

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ Α.ΔΙ.Π. ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ & ΠΙΣΤΟΠΟΙΗΣΗΣ ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΣΤΗΝ ΑΝΩΤΑΤΗ ΕΚΠΑΙΔΕΥΣΗ HELLENIC REPUBLIC H.Q.A. HELLENIC QUALITY ASSURANCE AND ACCREDITATION AGENCY

τεχνολογικό εκπαιδευτικό ιδρύμα ανατολικής μακεδονίας και θρακής ΜΟΝΑΔΑ ΔΙΑΣΦΑΛΙΣΉς ΤΗς ΠΟΙΟΤΗΤΑς ΤΕΙ ΑΜΘ

> Quality Assurance in Higher Education Course Data Collection Form

ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ ΑΝΑΤΟΛΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ & ΘΡΑΚΗΣ ΑΓΙΟΣ ΛΟΥΚΑΣ, 65404 ΚΑΒΑΛΑ EASTERN MACEDONIA AND THRACE INSTITUTE OF TECHNOLOGY AGIOS LOUKAS 65404 KAVALA

#### **COURSE OUTLINE**

#### (1) GENERAL

Name and surname of lecturer	PAPADOPOULOU PANAGIOTA				
SCHOOL	SCHOOL OF TECHNOLOGICAL ENGINEERING				
ACADEMIC UNIT	ELECTRICAL ENGINEERING				
LEVEL OF STUDIES	UNDERGRADUATE				
COURSE CODE	STN9 SEMESTER 6 <sup>o</sup>				
COURSE TITLE	OPTOELECTRONICS				
INDEPENDENT TEACHI if credits are awarded for separate co lectures, laboratory exercises, etc. If the whole of the course, give the weekly teacl	<b>NG ACTIVITI</b> mponents of the e credits are aw ning hours and t	VITIES of the course, e.g. re awarded for the and the total creditsWEEKLY TEACHING HOURSCREDITS			
		LECTURES	2 3		
Add rows if necessary. The organisation o methods used are described in detail at (a	f teaching and the teaching ).				
COURSE TYPE general background, special background, specialised general knowledge, skills development	Special background, Specialised general knowledge, Skills development				
PREREQUISITE COURSES:	PHYSICS, ELECTRONICS I & II ELECTROMAGNETIC THEORY				
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK				
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES, on demand				
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 course aim and scope is to give students the basic knowledge and principles of operation of modern optoelectronic devices, circuits and systems. The course offers students the opportunity to learn the basics optoelectronic elements (LEDs, Laser etc.) and their principles of operation as well as optical processes in semiconductors, operating principles of light detectors and optical modulators and structure and operation of optical fibers. More specific in this course will learn : Basic Elements of Opticall Physics, photons, Interaction of light radiation with solid materials, Production and source of radiation. Semiconductor light sources: luminescent diodes. Laser Diodes : principle of operation, properties, materials and applications. Light detectors. Photoconductors : operating principle , properties , materials and applications. LEDs : operating principle, properties, materials and applications. Phototransistor: bipolar, FET. Photothyristors. Special LEDs. Semiconductor photocathodes. Photonic Devices: Fiber Optics. Planar dielectric waveguide, optical fiber waveguide. Losses in optical fibers, optical fiber connectors. Measurement of optical fiber characteristics. Materials and manufacturing

<ul> <li>methods of optical fibers. Optical fiber techniques. Optical communications system guide fibers. Integrated optics. Integrated optics. Integrated optics. Integrated optics. Integrated optics. The course modules are:</li> <li>Optical Physics, Photons: radiation and interactilight sources, laser, diodes laser, light detectors Photonic Devices: Optical Fiber, fiber optic cab communication systems, fiber optic sensors, integrated optical Physics.</li> <li>Know the basic principles of Optical Physics.</li> <li>Understand the nature of the semiconductor</li> <li>Understand the nature and the differences of conventional light sources.</li> <li>Recognize the light detectors and to suggest</li> <li>The natural and the operation of the optical field the optic</li></ul>	cables. Optical Communications : Modulation ms with fiber. Optical fiber sensors, optics light rated photosensors, principles of integrated s, CCD. Optical couplers operating principle and ton with matter , Radiation Sources : Semiconductor . Photoconductor, photodiode, phototransistor, les, Optical Communications, Optical fiber egrated optical systems, and integrated photosensors . tudents will be able to: s. diation with matter. light sources. Taser sources and semiconductor laser sources with appropriate solution to address various problems. fibers and their applications. of image capturing units and integrated optical
General Competences Taking into consideration the general competences that the Supplement and appear below), at which of the following 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	he degree-holder must acquire (as these appear in the Diploma does the course aim? 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
<ul> <li>Search for, analysis and synthesis of detection technology.</li> <li>Working independently</li> <li>Production of new research ideas</li> </ul>	ata and information, with the use of the necessary

Criticism and self-criticism

## (3) SYLLABUS

#### 1. Optics

- 1.1. Optical Radiation Spectrum.
- 1.2. Photometry.
- 1.3. Geometric Optics.
- 2. Optical Processes in Semiconductors and Semiconductor Devices.
  - 2.1. Optical Absorption
  - 2.2. Luminescence.
  - 2.3. Photo conductivity
- 3. Optoelectronic Semiconductor Devices
  - 3.1. Photodetectors
    - 3.1.1. Diode species.
    - 3.1.2. Phototransistor.
  - 3.2. Semiconductor devices emit light
    - 3.2.1. LED semiconductor diodes
    - 3.2.2. Organic LED

- 4. Sources LASER Light
  - 4.1. Introduction to lasers Physics
  - 4.3. Theory and laser modulation methods.
  - 4.4. Laser categories.
    - 4.4.1. Diode laser
  - 4.5. Properties of laser radiation.
  - 4.6. Applications.
- 5. Optical Fiber
  - 5.1. Introduction.
  - 5.2. Principles of Optical Fiber operation.
  - 5.3. Structure and Characteristics of Optical Fiber.
  - 5.4. Construction of Optical Fiber.
  - 5.5. Applications of Optical Fibers.
    - 5.5.1. Optical fiber cables.
    - 5.5.2. Optical Communications.
    - 5.5.3. Optical communications systems with optical fibers.
    - 5.5.4. Fiber optic sensors.
- 6. Image Technologies
  - 6.1. Operating Principles of CCD.
  - 6.2. Operating Principles of LCD.
  - 6.3. Operating Principles of TFT
  - 6.4. PLASMA technologies
  - 6.5 .OLED technology

#### (4) TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</b> Face-to-face, Distance learning, etc.	In classroom			
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Lectures using Power Point presentations. Website of the course in e-class with supporting and auxiliary material which is updated at regular intervals. Software simulation Application. E-mail contact.			
TEACHING METHODS	Activity Semester workload			
the manner and methods of teaching are described in detail.	Lectures 26			
Lectures, seminars, laboratory practice, fieldwork study and analysis of hibliography				
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	Self study 64			
	Lourse total (30 hours	90		
STUDENT PERFORMANCE	1 Final writing examination where			
EVALUATION	students solve different problems and			
Description of the evaluation procedure	multiple choice questionnaires 50%.			
Language of evaluation, methods of	<b>2.</b> Written report and public presentation			
evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions,	50%			

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.

# (5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Οπτοηλεκτρονική, Νέα Βελτιωμένη, Singh Jasprit, ISBN: 978-960-418-545-0, Εκδόσεις Α. Τζιόλα & Υιοί Α.Ε.
- Οπτοηλεκτρονική, Αλεξανδρής Αλέξανδρος, ISBN: 978-960-418-234-3, Εκδόσεις Α. Τζιόλα & Υιοί Α.Ε.

- Related academic journals: