ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Α .Δ Ι .Π .
ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ & ΠΙΣΤΟΠΟΙΗΣΗΣ
ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΣΤΗΝ ΑΝΩΤΑΤΗ
ΕΚΠΑΙΔΕΥΣΗ

HELLENIC REPUBLIC
H .Q .A .
HELLENIC QUALITY ASSURANCE
AND ACCREDITATION AGENCY

ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ ΑΝΑΤΟΛΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ ΚΑΙ ΘΡΑΚΗΣ
ΜΟΝΑΔΑ ΔΙΑΣΦΑΛΙΣΗΣ ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΤΕΙ ΑΜΘ

Quality Assurance in Higher Education
Course Data Collection Form

ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ
ΑΝΑΤΟΛΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ & ΘΡΑΚΗΣ
ΑΓΙΟΣ ΛΟΥΚΑΣ,
65404 ΚΑΒΑΛΑ

EASTERN MACEDONIA AND THRACE
INSTITUTE OF TECHNOLOGY
AGIOS LOUKAS
65404 KAVALA

COURSE OUTLINE

(1) GENERAL

Name and surname of lecturer	Lykourgos Magafas		
SCHOOL	of Technological Applications		
ACADEMIC UNIT	Department of Electrical Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**CN4**	**SEMESTER**	**3rd**
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**
	Lectures and Exercises	2 Th.	4,5
	Laboratory	3 Lab.	
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*		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek – English in the case of foreign students		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	http://eclass.teikav.edu.gr/claroline/document/document.php		

(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*

The course is an introduction on the subject of digital electronics with emphasis on applications (design, digital electronic circuit) that concerns electrical engineer with main objectives:
Familiarity with numerical systems (binary, octal, hexadecimal codes) required in digital electronics, conversions from one system to another and arithmetic operations.
Also, familiarity with algebra Boole (Karnaugh maps minimization function).
The presentation of logic gates and solve problems with the design of simple digital and combinational circuits for applications in electrical engineering problems.
The presentation of complex digital electronic circuits (adders, comparators, encoders, multiplexers)
The introduction to programmable logic devices PLD and programming software.

Upon successful completion of this course the student will be able to:
• To have understood the basic principles on the binary logic and algebra Boole and may perform the basic arithmetic operations.
• Be able to solve problems in field of electrical engineering in order to design digital circuits using the more simplified solution.
• Be able to use complex digital electronic circuits in complex applications.
• Be able to handle programmable logic devices PLD in electrical engineering 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
Decision-making
Working independently
Team work
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management

(3) SYLLABUS

I. **Introduction to Digital and Arithmetic Systems**
a. Binary levels, digits and waveforms
b. Decimal and Binary systems
c. Octal and Hexadecimal systems
d. Convert numbers from one system to another
e. Supplements binary numbers
f. Unsigned binary numbers
g. Binary codes (BCD, Grey)

II. **The Boole's Algebra**
a. Introduction and basic definitions
b. The operations and rules of Boole's algebra
c. Basic theorems and properties of Boole's algebra
d. De Morgan's theorems
e. Karnaugh maps, minimization function
f. Application to digital circuits

III. **Logic Gates**
a. The inverse gate - isolation
b. The AND gate
c. The OR gate
d. The NAND gate,
e. The NOR gate
f. The XOR gate
h. Application to digital circuit

IV. **Combinatorial Logic**
a. Implementation of simple logic circuits
b. Analysis of combinatorial circuits
c. Synthesis of combinatorial circuits
d. Application of digital logic in solving problems
e. Implementation of digital circuits with NAND and NOR gates
f. Minimization of digital circuits using the Karnaugh maps.
g. Application to digital circuit

V. Practices of Digital Logic
a. Timing Circuits
b. Combined Programmable Logic Device.
c. Adder.
d. Comparators
e. Coders and Decoders
f. Code Converters.
g. Multiplexers and Demultiplexers
h. . Generators and Controllers Functions
i. Application to digital circuit

VI. . Sequential Circuits
a. Bistable elements
b. Latch circuits and Flip- Flop
c. Analysis of sequential circuits with clock
d. Minimization and Encoding
e. Applications to sequential logic of PLD
f. System implementation with PLD
g. Application to digital circuit

VII. Memories and storages
a. Read only memory (ROM)
b. Programmable ROMs
c. Random Access Memory (RAM)
d. Flash Memories
e. Data storage on optical and magnetic media
f. Application of digital circuit

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face (in the classroom)
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use slides, website of the course with supporting and auxiliary material,
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*	***Activity*** — ***Semester workload*** *Lectures* — 26 *Laboratory practice* — 39 Independent study — 47,5 Course total — ***112,5***
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.*	Theoretical Course Final written examination (100%), that combines theoretical questions with critical ones as well as problems covering all the sections of the course. Laboratory course I. Individual work (40%) II. Test with multiple choice questions during the lessons (20%). III. Final Exam with multiple choice questions covering all the course sections (40%).

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

1.M.M. Mano, M.D. Ciletti, " Digital Design ", Pearson Prentice Hall, 2012.

2. J. F. Wakerly, "Digital Design: Principles & Practices", Prentice Hall, 2001.

3. William Gothmann H " Digital Electronics : An Introduction to Theory And Practice" 2011 .USA.,

4.R.P.Jain "Modern Digital Electronics " **McGraw-Hill Education, 2010**

5. V K Jain, Arti Agarwal, "Digital Electronics", Genius Publications, 2014

6. A.Maini “Digital Electronics, Principles and Applications” John Wiley, 2007.