COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	ELECTRICAL AND COMPUTER ENGINEERING DEPT.		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**ECE_K620**	**SEMESTER**	**6**
COURSE TITLE	**MICROCOMPUTER SYSTEMS**		

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	3	
Seminars / Practice exercises	-	
Laboratory	2	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (4).	5	6

COURSE TYPE *general background, special background, specialised, general knowledge, skills development*	special background
PREREQUISITE COURSES:	No. Students are advised to have already attended the courses: Digital Logic Design, Digital Circuits & Systems
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://www.ece.uop.gr/

(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 introduces the students to the basics of 8-bit microcomputer systems employing the Intel 8085 specific system and technology. The laboratory course introduces low-level programming in 8085 Assembly and machine language. Laboratory training is implemented in simulators as well as in 8085 mikro-kits. The theoretical and applied knowledge that the student develops during the course consists of:

- Analytic study of 8085 microcomputer structure, architecture, operation, interfacing and programming.
- Analytic description of assembly instruction handling and execution timing in 8085 hardware.
- Connecting Memory to 8085: Memory map & 16-bit address decoding procedure, memory chip interconnection and operation.
- Microcomputer system interfacing to external devices for automatic control and associated processing.

- 8085 Interfacing to peripherals such as 8255 I/O ports, 8259 Priority Interrupt Controller, 8257 DMA Controller and 8251 Usart
- Design and development of microcomputer systems for control, automation and associated data processing applications.

At the end of the course the student would also develop several additional skills such as:

- A deep theoretical and practical ability to cope with 8-bit microcomputer systems,to conceive their philosophy, to understand their architecture and to learn to program them in low-level realizing how assembly / machine language instructions turn out to be hardwired processes and associated complex digital signalling.
- A good knowledge basis in interfacing the 8085 to RAM/ROM memory chips and to specific peripheral chips in order for the student to acquire a certain ability to understand and develop larger and more complex microcomputer systems that may be applied to "automation & control" fields of use.

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 theoretical concepts, terms and technology
- Adapting to new situations
- Decision-making
- Working independently
- Team work
- Critical thinking development
- Inductive thinking development
- Ability to make an idea work thru implementation
- Develop skills for applied research

(3) SYLLABUS

Theoretical course consists of:

- The history of microcomputer. Invention and evolution.
- A brief review of digital electronics and their role to microcomputers.
- Principles of 8-bit microprocessor architecture and programming.
- Analysis and study of the 8085 Intel microprocessor. Stucture, architecture, operation, interfacing.
- Operation, programming, timing diagrams, state diagrams.
- 8085 Assembly language and machine language. Syntax, intruction set.
- Data/Address buses. Status & control signalling.
- Basic operations, machine cycles (read/write memory, etc.)
- Analytical timing diagrams for instruction execution and other microcomputer functions/operations (interrupt, hold, etc.)
- Addressing Memory and I/O. Memory Map. Address decoding. RAM/ROM memory chips. Connecting memory to 8085.
- I/O interfacing and peripherals. Memory mapped & I/O mapped I/O. Applications with the 8255 peripheral.
- Interrupt philosophy. Priority interrupt controller 8259 operation. Interrupt controlled I/O.
- Universal asynchronous synchronous receiver transmitter 8251 USART.
- The hold cycle and Direct Memory Access interface & operation.

- How an 8085 microcomputer system can be interfaced to external devices for control, automation and associated processing. Complex microcomputer systems.
- A brief introduction to the next generation of 16-bit microprocessors by means of Intel 8086.

The laboratory course consists of applied training exercises in 8085 programming simulator as well as in 8085 mikro-kit and covers the following issues:

- 8085 architecture and instruction set
- 8085 Assembly programming
- Data tranfers
- Simple Arithmetic & Logic functions
- Program flow control. Compare, Branch, Loop
- Use of stack
- Subroutines
- Multiplication & division
- I/O operations
- Interrupt management
- Serial communication
- Hold & DMA

Laboratory S/W: GNUSim 8085 Microprocessor Simulator, Crossware Embedded Development Studio / 8085 Assembler for Windows, 8085 Virtual Kit by Jadavpur University, Win85 - i8085 Emulator for Windows.
Laboratory H/W: 8085 micro-kit, Multi Application Board by Flight Electronics International

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face. Distant learning availability via video-captured lectures.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	- MP4 video-captured lectures. - Power Point presentations. - Laboratory exercises textbook. Available in typed and electronic form. (http://www.microlab.uop.gr & https://eclass.pat.teiwest.gr/) - Laboratory exercises assembly programs. - Freeware downloadable 8085 simulation tools. - Further digital learning & educational/training material such as : assembly programs, associated videos, exercise presentations & video-captured mp4 laboratory classes, older exam solutions & problems solved for theory and lab, announcements, homework collecting service, student registration & mail service, alerts, statistics, other educational services, etc. (http://www.microlab.uop.gr & https://eclass.pat.teiwest.gr/)

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	3 x 13=39
Laboratory practice	2 x 13=26
Homework	79
Final exam (theory)	3
Final exam (lab)	3
Course Total	***150 ώρες (ECTS)***

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.

Language: Greek

Evaluation:

(a) Final written examination in theory. It includes all educational material described in (3)

(b) Final written and/or practical examination in laboratory context based on all exercises as well as weekly student assessment for every laboratory exercise by means of an obligatory homework evaluation scheme for each student.

Final grade=0,6x(a) + 0,4x(b)

The whole evaluation procedure and criteria are known to all students.

(5) ATTACHED BIBLIOGRAPHY

1. Microcomputer Systems 1, microprocessors 80x86 Pentium & ARM, Pekmestzi Kiamal, Symmetria Publisher, ISBN: 978-960-266-268-7, pages: 576, 2015
2. Intel Corp., MCS-8085 family user's manual, 1979.
3. Intel Corp., 8080-8085 assembly language programming, 1977
4. Programming examples in Intel microprocessor systems, INTEL 8085, G. Papadopoulos, S. Leventis, S. Koubias, J.Konstantinides, 1984.
5. Microprocessors and Microcomputer Systems Design, 2nd edition, Alexiou George, Petrellis Nikolaos, Kleidarithmos Publisher 2012.
6. W. Kleitz, Microprocessor and microcontroller fundamentals: The 8085 and 8051 hardware and soft-ware, Prentice Hall, 1998.
7. Electronic System Design with Microprocessors, G. Papadopoulos, Professor, University of Patras, 1980.
8. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor, Brey, 1999 (4th edition).
9. S. K. Sen, Understanding 8085 8086 microprocessor and peripheral ICs, New Age International, 2006
10. Laboratory Exercises textbook, Programming in 8085 Assembly, Microcomputer laboratory, ECE, UOP, 2019