DEPARTMENT OF MATERIALS SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details

Code	Academic Year			Semester
NW1204	2			4
Title	**T**	**A**	**L**	**ECTS**
Measurement Techniques	2	1	1	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Materials Science and Technology					
Forms of Teaching and Learning	Face-to-face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	Introduction of Measurement Technique, electrical circuits and their analysis, using of operation amplifier to solve the common measurement practice. Measurement of voltage, current, time, Phase (simulation)					
Content	International unit system, Concept of electrical field, potential, voltage, current, phase. Analyse of LTI circuits using sinus generators, phasor. Kirchhoff, Thevenin, Norton, Superposition. Voltage and current divider. Operation amplifier and its basic parameter. The basic circuits build with operation amplifier (see pls. weekly content for details)					
Prerequisites	-					
Coordinator	-					
Lecturer(s)	Dr. Sungur Aytaç					
Assistant(s)	-					
Work Placement	-					

Recommended or Required Reading

Books / Lecture Notes	Lecture notes (German & Turkish), appendices, user guide for Muıltisim
Other Sources	O. Marti et. al., Vorlesungsskript, Physikalische Elektronik und Messtechnik, Uni Ulm, 2002 T. Mühl, Einführung in die elektrische Messtechnik, Teubner, 2. Auflage, 2005 W. Nawrocki, Measurement Systems and Sensors, Artech House, 2005 Anhänge : Komplex Zahlen PTB Mitteilungen, 2012, Heft 1 Solved and unsolved problems

Additional Course Material

Documents	Notes on. Fourier series, MATLAB,
Assignments	Problems for advanced topics
Exams	1 intermediate exam

Course Composition

DEPARTMENT OF MATERIALS SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Mathematics und Basic Sciences		40%
Engineering		60%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	40%
Quiz		
Assignments		
Attendance		
Recitations		
Projects		
Final Exam	1	60%
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	12	4	48
Self-Study	12	4	48
Assignments (preparation für midterm exam)	1	15	15
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations (during lectures)			
Laboratory (simulation)	5	10	50
Projects			
Final Exam and preparation for it	1	27	27
		Total Work Load	**190**
		ECTS Points (Total Work Load / Hours)	**6,3**

Learning Outcomes

1	Introduction to measurement techniques, try to create a basis, die also beneficial for following lectures
2	Physical interpretation of abstract terms, trying to teach the analytical, critical and creative thinking.
3	Try to develop system point of view

DEPARTMENT OF MATERIALS SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

4	Discussion about the benefit of working in groups.
Weekly Content	
1	Introduction to measurement techniques, Basic Terms, international Unit System
2	Electric field, potential, voltage, current, phase difference, Power
3	Linear Time Independent (LTI) circuits, analysis of LTI circuits which forced by sinus generators, Fourier Series
4	Phasor, w domain, Kirchhoff equations, Thevenin and Norton equivalent circuits, superposition
5	Operation amplifier (short OPA) and its basic parameter
6	Circuits with OPAs which are find a wide praxis in the measurement technique
7	Introducing of simulation program and its user interface
8	Inverting and non-inverting OPA circuits
9	Summing and differential amplifier, Instrumentation Amplifier, Integrator, differentiator
10	Log Amplifier, Voltage to Current, Current to Voltage converters
11	LP, BP, HP Filter
12	LP, BP, HP Filter
13	Average builder, voltage follower, Diode and diode OPA circuits
14	
15	

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7	P8
1	5	5	5	5	5	5	5	5

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=207

Compiled by:	Dr. Sungur Aytaç
Date of Compilation:	15.05.2022