ETE914 - Surface Science Thin Film Technology

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ETE914	**SEMESTER**	9
COURSE TITLE	Surface Science Thin Film Technology		

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 / Tutorials	3	3
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*	Specialized, skills development
PREREQUISITE COURSES:	NO
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
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*

The students gain experience in handling high vacuum equipment and using thin film growth techniques which to enables them to work at production units related to optical, mechanical, electronic coatings etc. They acquire a range of basic knowledge and practical skills required to act as responsible for making scientific decisions and to accomplish tasks related to the development, production, processing of coating materials and solve routine problems as well as in unpredictable contexts.

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…* *…….*

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, specialized problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields.

(3) SYLLABUS

Introduction to the Science and Physics of Surfaces. Thermodynamics and reactivity Surfaces. Film formation and structure: Nucleation, growth modes (Volmer-Weber, Frank van der Merwe, Stranski-Krastanov), microstructure, effect of substrate and Growth rate. Epitaxy: Geometric laws - lattice matching. Atomic models for crystalline surfaces. Surface diffusion. Physical and chemical adsorption. Surface crystallography and reconstruction.
Thin film deposition: Chemical vapor deposition, Evaporation, Sputtering, Laser-Ablation, MBE etc.
Methods of characterization of films and multilayers. X-ray and microscopy and electron diffraction techniques. Diffraction Electrons from surface layers. Spectroscopic surface study. In-situ characterization and growth control techniques. Modern applications Films and artificial superstructures. Electronic and optical devices. Thermal and Chemical Surface Protection.

(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*	
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
Self-study	36
Course total	75h

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure*	LANGUAGE OF EVALUATION: Greek METHOD OF EVALUATION:

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 examination, written work, problem assignments.

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

- «Introduction to Surface and Thin Film Processes», JOHN A. VENABLES, Cambridge University Press
- «Materials Science of Thin Films», M. Ohring, Academic Press

-Related academic journals:

- Thin Solid Films
- Surface and Coatings Technology
- Journal of Coatings Technology and Research