COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
FUNDAMENTALS OF ELECTRICAL ELECTRONICS ENGINEERING	**ES 222**	**2**	**3 + 0**	**3**	**5**

Prerequisites	none

Language of Instruction	English
Course Level	Bachelor's Degree
Course Type	Compulsory
Course Coordinator	Prof. Dr. Fethi Olcaytug
Instructors	Prof. Dr. Fethi Olcaytug
Assistants	none
Goals	The aim of this course is to give an itroduction to the basics of Electrical and Electronics Engineering (EEE) for those engineering students whose branches will be continuously in touch with the field of EEE. After an overwiev of the wide field of EEE, fundamentals of circuits and systems will be taught. Analytical methodologies and their application as well as examples on selcted topics will be presented. By the end of the course, students will be able to look for and assess solutions when they are faced with problems in their field related to EEE topics.
Content	Brief overview of Electrical and Electronics Engineering, basic concepts, definitions, application areas, unit systems, voltage and current as basic terms, direct and time variable quantities, resistance, conductance, inductance, capacitance, circuit definition, series and parallel circuits, Ohm’s law, Kirchhoff’s voltage and current laws, node voltage and mesh current analysis, superposition principle, power as term and modeling of power sources, Thevenin and Norton theorems, maximum power transfer, measurement, nonlinear elements, operational amplifiers, derivation of differential equation of circuits, transients and steady state analysis of the first and second order circuits, sinusiodal quantities, phasors, logic circuits.

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Ability to define basic electrical and electronics concepts	1, 4	1, 2	A
2) Ability to analyse and design simple electrical and electronic circuits to solve a specific problem	2, 4	1, 2	A

3) Ability to apply potential and current laws in the field of EEE and to make assessments on this base	1	1, 2	A
4) Ability to know and select proper measurement devices for a given specific task in EEE	4	1	A

Teaching Methods:	1: Lecture, 2: Question-Answer
Assessment Methods:	A: Testing

COURSE CONTENT

Week	Topics	Study Materials
1	Overview of Electrical and Electronics Engineering, introduction to basic concepts of EEE, application areas, unit systems	Lecture notes
2	Definitions of voltage and current, direct and variable quantities, resistor, conductor, inductor, capacitor, voltage and current sources	Lecture notes
3	Circuit definition, series and parallel circuits	Lecture notes
4	Ohm's law, Kirchhoff's voltage and current laws, models for power sources and measurement devices	Lecture notes
5	Node voltage and mesh current analysis	Lecture notes
6	Superposition principle, Thevenin and Norton theorems	Lecture notes
7	Maximum power transfer, nonlinear elements	Lecture notes
8	MID-TERM I	Lecture notes
9	Brief look into microelectronics and integrated circuits, operational amplifiers	Lecture notes
10	Voltage-current relations across capacitance and inductance	Lecture notes
11	Power and energy, time-dependent sources , mean and rms values	Lecture notes
12	MID-TERM II	Lecture notes
13	Derivation of differential equation of circuits, transients and steady state analysis of the first and second order circuits	Lecture notes
14	Sinusiodal quantities in linear circuits, phasors, power and rms relations, industrial frequencies, terms of EMI, EMC	Lecture notes
15	Logic circuits	Lecture notes
16	Vital importance of continuing education in a rapidly developing field, need for interdisciplanary collaboration and mutual support	Lecture notes

RECOMMENDED SOURCES

Textbook	• **James W. Nilsson, and Susan A. Riedel**, 'Electric Circuits', Last Edition, Pearson Prentice Hall, 2004.

Additional Resources	• **Richard C. Dorf, and James A. Svoboda**, 'Introduction to Electrical Circuits', John and Wiley, New York, 7th addition

MATERIAL SHARING	
Documents	Printed copies of presentation slides as lecture notes
Exams	Preparatory questions for theoretical part of mid-term and final exams, preparatory classes before exams in case of need

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	60
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.					x
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.			x		
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.					
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.			x		
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.	x				
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.	x				
7	Ability to communicate effectively both orally and in writing; knowledge of a minimum of one foreign language.					

8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.	x				
9	Awareness of professional and ethical responsibility.	x				
10	Information about business life practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development.					
11	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety; awareness of the legal consequences of engineering solutions.	x				

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	5	70
Midterm examination	2	2	4
Final examination	1	2	2
Total Work Load			120
Total Work Load / 25 (h)			4.8
ECTS Credit of the Course			5