COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	2603003	**SEMESTER**	3
COURSE TITLE	Analog Electronics II		

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	4	6
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:	Analog Electronics I (2nd Semester)
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (in English)
COURSE WEBSITE (URL)	http://audio.teipir.gr/analogelectronics2/

(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 Analog Electronics that enable them to:

1. Analyse amplifier circuits with discrete and with integrated components, for low and for high frequencies,
2. Design analog electronic circuits including active first order filters with emphasis on OpAmp circuits,
3. Understand and explain by drawing diagrams the effect of negative feedback on an amplifier and analyse single feedback loop circuits,
4. Analyse and design simple power amplifiers for audio signals, understand and explain the notions of distortion and noise and apply noise and distortion reduction methods,
5. Work in a team to achieve these goals.

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
- Project planning and management

(3) COURSE CONTENT

Lectures:

1. Introduction – Quick resumption of basic knowledge on Linear Circuits Theory
2. Amplification-Amplifiers
3. Transfer Function
4. Linear amplifiers' models – Generalized circuit Two-Port
5. Operational Amplifiers (OpAmps)
6. Basic OpAmp circuits – Applications
7. Negative Feedback
8. Single Loop Feedback Circuits' Analysis Methods
9. Spectral Response of Amplifiers
10. High Frequency Models of Amplifier Devices
11. High Frequency Analysis of Amplifier Circuits
12. Power Amplifiers
13. Power Amplifier Analysis / Linearity, Distortion, Noise

Laboratory Experiments:

Analog Electronics II Lab offers a study of Analog Electronics operating from DC up to 10MHz through 3 Lab-preparatory Lectures / Lab-familiarization sessions and a set of 10 appropriately designed Lab Projects:

Lab Project 1 : "Power Supplies 1: Rectification & Filtering "
Lab Project 2 : " Power Supplies 2: Linear Regulation"
Lab Project 3: "Operational Amplifiers 1: Basic Amplifier Topologies using OpAmps "
Lab Project 4: "Operational Amplifiers 2: OpAmp Differential Amplifier and OpAmp Applications"
Lab Project 5: "Acquisition / Study of Transfer Functions "
Lab Project 6: "Negative Feedback 1: Examples with 1 BJT"

Lab Project 7: "Negative Feedback 2: Examples with OpAmps and Two-Stage BJT Amplifier"
Lab Project 8: "Power Amplifiers "
Lab Project 9: "Design of Basic BJT Circuits"
Lab Project 10: "Design of Basic JFET Circuits

(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, • Lab practice tests over the departmental e-learning platform (moodle).
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*	Lectures, Laboratory experiments, study. ***Activity*** / ***Semester workload (hours)*** Lectures: 52 Study for lectures: 52 Laboratory experiments: 26 Report on lab experiments: 26 Study and preparation for exams: 24 **Course Total**: ***180***
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 exam (60%) Midterm exam (30%) Participation (10%) ***Lab part grade:*** Average of all grades received at each weekly Lab Experiment

(5) ATTACHED BIBLIOGRAPHY

Essential reading

1. SEDRA, A.S. and K. C. SMITH, Microelectronic Circuits, 6th Edition, Oxford University Press, 2009, ISBN-13 978-0195323030..
2. PAUL R. GRAY, PAUL J. HURST,
3. S. H. LEWIS, ROBERT G. MEYER, Analysis and Design of Analog Integrated Circuits, 5th Edition, ISBN-13: 978-0470245996
4. MALVINO A.P., BATES D., Electronic Principles, McGraw-Hill Science/Engineering/Math, 7th Edition, 2006, ISBN-13: 978-0073222776.
5. Lecture Notes.
6. Laboratory Handbook (in Greek)

Recommended Books

1. HOROWITZ P., HILL W., The Art of Electronics, Cambridge University Press, 2006
2. FRANCO S., Design with Operational Amplifiers and Analog Integrated Circuits, 4th Edition, McGraw-Hill Science/Engineering/Math, 2014, ISBN-13: 978-0078028168
3. FLEEMAN S., Electronic Devices: Discrete and Integrated, Prentice Hall, 1990, ISBN-13: 978-0133381207