COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	2606006	**SEMESTER**	6
COURSE TITLE	Optical Communications		

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 (ECTS)**
Lectures	2	4
Laboratory	2	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialisation Course
PREREQUISITE COURSES:	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (in English)
COURSE WEBSITE (URL)	http://optcomm.teipir.gr

(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*

Upon successful completion of this course module students possess advanced knowledge, skills and competences in the subject of Optical Communications that enable them to:

1. present and explain the principles and operational characteristics of an optical link,
2. clarify the propagation characteristics in optical fibers,
3. illustrate the basic characteristics of optical transmitters and optical receivers,
4. describe the operating principle and uses of optical network components such as optical couplers, filters, amplifiers and modulators,
5. analyze the topologies of optical fiber networks (point-to-point, star, ring and bus),
6. calculate the balance of optical power in a fiber optic link, for any given network topology and assess its ability to operate within certain specifications.

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

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team work

(3) COURSE CONTENT

Theory

1. Geometric representation and wave optics.
2. Planar waveguides: waveguide rate, dispersion diagrams rectangular waveguides.
3. Cylindrical waveguides, optical fibers: guided modes, linearly polarized waves, graded index fibres, propagation characteristics, dispersion phenomena.
4. Optical sources: semiconductor Lasers, uni-junction and hetero-junction. Light – emitting diodes.
5. Light detectors: photodiodes PIN and APD.
6. Fiber fused bi-conical taper couplers. Fabry-Perot interferometer.
7. Optical modulators.
8. Optical amplifiers: SOA and EDFAs. Tuned optical filters.
9. Drive circuits for Lasers, LEDs and photodiodes. Repeaters-regenerators. Noise in receivers.
10. Basic fiber optic network topologies: star, double bus and folded bus. Use of optical amplifiers in point-to-point applications.
11. Analysis of basic optical topologies in optical networks.
12. WDM systems and wavelength routing.
13. Optical fiber testing instrumentation - OTDR.

Laboratory Experiments

- Simulation of optical components (optical sources and detectors, couplers, filters) and fiber optic link topologies.
- Use of fiber optic splicer.
- Use of OTDRs for optical fiber testing.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face lectures
USE OF INFORMATION AND	• Use of electronic presentation with multimedia content

<table>
<tr><td>COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>in class,
• Student support through the course webpage and the departmental e-learning platform,
• Electronic communication of instructors and students, through the course webpage and by e-mail.
• Use of fiber optics networks simulation software in the lab.</td></tr>
<tr><td>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</td><td>Lectures, Laboratory experiments – practice assignments and study.

<table><tr><th>Activity</th><th>Semester workload (hours)</th></tr><tr><td>Lectures</td><td>26</td></tr><tr><td>Study for lectures</td><td>26</td></tr><tr><td>Laboratory experiments</td><td>26</td></tr><tr><td>Report on lab experiments - practice assignments</td><td>26</td></tr><tr><td>Study and preparation for exams</td><td>16</td></tr><tr><td>Course Total</td><td>120</td></tr></table></td></tr>
<tr><td>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.</td><td>Student evaluation is performed in the language of instruction.

Final course grade =
Lectures part grade x 60% + Laboratory part grade x 40%,

Lectures part grade results from:
Final written exam on all taught material. The exam includes:
• Multiple choice questions,
• Development questions,
• Problem solving involving fiber optics networks.

Laboratory part grade results from:
• Written test on two groups of lab experiments.
• Reports on lab experiments
• Oral grade from lab participation</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

Essential reading

Lecture notes by the instructors

Recommended Books

1. GREEN, P., 'Fiber optic networks' Prentice-Hall, 1993.
2. SENIOR, J., 'Optical fiber communications', Prentice Hall 1992.
3. GOWAR, J., 'Optical communication systems', Prentice Hall 1993.