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