COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**206**	**SEMESTER**	**7**
COURSE TITLE	Semiconductors Physics		

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**
	4	4
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*	General background / special background, General knowledge
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (in GREEK)
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 introduces students to the important concepts of the Physics of Semiconductor materials and devices
Upon successful completion of thiscourse module students possess advanced knowledge and competences in the subject of Semiconductor devices that enable them to:

- Have a solid background on the fundamental Physics of semiconductors (energy bands, carriers, mobility of carriers, doping, bulk transport mechanisms, surface physics)
- Understand the physics underlying the basic characteristics and operation of semiconductor devices such as p-n junctions, Schottky or Zener diodes, Bipolar Transistors (BJT) or Field Effect Transistors (FETs).
- Understand the physics and the basic theory of operation of the semiconductor devices that emit or receive light such as LEDs or Photoconductors
- Understand the deposition processes and the (inter-)connection of semiconductor devices to form modern Integrated Circuits

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…*
	…….

- Working independently
- Team work
- Production of free, creative and inductive thinking
- Production of new research ideas

(3) SYLLABUS

Structure and Physics of Semiconductors. Intrinsic and doping concentration of carriers in a semiconductor. Electrical conduction, diffusion generation and recombination of carriers. p-n or p-i-n homojunctions, metal semiconductor junctions. Forward and reverse bias of a semiconductor junction. Diodes, Bipolar transistors, Field effect transistors (JFET, MOSFET etc). Photoconductors, Photovoltaics, LED's. Heterojunctions and quantum devices (e.g wells or dots)

(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 contentin class, • Electronic communication of instructors and students, through the course webpage and by e-mail, • Use of special semiconductor device simulation software.

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	30
Exercises	10
project	17
study and analysis of bibliography	40
exams	3
Course total	***100***

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.*	Course grade = Final exam (80%) + public presentation (20%) Final exam is at the end of semester based on Theory Lectures. Presentation of an advanced modern subject is given during the last week of the semester

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Semiconductor Physics (G. Triberis), ed. Liberal books (in Greek)
2. Principles of Electronic materials and Devices (S.O. Kasap), Papasotiriou publishing (translated in Greek)