COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	PHYSICS DEPARTMENT		
LEVEL OF STUDIES	GRADUATE		
COURSE CODE	**510**	**SEMESTER**	**7**
COURSE TITLE	MODERN PROGRAMABLE ELECTRONICS		

INDEPENDENT TEACHING ACTIVITIES *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*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	4
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Skills development
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes(Greek)
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes

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.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

This course aims to introduce students to modern programmable electronic devices. It includes theory and a series of laboratory exercises that constitute a complete set of experiments. The theory combined with laboratory exercises beyond the scientific knowledge will provide students with a valuable practical resource useful for their further research or professional career. There will be emphasis on the theory and application of programmable integrated circuits (FPGAs) and microcontrollers (μC). After the completion of theory and laboratory exercises the student:

- Will be able to program a modern electronic device (FPGA / μC) and control a simple system
- Have acquired practical skills in programming and testing digital systems on FPGA development boards and microcontrollers.
- He / she will have a very good knowledge of the processes that are

performed in the programable module

- Understand the operation of various I / O devices and how they are controlled and communicated with the programmable electronic device
- Have knowledge of an integrated development environment (IDE) suitable for simulating, debugging and implementing a physical layout for testing and construction.

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…*
	…….

Working independently
Decision-making
Team work
Search for, analysis and synthesis of data and information, with the use of the necessary technology

(3) SYLLABUS

Introduction to programmable electronics. Laboratories: Measurements using programmable electronics, photodiodes / switches interface, imaging applications, serial / parallel data transfer, encoding / decoding, multiplexing, memory circuits, registers, counters, timing, waveform generator.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face learning	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• All information is provided to the student about the announcements, course scheduling, course regulation, etc through the e-course asynchronous tele-learning system • During the laboratory training an integrated development environment suitable for the design, simulation, debugging and implementation of the workout exercises is used.	
TEACHING METHODS	***Activity***	***Semester workload***

The manner and methods of teaching are described in detail. *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *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*	Lectures	12
	Laboratories	40
	Bibliography study	33
	Project	12
	Exams	3
	Total	***100***
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	• Tests during the labs (30%) • Laboratory reports during the labs(70%) Laboratory report (30%) at the end of the course. A prerequisite for participation in the final laboratory exam is the successful grade in the laboratory performance. The course completes successfully when the final laboratory exam degree is also successful.	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

- *Digital Systems Design with FPGAs and CPLDs, Ian Grout, Newnes, 2008*
- Hands-on Experience with Altera FPGA Development Boards, Parab, Jivan S., Gad, Rajendra S., Naik, G.M, Springer,2018.
- Σχεδιασμός ψηφιακών συστημάτων FPGAs, Π. Κίτσος, Ν. Σκλάβος, 2015,Εκδόσεις Πατάκη. [Μετάφραση: Wayne Wolf, FPGA-Based System Design,ISBN: 0-137-03348-6,Prentice Hall Modern Semiconductor Design Series].
- Εισαγωγή στον προγραμματισμό μικροελεγκτών, FPGA και CPLD, Στυλιανός Μπουλταδάκης, Γιώργος Πατουλίδης, Νικόλαος Ασημόπουλος, Εκδόσεις Τζιόλα, 2010
- *Εφαρμογές της VHDL για Ηλεκτρονικούς, Π.Κωσταράκης, Γ.Αγγουράς, Πανεπιστημιακό Τυπογραφείο Ιωάννινων, 2003*
- *Αρχιτεκτονική και προγραμματισμός του AVR, Παναγιώτης Παπάζογλου, Εκδόσεις: Τζιόλα, 2017*
- *Programming and Customizing the AVR Microcontroller, D.V. Gadre, 2017*
- *AVR Microcontroller and Embedded Systems: Using Assembly and C, Sepehr Naimi, 2010*