COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**10EK204**	**SEMESTER**	**8**
COURSE TITLE	**Microelectronics**		

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 (theory and exercises)	4	6

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialised Knowledge
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	eclass: https://eclass.uoa.gr/courses/PHYS239/

(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*

In this course the student acquires the necessary knowledge for the understanding of the structure and the functionalities of fundamental microelectronic devices as well as the fabrication processes required for their realisation

With the completion of the course the student is able to:

A. Determine the fabrication steps required for the realisation of a microelectronic device. Moreover to describe the function of the fundamental microelectronic devices (pn diodes, MOSFET, CMOS)

B. To identify the differences between alternative technological approaches and to estimate the performance of the corresponding realisations. To explain the operation of fundamental microelectronic devices taking into account their structural properties

C. To combine the functions with basic structural elements in order to design microelectronic circuits with the desired specifications. To determine the optimal realisation techniques comparing the available technologies

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
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

The course aims at the following general competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Respect for the natural environment
- Production of free, creative and inductive thinking
- Analytical and synthetic thinking
- Critical thinking
- Time management
- New Technology skills
- Information management
- Meeting Deadlines and Keeping Schedules
- Flexibility / Adaptability
- Problem solving

(3) SYLLABUS

- Development and fields of application of microelectronics in the realization of integrated circuits of silicon or compound semiconductors.
- Semiconductor materials (Si, GaAs).
- Growth of Si and GaAs crystals.
- Epitaxy. Lithography. Diffusion. Ion implantation and oxidation.
- Etching processes and material deposition methods (metallization).
- Structure of basic devices and physical design of integrated circuits: p-n diodes, bipolar transistor, MOSFET and CMOS transistors, realization of logic gates.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Yes Electronic communication with the students using ICT (Information and Communications Technology) Computer-aided lectures, use of Overhead Projectors, eclass platform
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/ Exercises	52 hr
Individual Study/ Study and Analysis of bibliography / Preparation	91 hr
Educational Visits	5 hr
Exams	2 hr
Course Total	**150 hr**

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.*	Final written exams in Greek Oral examination during the lectures

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography

- Διατάξεις Ημιαγωγών, Φυσική και Τεχνολογία, 3η Έκδοση, Sze Simon, Lee Ming-Kwei , Κωδικός Ευδοξου: **94692386**
- Σχεδίαση Ολοκληρωμάτων CMOS VLSI ,Weste Neil H., Eshraghian Karman,(μετάφραση: Δημήτριος Σούντρης Κ. Πεκμεστζής), ΕΚΔΟΣΕΙΣ Α.ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ, 2010, Αθηνα,,Κωδικός Ευδοξου:**9779**
- Σημειώσεις «Εισαγωγή στη Μικροηλεκτρονική

- Related academic journals

- IEEE Journal of Quantum Electronics
- Physical Review
- Physical Review Letters
- Physica Status Solidi
- Journal of Applied Physics
- Applied Physics Letters
- J. Electrochem. Soc.
- International Journal of Nanotechnology,
- Microelectronic Engineering,
- Superlattices and Microstructures
- Semiconductor Science & Technology