

PHOTONICS AND NANOTECHNOLOGY

COURSE OUTLINE

Responsible: [Georgios Kakavelakis](#)

1. GENERAL			
SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Electronic Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	8000.1.252.0	SEMESTER	Winter/Spring
COURSE TITLE	Photonics and Nanotechnology		
INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS		CREDITS
	3		5
Total	3		5
COURSE TYPE general background, special background, specialised general knowledge, skills development	Erasmus		
PREREQUISITE COURSES	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English		
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Both Winter and Spring Semesters		
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/EE361/		
2. LEARNING OUTCOMES			
Learning outcomes			
Understands the basic principles of Quantum Physics			
Understands the basic principles of laser operation			
Understands the basic principles of structural characterization of nanomaterials using laser light			
Understands the basic principles of morphological characterization of nanostructures using laser light			
Understands the basic principles of nanostructure design using laser light			
Understands the basic principles of nanostructure processing using laser light			
General Competences			
Search, analysis, and synthesis of data and information, using the necessary technologies			
Independent and teamwork			
Adaptation to new situations			
Decision-making			
Generation of new research ideas			

3. SYLLABUS

Blackbody
The concept of the photon
The Schrodinger equation
The concept of the wavefunction
The Harmonic Oscillator
Einstein's equations
The building blocks of a laser
Light-matter interaction
Continuous-wave and pulsed laser operation
Basic principles of X-ray spectroscopy
Basic principles of absorption spectroscopy
Basic principles of TEM & SEM spectroscopy
Basic principles of Raman spectroscopy
Basic principles of FTIR spectroscopy
Time-resolved spectroscopy with an emphasis on photovoltaic cells
Basic principles of nanoparticle generation using laser radiation
Nanostructure processing using laser radiation

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY

Face-to-face, Distance learning, etc.

Face-to-face theoretical teaching Asynchronous e-learning

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Use of ICT in teaching, laboratory education, communication with students

Educational software packages for measurement collection and analysis
Support for the learning process through the e-class electronic platform

TEACHING METHODS

The manner and methods of teaching are described in detail.

Activity

Semester workload

Lectures and discussions

26

Tutorial (examples, application exercises)

26

Assignments (optional)

26

Project Presentation

26

Non-guided (independent) study

42

Exams

4

Course total

150

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Assessment Language: English
Multiple/Combined assessment methods:
Mid Term Exam: 30% of the final grade
Project Presentation: 40% of the final grade
Final written examination: 30% of the final grade (60% of the final grade if there is no mid-term exam)

5. ATTACHED BIBLIOGRAPHY

Quantum Mechanics I, Stefanos L. Trachanas

Principles of Lasers, Orazio Svelto

Laser Spectroscopy, W. Demtroder

Physical Chemistry, Atkins

Scientific Publications

DEPARTMENT OF ELECTRONIC ENGINEERING, HELLENIC MEDITERRANEAN UNIVERSITY

