COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	2603006	**SEMESTER**	3
COURSE TITLE	Logic Circuit Design		

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 (ECTS)**
Lectures	4	6
Laboratory	2	
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*	Special Background Course
PREREQUISITE COURSES:	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	http://digilab.teipir.gr/index.php/edu/edu1

(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*

It is an introductory course to logic circuits and digital systems aiming to:

- familiarization with binary logic, synthesis and analysis of combinational circuits
- introduction to the concept and methods of digital computer arithmetic
- introduction to the fundamental principles of sequential circuits
- acquaintance to novel design techniques and implementation technologies of digital systems

Upon successful completion of this course module students possess advanced knowledge, skills and competences in the subject of Logic Circuit Design that enable them to:

- understand the functionality and applications of logic circuits;
- design and simulate logic circuits using software CAD tools;
- recognize and define the hardware required for synthesis and implementation of simple

combinational and sequential circuits in terms of standard integrated circuits;

- analyze, design and synthesize logic circuits for low complexity 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*
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
- Working independently
- Team work

(3) COURSE CONTENT

Lectures

- Binary numbers
- Numerical systems and codes
- Boolean algebra
- Logic functions and logic gates
- Function simplification
- Combinational logic modules and circuits
- Information storage, flip-flops, registers
- Introduction to digital circuit design tools
- Implementation methodologies

Laboratory

Ten laboratory exercises covering all module topics either by using commercial CAD tools for design and simulation of logic circuits or by implementing simple logic functions on breadboard.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face lectures
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of electronic presentation with multimedia content in class, • Student support through the course webpage and the departmental e-learning platform, • Electronic communication of instructors and students, through the course webpage and by e-mail. • Use simulation software for the simulation of logic circuits

<table>
<tr><td></td><td></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 non-directed study according to the principles of the ECTS</td><td>Lectures, Laboratory experiments, study.

<table><tr><th>Activity</th><th>Semester workload (hours)</th></tr><tr><td>Lectures</td><td>52</td></tr><tr><td>Study for lectures</td><td>52</td></tr><tr><td>Laboratory experiments</td><td>26</td></tr><tr><td>Report on lab experiments</td><td>26</td></tr><tr><td>Study and preparation for exams</td><td>24</td></tr><tr><td>Course Total</td><td>180</td></tr></table></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>Final course grade = Lectures part grade x 60% + Laboratory part grade x 40%

The final written exam of the theoretical part of the module includes exercises and design problems of graded difficulty. The module content as well as test examples (solved and unsolved) are available to the students through the course web page. Students are allowed to bring any related book during examination.

The evaluation of the laboratory part is performed through:
• Oral or written test during lab exercise implementation (20%),
• Mid term exam (20%)
Final exam (60%)</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

Essential reading

1. MORRIS MANO, M., CILETTI, M., Digital Design, 4/e, Prentice Hall.
2. BROWN, ST.,VRANESIC, Z., Fundamentals of Digital Logic with VHDL Design, 3/e, McGraw-Hill Higher Education
3. KYRIAKIS-BITZAROS, E. D., Logic Circuit Design, Laboratory Manual

Recommended Books

1. MORRIS MANO, M., and KIME, C.R., Logic and Computer Design Fundamentals, Pearson Education, 4/e, 2008.
2. GAJSKI D.D., Principles of Digital Design, Prentice Hall; 1/e, 1996.