

TOROS ÜNİVERSİTESİ

Faculty Of Engineering
Electrical And Electronics Engineering (English)

Course Information

ELECTRICAL-ELECTRONICS MEASUREMENT AND ENSTRUMENTATION					
Code	Semester	Theoretical	Practice	National Credit	ECTS Credit
		Hour / Week			
EEE326	Spring	3	0	3	3

Prerequisites and co-requisites	
Language of instruction	English
Type	Elective
Level of Course	Bachelor's
Lecturer	Prof. Dr. C. Cengiz ARCASOY
Mode of Delivery	Face to Face
Suggested Subject	
Professional practise (internship)	None
Objectives of the Course	The purpose of this course is to increase the knowledge of electrical measurements and instrumentation.
Contents of the Course	Introduction. Definitions: Measurement, Accuracy and Precision, et al. Static and dynamic characteristics of measurement systems. Types of error, error analysis. Analogue meters: Principle of operating, accuracy. Digital multimeters; principle of calibration, common mode rejection. AC or DC current and voltage measurement - standards, methods and instruments. Bridge measurements (Wheatstone, Kelvin, Maxwell, and Hay Bridge). Measuring amplifiers with operational amplifier, converters of average and of RMS value, phase-sensitive rectifier. Principle of sampling and quantisation of analogue signal, DACs and ADCs - principle and properties. Measurement of power - definition, measuring methods, digital wattmeter; measurement of energy consumption. Sensors and transducers: Principles of operating and characteristics. Analog and Digital Data Acquisition Systems.

Learning Outcomes of Course

#	Learning Outcomes
1	Students will be able to use techniques about measurements in electrical systems.
2	Students will analyse operating principle of analog and digital measurements equipments.
3	Students will be able to recall physical principles of sensors and transducers.
4	Students will gain the skill of circuit design with sensors and transducers.
5	Students will analyse types of measurements circuits realized with operational amplifiers.

Course Syllabus

#	Subjects	Teaching Methods and Technics
1	Login. Definitions: Measurement, error, accuracy, precision, etc.	Lecture notes
2	Static and dynamic characteristics of measuring systems.	Lecture notes
3	Types of errors, error analysis.	Lecture notes
4	Analog measuring instrument: working principles, accuracy.	Lecture notes
5	Structure of digital measuring instruments, principles of calibration, common mode suppression ratios.	Lecture notes
6	AC or DC current and voltage measurement methods and standards.	Lecture notes
7	Bridging methods (Wheatstone, Kelvin, Maxwell, Hay bridge).	Lecture notes

8	Midterm	
9	Measuring amplifiers with operational amplifiers, Mean and effective value transducers, Phase sensitive rectifier.	Lecture notes
10	Sampling and quantization of analog signals. DAC and ADC constructions.	Lecture notes
11	Power and energy measurement.	Lecture notes
12	Sensors: Working Principles, Characteristics.	Lecture notes
13	Sensors: Working Principles, Characteristics.	Lecture notes
14	Analog and digital data collection systems.	Lecture notes
15	Analog and digital data collection systems.	Lecture notes
16	Midterm	

Course Syllabus

#	Material / Resources	Information About Resources	Reference / Recommended Resources
1	D. A. Bell, Electronic Instrumentation and Measurements, PH1, 2nd Edition, 2003.		
2	H. S. Kalsi, Electronic Instrumentation, Second edition, Mc Graw-Hill, 2004.		
3	A. D. Hell Frick and W.D Cooper, Modern Electronic Instrumentation & Measurement Techniques, PH1, 5th, 2002.		

Method of Assessment

#	Weight	Work Type	Work Title
1	40%	Mid-Term Exam	Mid-Term Exam
2	60%	Final Exam	Final Exam

Relationship between Learning Outcomes of Course and Program Outcomes

#	Learning Outcomes	Program Outcomes	Method of Assessment
1	Students will be able to use techniques about measurements in electrical systems.	1	1,2
2	Students will analyse operating principle of analog and digital measurements equipments.	1	1,2
3	Students will be able to recall physical principles of sensors and transducers.	1	1,2
4	Students will gain the skill of circuit design with sensors and transducers.	1	1,2
5	Students will analyse types of measurements circuits realized with operational amplifiers.	1	1,2

PS. The numbers, which are shown in the column Method of Assessment, presents the methods shown in the previous table, titled as Method of Assessment.

Work Load Details

#	Type of Work	Quantity	Time (Hour)	Work Load
1	Course Duration	14	3	42
2	Course Duration Except Class (Preliminary Study, Enhancement)	14	2	28
3	Presentation and Seminar Preparation	0	0	0
4	Web Research, Library and Archival Work	0	0	0
5	Document/Information Listing	0	0	0
6	Workshop	0	0	0

7	Preparation for Midterm Exam	1	8	8
8	Midterm Exam	1	1	1
9	Quiz	0	0	0
10	Homework	0	0	0
11	Midterm Project	0	0	0
12	Midterm Exercise	0	0	0
13	Final Project	0	0	0
14	Final Exercise	0	0	0
15	Preparation for Final Exam	1	10	10
16	Final Exam	1	1	1
				90