COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	2604005	**SEMESTER**	4
COURSE TITLE	Introduction to Telecommunications		

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*	Special Background Course
PREREQUISITE COURSES:	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	http://telecom.teipir.gr http://eclass.teipir.gr/openeclass/courses/ENGI101/

(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*

This course provides the first contact of the students with the field of Telecommunications; therefore, the curriculum to introduce basic concepts and familiarize the students with the wide object of Telecommunications.

In the theoretical part (lectures), for the analysis and the description of the various systems and parameters mathematical expressions are used, a deeper mathematical analysis is avoided on purpose, so as to help the students focus on the basic concepts.

Special attention is given to the understanding of the telecommunication principles in combination with practical applications, since related systems and devices are used every day (radio, television, cellular phones, multimedia, etc.). To this end, the students are given exercises which combine the theoretical knowledge and tools with practical applications.

Furthermore, in order to provide the students combined knowledge with experimental

procedures, the theoretical module is connected to the laboratory exercises.

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

- Understand and possess the basic concepts, principles and tools for the description of telecommunication signals and systems.
- Understand and possess the basic concepts, principles and characteristics/parameters of modulations systems, analog-to-digital conversion systems, time/frequency division multiplexing, noise in telecommunication systems.
- Describe theoretically and draw in block diagram form the operation of various telecommunication sub-systems (transmitter, receiver, etc.) using mathematical expressions/tools.
- Describe and analyze the operation of various telecommunication sub-systems using related computer software tools.
- Study experimentally the basic characteristics of various telecommunication sub-systems, and record performance parameters using measuring instruments (oscilloscope).
- Collaborate in a team to analyze a composite telecommunication problem and synthesize a solution.
- Evaluate alternative solutions and select the appropriate for a given problem.

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

Lectures:

1. Introduction to telecommunication signals (categories, expressions, basic signals, etc.).
2. Telecommunication signals in the time/frequency domain. Introduction to Fourier transform. Filters (categories, properties, applications).
3. Logarithmic scale and application in telecommunications (gain, loss, definitions and applications of dB, dBm).
4. Principles of modulation (baseband signals, frequency shift). Introduction to amplitude modulation AM.
5. Alternatives of AM modulation (DSB, DSB-SC, SSB). Characteristics/parameters of AM

modulation using single frequency. Digital amplitude modulation.
6. AM demodulation (coherent detection, envelope detection).
7. Introduction to angle modulation. Frequency modulation FM. Digital frequency modulation.
8. Characteristics/parameters of FM modulation using single frequency. FM demodulation.
9. Sampling and signal reconstruction principles. Sampling theorem – analysis using Fourier transform.
10. Quantization and coding. Baseband pulse code modulation.
11. Time/frequency multiplexing.
12. Basics of noise in telecommunication systems.
13. Analysis of a telecommunication link using power budget. Applications.

Laboratory Experiments:

1. Introduction and rules.
2. Familiarization with lab equipment and basic measurements.
3. Introduction to modulation. Computer simulation of amplitude modulation/demodulation (AM).
4. Experimental study of amplitude modulation/demodulation (AM).
5. Introduction to angle modulation. Computer simulation of frequency modulation/demodulation (FM).
6. Experimental study of frequency modulation/demodulation (FM).
7. Introduction to sampling and signal reconstruction. Computer simulation.
8. Experimental study of signal sampling and reconstruction system.
9. Computer simulation of signal quantization and coding.
10. Experimental study of signal quantization and pulse code modulation systems.
11. Introduction to digital modulation of analog carrier.
12. Student's time.
13. Lab examinations.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face lectures
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of electronic presentation with multimedia content 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 special software for telecom systems simulation in the lab.
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-*	Lectures, Laboratory experiments, study. ***Activity*** / ***Semester workload (hours)*** Lectures: 26 Study for lectures: 52 Laboratory experiments - : 26

directed study according to the principles of the ECTS	recording of results in the lab	
	Study and preparation for exams	16
	Course Total	***120***
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.*	Final grade = Theory part grade x 60% + Lab part grade x 40% Theory part grade: Final written exam on all taught material. Exam includes development questions and computational - problem solving questions. Lab part grade: • Written tests during the semester • Assessment of lab reports and student presence	

(5) ATTACHED BIBLIOGRAPHY

Essential reading

1. S. Haykin, M. Moher, “Communication Systems”, 5th edition 2010, Papasotiriou Ed., Athens, Greece.
2. H. Taub, D.L. Schilling, «Principles of Telecommunication Systems”, 3rd edition 2006, Tziolas Eds., Thessaloniki, Greece.
3. J. Proakis, M. Salehi, “Communications Systems», 1st edition 2003, University of Athens Eds., Greece.
4. A. Nasiopoulos, “Telecommunications”, 1st edition 2007, Arakynthos Eds., Athens, Greece.
5. Lecture notes by the instructor (available on-line).
6. Laboratory handbook by the instructor.