COURSE OUTLINE

GENERAL

FACULTY	ENGINEERING TECHNOLOGY		
DEPARTMENT	ELECTRICAL ENGINEERING DEPARTMENT		
EDUCATION LEVEL	UNDERGRADUATE		
COURSE CODE	ZN12	**SEMESTER**	7th
COURSE TITLE	**ECONOMICS AND NANOTECHNOLOGY**		

INDEPENDENT TEACHING ACTIVITIES *in the case of credits being awarded in distinct parts of the course eg. Lectures, Laboratory Exercises, etc. If credit units are awarded uniformly for the whole course, indicate the weekly hours of teaching and the total number of credits*	**WEEKLY COURSE HOURS**	**CREDITS**
Lectures and Practice Exercises	3	4,5
Laboratory	-	-
Add rows if needed. The teaching organization and the teaching methods used are described in detail at 4..		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skills Development*	Scientific Area
PREREQUISITE COURSES:	
LANGUAGE OF COURSE AND EXAMINATIONS:	Greek - English
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBPAGE (URL)	

LEARNING RESULTS

Learning Results

The learning outcomes of the course describe the specific knowledge, skills and competences of an appropriate level that students will acquire after successfully completing the course.
Refer to Appendix A.

- *Description of the level of learning outcomes for each cycle of study according to the European Higher Education Area Qualifications Framework*
- *Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning*
- *and Annex B.*
- *Curriculum Vitae Summary Guide*

This course will introduce students to the fundamental concepts, tools, materials and techniques of Nanotechnology, focusing mainly on its application in the fields of Medicine. The course covers basically the main categories of materials (nanomaterials, polymers, adsorbents) in two directions [a] use-application of these materials to medical technologies. [b] The impact of these materials on the economy during their production, use and disposal after the end of their life cycle. Emphasis is placed on the physicochemical-mechanical properties of materials in relation to their destabilization under environmental conditions. More specifically, after understanding the techniques and methods of characterizing nanomaterials (Scanning and Passing Electron Microscopy, Atomic Power Microscopy, etc.), particular nanomaterials will be studied for their uses.

Upon successful completion of the course the student will have the opportunity to understand basic notions regarding nanotechnology and materials technology, the properties on which their functionality depends and the modern techniques of development and characterization of specialized materials. At the same time, they will have acquired the necessary knowledge to be able to explore their usability in various applications. The student will be able to:

- Understand the basic principles of Nanotechnology
- Learn about the main applications in Medicine.
- Understand the basic economic parameters of Nanomaterial use.

- Understand the importance of the structure of materials in relation to their function and their physical properties.
- Understand the connection of the physicochemical properties of materials in relation to their environmental behavior.
- Familiarize themselves with Nanomaterial Life Cycle Analysis

General Abilities

Considering the general competencies that the graduate must have acquired (as listed in the Diploma Supplement and listed below), which one (s) is the course intended for?

- *Search, analyze and synthesize data and information, using the necessary technologies*
- *Adapt to new situations*
- *Decision making*
- *Autonomous work*
- *Teamwork*
- *Work in an international environment*
- *Working in an interdisciplinary environment*
- *Production of new research ideas*
- *Design and project management*
- *Respect for diversity and multiculturalism*
- *Respect for the natural environment*
- *Demonstration of social, professional and moral responsibility and sensitivity to gender issues*
- *Exercise of criticism and self-criticism*
- *Promote free, creative and inductive thinking*

- Search, analyze and synthesize data and information, using the necessary technologies
- Decision making
- Working in an interdisciplinary environment
- Autonomous Work
- Teamwork
- Design and Project Management
- Production of new Research Ideas

COURSE CONTENT

I. Introduction to Nanotechnology
Nanotechnology,
Nano objects,
Synthesis and construction of nanostructures
Nanostructure properties,
Nano-medicine,

II. Nanomaterials
Properties and categories of nanomaterials
Special categories of nanomaterials:
Methods of characterizing nanomaterials
In vivo
In vitro
Toxicity

III. Nanomaterials and Economics
Cost of Nanomaterials
Cost of Toxicity
Production cost
Machine maintenance costs
Cost
Total cost of ownership

TEACHING AND LEARNING METHODS - EVALUATION

DELIVERY METHOD *Face to face, distance learning etc.*	Class room ,

USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in Teaching, in Laboratory Education, in Communication with Students*	Presentation of the Theory with the help of slides, Course website with supporting and auxiliary material, Creation of an asynchronous platform.

TEACHING ORGANIZATION

Teaching methods described in detail:
Lectures, Seminars, Laboratory Exercise, Field Exercise, Study & Analysis of Bibliography, Tutorial, Practice (Placement), Clinical Exercise, Artistic Lab, Interactive Teaching, Educational Visits, Project Work, etc. .;

The student's study hours for each learning activity and the hours of non-guided study are indicated so that the total workload at the semester corresponds to the ECTS

Activity	*Semester workload*
Lectures	40
Laboratory Exercise	-
Written paper	60
Independent Study	35
Course Total (30 hours of workload per unit of credit)	***135***

STUDENT EVALUATION

Description of the evaluation process

Assessment Language, Assessment Methods, Formulation or Conclusion, Multiple Choice Test, Short Response Questions, Test Questions, Problem Solving, Written Paper, Reporting, Oral Examination, Public Presentation, Laboratory Work, Clinical Patient Examination, Artistic Interpretation, Other

Evaluation criteria are identified and examined to check if they are accessible to students.

THEORY

Written work (30%), final exam (70%) that includes theoretical questions, judgement and problem solving questions from different modules of the course.

• RECOMMENDED BIBLIOGRAPHY

- Suggested bibliography:
- Related scientific journals:

Nanotechnology and advanced polymeric materials, ISBN: 978-960-9400-43-5
Health, Health Care and Health Economics, ISBN: 978-960-02-3337-7
NanoState:Understanding the Emerging Nanoeconomy by Cynthia Needham and Kenneth A. McPherson, ISBN-10: 0313393737
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Journal of Nanoparticle research
Nanomedicine
NanoToday