COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCE		
ACADEMIC UNIT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	GRADUATE		
COURSE CODE	**M412**	SEMESTER	**1**
COURSE TITLE	Digital 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**
	5	8
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	special background, knowledge, skills development
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
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 provides the methodology for designing and building complex digital electronic systems. After completing the theory and laboratory exercises, the student will be able to:

- Design and implement combinational digital circuits using gates and logic elements such as multiplexers, adders and decoders.
- Design and implement sequential digital systems including counters, timers, memory elements
- Design and implement typical Mealy and Moore type state machines.
- Use electronic design automation (EDA) tools
- Analyze a real-world scenario leading to the design and implementation of complex digital electronic circuits for research or commercial applications

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*
Teamwork	*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…*
	…….

- Production of free, creative, and inductive thinking.
- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Working independently.

(3) SYLLABUS

Logic gates, Boolean algebra, De Morgan's theorem. Logic minimization, truth tables, Karnaugh maps, Quine-McCluskey method. Combinational logic, Adders, Subtractors, Comparators, Multiplexers/demultiplexers, Encoders/decoders, Combinational logic applications. Sequential logic, memory elements, synchronous/asynchronous enumeration, registers, applications. Finite State Machines (FSM). Laboratory work on the design and implementation of digital systems of complex complexity using special development tools and discrete components

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of email for information exchange and improved communication with students.
• Electronic design automation software is used during the laboratory training</td></tr>
<tr><td>TEACHING METHODS
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 nondirected study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>40</td></tr>
<tr><td>Laboratory practice</td><td>25</td></tr>
<tr><td>Guided-study and analysis</td><td>30</td></tr>
<tr><td>Self-study and analysis</td><td>48</td></tr>
<tr><td>Project</td><td>54</td></tr>
<tr><td>Exams</td><td>3</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>200</td></tr>
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</td></tr>
<tr><td>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.</td><td>Performance in the Laboratory (30%)
Project and presentation (40%) It involves developing a complex application
Written exams (30%)
The course is successfully completed when the grade in the individual assessments is also passable.</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

Suggested bibliography:

- Ψηφιακά Ηλεκτρονικά, Εκδ.8, William Kleitz, , 2011, ISBN: 978-960-418-3388
- Ψηφιακά Ηλεκτρονικά, Floyd, 2007, ISBN978-960-411-646-1
- Ψηφιακά Ηλεκτρονικά, A. Malvino/Leach, Εκδ. 7, 2006, ISBN 978-960-8129-16-18
- Digital Electronics: Principles, Devices and Applications 1st Edition by Anil K. Maini 2007