COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Department of Informatics and Computer Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE		**SEMESTER**	**7th – 9th**
COURSE TITLE	Optical Communication Networks		
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	3	
	Exercices	1	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		4	5
COURSE TYPE general background, special background, specialised general knowledge, skills development	Special background, skills development		
PREREQUISITE COURSES:	Digital Communications, Computer Networks I, Physics		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)		
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 aims to deepen students' knowledge of physical layer and network layer technologies of today's optical communication network systems, which make up more than 99% of the internet. The aim of the course is to highlight the structural elements of modern optical communication systems, analyzing their operation and the corresponding performance in various types of networks (access, metropolitan, long distance, data centers).

Upon successful completion of the course, the student will be able to:

- Know in depth the basic devices that determine the operation of an optical communications system (laser sources, amplifiers, multiplexers, demultiplexers, photodiodes, modulators).
- Know the function of building blocks (add drop multiplexers, optical switches) and network architectures (wavelength switching, spatial switching, etc.).
- Use basic tools to simulate the operation of optical communication systems.
- Analyze and estimate the performance of optical communications systems by correlating channel quality, spectral efficiency, and error correction or detection needs.
- Use basic laboratory equipment (modulators, laser sources, photodiodes, optical spectrum analyzers) to calibrate performance optical transmission systems.
- Have acquired deep knowledge and understanding in the subject of optical

communications with the aim of being able to produce research or innovation in the area or in combination with other subjects such as mobile communications networks

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	Project planning and management
	Respect for difference and multiculturalism
	Respect for the natural environment
Adapting to new situations	Showing social, professional and ethical responsibility and sensitivity to gender issues
Decision-making	
Working independently	Criticism and self-criticism
Team work	Production of free, creative and inductive thinking
Working in an international environment	……
Working in an interdisciplinary environment	Others…
	…….
Production of new research ideas	

- Working independently
- Team work
- Production of free, creative and inductive thinking
- Production of new research ideas
- Working in an interdisciplinary environment

(3) SYLLABUS

Introduction to the concepts of optical communications and fiber optic networks
Basic devices and the medium
a. Optical fiber (types, properties, effects)
b. Transmitters (LEDs, Lasers)
c. Receivers (photodiodes)
d. Amplifiers (semiconductor, erbium, Raman)
e. Multiplexers, filters, couplers, splitters

Modulation and Signaling Techniques in Optical Communications (PSK, ASK, FSK and QAM variants, coherent, direct detection)

Introduction to optical networks
a. Networking types (all-optical, hybrid)
b. Optical networking devices (wavelength, space switches, etc.)
c. Routing algorithms for optical networks
Analysis of access networks, metropolitan networks and long-haul networks

Special issues of convergence of optical and mobile communication networks and data center networks

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	**Simulators in Python, Matlab** **e-class: electronic platform for asynchronous distance learning**
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 Exercices: 13 project: 25 Study: 48 Course total: **125**
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure 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.	I. Final written exam in theory (80%) which includes: - Short answer questions that assess understanding of key concepts of optical communications networks - Solving problems related to system performance analysis II. Evaluation of individual and group assignments (20%)

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Agrawal, Govind P. Fiber-optic communication systems. John Wiley & Sons, 2012.
2. Ramaswami, Rajiv, Kumar Sivarajan, and Galen Sasaki. Optical networks: a practical perspective. Morgan Kaufmann, 2009.

- Related academic journals:

IEEE Photonics Society Journals
Optical Publishing Group