ETY702 - Semiconducting and Dielectric Materials

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ETY702	**SEMESTER**	7
COURSE TITLE	Semiconducting and Dielectric Materials		

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 recitation	4	4
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	Special background
PREREQUISITE COURSES:	NO
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	http://cmsl.materials.uoi.gr/lidorikis/courses.html

(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*

Knowledge: Understanding the basic concepts governing semiconductor materials used in all electronic technologies: energy gap, effective mass, carriers, impurities. Understanding the basic operating principles of devices (pn diodes, transistors, photovoltaics). Identification of the phenomena governing each of them and the necessary configurations of the materials (thickness, impurities, etc.) required for their proper operation.

Skills: Design of energy diagrams of semiconductor materials in the case of pure crystals and crystals containing impurities of donors and recipients. Solving admixtures and modifying properties, solving simple exercises.

Competences: Analysis of device operation, design of simple devices, design of materials, combinations of simple devices.

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…*
	…….

Autonomous work
Production of new research ideas
Promote free, creative and inductive thinking

(3) SYLLABUS

Crystalline semiconductor materials. Intrinsic and extrinsic semiconductors. Energy band diagrams. Electrical charge transport phenomena. Scattering mechanisms. p-n diode. Dielectric materials. Atomic and molecular dipoles. Sources of polarization. Interactions of dielectrics with electromagnetic radiation. Optical properties of semiconductors and dielectrics. Dielectric break-down. Quantum charge transport phenomena through dielectrics

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In class, lectures
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Communication with the students also through the course website
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	39
In class recitation	13
Self-study for preparing for final examination	48
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*	LANGUAGE OF EVALUATION: Greek METHOD OF EVALUATION: Written final exam: • Development and explanation of theory • Developing and resolving problems

given, and if and where they are accessible to students.	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Semiconductors, David K. Ferry, Arizona State University, Maxwell Mackmillan International Editions, ISBN 0-02-946519-2
- 2)Solid State Physics, VOLUME I: Metals, Semiconductors, Insulators, E. N. Economou, Crete University Press, Heraklion, Crete 1997, ISBN SET 960-524-038-6
- 3) Growth and Characterization of Semiconductors, Edited by R. A. Stradling and P.C. Klipstein, Imperial College of Science, Technology and Medicine, Adam Hilger, Bristol and New York, ISBN 0-85274-131-6

-Related academic journals: