

Course Outline

1. General

SCHOOL	Engineering		
DEPARTMENT	Electrical and Computer Engineering		
LEVEL OF STUDY	Undergraduate		
COURSE UNIT CODE	7.006	SEMESTER	7 th
COURSE TITLE	Modeling of Electronic and Electrical Systems		
COURSEWORK BREAKDOWN		TEACHING WEEKLY HOURS	ECTS Credits
Theory (Lectures)		2	2.5
Exercises		1	1.5
TOTAL		3	4
COURSE UNIT TYPE	Specialized knowledge/Consolidation		
PREREQUISITES	-		
LANGUAGE OF INSTRUCTION/EXAMS	Greek		
COURSE DELIVERED TO ERASMUS STUDENTS	No		
COURSE WEB PAGE (URL)	https://eclass.hmu.gr/courses/ECE183/		

2. LEARNING OUTCOMES

Learning outcomes
<p>The course "Modeling of Electronic and Electrical Systems" aims to give students the necessary knowledge on how one can simulate electronic and electrical circuits with the help of software packages. Emphasis is given on the use of appropriate behavioral models of semiconductor elements.</p> <p>Upon successful completion of the course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Understand the concept of modeling and simulation of electrical and electronic circuits. 2. Use the tools to simulate circuits and how they are made as well as their application limits. 3. Implement the computer simulation tools depending on the operation of each circuit. 4. Analyze the produced simulation results and calculate basic characteristics of the circuits to compare them with experimental data so that it can give feedback to its model for improvement. 5. Propose solutions to issues that have to do with the need to create model circuits at the level of initial development but also to predict their behavior when they are implemented.
General skills
<ul style="list-style-type: none"> ▪ Search, analysis and synthesis of data and information, using the necessary technologies ▪ Autonomous work ▪ Teamwork ▪ Search, analysis and synthesis of data and information, using the necessary technologies ▪ Decision making ▪ Promoting liberal, creative, and inductive/deductive thinking ▪ Work in an interdisciplinary environment

3. Syllabus

Modeling and analysis of analog circuits of weak currents and power circuits, hardware characteristics, circuit response, Introduction to Capture, circuits in series and in parallel, multiple schematics, DC SWEEP Analysis - Linearity, AC resistance, inductance, capacitance, RLC circuits, AC Sweep analysis, RC transient circuits, The diode - DC power supply, The bipolar transistor (BJT) - Characteristic curves, Bipolar transistor polarization, The bipolar transistor as a buffer and amplifier, FET transistor - Characteristic curves of thyristor, Operational amplifier Power electronic circuits and problems

4. Teaching methods - assessment

MODE OF DELIVERY	In-Class Face-to-Face		
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY	<ul style="list-style-type: none"> ▪ Use of ICTs in lecturing ▪ Use of ICTs in weekly tests ▪ Use of ICTs for the communication with students via the e-class platform 		
TEACHING ORGANIZATION	<i>Method description/Activity</i>	<i>Semester Workload</i>	
	Lectures	26	
	Laboratory exercises	13	
	Non-guided personal study	52	
	Homework exercises	26	
	Electronic test	3	
	Total Contact Hours	120	
ASSESSMENT METHODS	<p>All announcements for the course regulations and complementary reading material are permanently posted in the course web page. The course grade incorporates the following evaluation procedures:</p> <ol style="list-style-type: none"> 1. Weekly tests (10%) <ul style="list-style-type: none"> • Short answer questions 2. Written examination I (40%) <ul style="list-style-type: none"> • Problem solving • Short answer questions 3. Final written examination (50%) <ul style="list-style-type: none"> • Problem solving • Short answer questions • Multiple choice questions 		

5. Recommended bibliography

- Analog Design and Simulation using OrCAD Capture and PSpice, Dennis Fitzpatrick
- SPICE for Power Electronics and Electric Power, Muhammad H. Rashid, Hasan M. Rashid