Connecting sensors	3 hrs.
	IoT project	
	STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English
<p><i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students</i></p>		
STUDENT OBLIGATIONS	<p><i>Compulsory attendance of lectures, labs, recitations, compulsory participation in midterms, exams, compulsory delivery of homework, projects, etc.</i></p>	
	<p>Language of Evaluation: English</p> <p>Evaluation Procedure:</p> <ul style="list-style-type: none"> ● Written Exams (30%). Methods of evaluation: <ul style="list-style-type: none"> ○ Multiple choice questions ● Group project (70%): <ul style="list-style-type: none"> ○ Build an IoT application (hardware-software) <p>The evaluation procedure is announced to the students during the first lecture.</p>	
STUDENT OBLIGATIONS		<ul style="list-style-type: none"> ● Compulsory attendance of lectures ● Compulsory attendance of labs ● Compulsory participation in the exams ● Compulsory delivery of project

(5) ATTACHED BIBLIOGRAPHY

<p>- Suggested Textbooks</p> <ol style="list-style-type: none"> 1. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry. Cisco Press, 2017. 2. Practical Internet of Things Security. Brian Russell, Drew Van Duren. Packt Publishing, 2016. 3. Enterprise IoT: Strategies and Best Practices for Connected Products and Services. Dirk Slama, Frank Puhlmann, Jim Morrish, Rishi Bhatnagar. O'Reilly Media, 2015. <p>- Additional Bibliography:</p> <ol style="list-style-type: none"> 1. Programming the Internet of Things: An Introduction to Building Integrated, Device-to-Cloud IoT Solutions, A. King, O'Reilly Media, 2021 2. IoT Development A Complete Guide, Gerardus Blokdyk, 5STARCOOKS, 2021
