GENERAL METROLOGY

1	Course Title:	GENERAL METROLOGY	
2	Course Code:	MAK4412	
3	Type of Course:	Optional	
4	Level of Course:	First Cycle	
5	Year of Study:	4	
6	Semester:	8	
7	ECTS Credits Allocated:	3.00	
8	Theoretical (hour/week):	2.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	-	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Prof. Dr. A.ALPER ÖZALP	
15	Course Lecturers:	Yrd. Doç. Dr. Eser KARLIK	
16	Contact information of the Course Coordinator:	e-posta : aozalp@uludag.edu.tr tel : 224 294 19 81	
17	Website:		
18	Objective of the Course:	To provide 4th year Mechanical Engineering Students knowledge on the measurement techniques and data processing methods for applications on fluid mechanics and heat transfer; to introduce basic concepts and philosophy of electrical/electronics metrology and to emphasize the importance of metrology in engineering and industrial applications; to present electrical measurement standards and techniques.	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	The concept of measurement and measurement systems will be defined.
		2	Information on liquid manometers and barometers will be given.
		3	Basic principles of flowrate measurement with cross-section change in closed conduits will be given.
		4	Basic principles of pyrometers and liquid crystal techniques will be given.
		5	Understanding of reference measurement standards, measurement systems and uncertainity calculations used in metrology laboratories of manufacturing and quality control departments of plants will be provided.
		6	Usage of measurement analysis methods in research, development and measurement system design will be provided.
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21	Course Content:		

	Course Content:	
Week	Theoretical	Practice
1	Definition of Measurement, Generalization of Measurement Systems.	
2	Pressure Measurement.	
3	Liquid Manometers. Barometers.	
4	Flow Measurement.	
5	Flowrate Measurement with Cross-Section Change in Closed Conduits.	
6	Temperature Measurements with Pyrometers.	
7	Temperature Measurements with Liquid Crystals.	
8	Repeating courses and midterm exam	
9	Statistical analysis of measurement errors: Average, deviation, standard deviation, Gauss distribution	
10	Static and dynamic characteristics in electrical/electronics measurements: Accuracy, sensitivity, resolution, linearity/nonlinearity, transfer function, delay time, dynamic nonlinearity	
11	Wheatstone bridge	
12	Alternative current (AC) measurements: characteristics of measurement equipments, measuring AC signals by rectifying	
13	electromagnetic interference measurements: Interference sources, measurement	
14	Materials:	İstanbul, 1995.
15		Teknik Kitabevi, 2009.
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23	Assesment	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	13	4.00	52.00
Homeworks	0	0.00	0.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	2.00	2.00
Others	2	4.00	8.00
Final Exams	1	2.00	2.00
Total Work Load			92.00
Total work load/ 30 hr			3.07
ECTS Credit of the Course			3.00

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Midterm Exam	1	40.00
Quiz	0	0.00
Home work-project	0	0.00
Final Exam	1	60.00
Total	2	100.00
Contribution of Term (Year) Learning Activities to Success Grade		40.00
Contribution of Final Exam to Success Grade		60.00
Total		100.00

Measurement and Evaluation Techniques Used in the Course	

24	ECTS / WORK LOAD TABLE

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	5	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0
ÖK2	5	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0
ÖK3	5	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0
ÖK4	5	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0
ÖK5	5	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0
ÖK6	5	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	**1 very low**		**2 low**			**3 Medium**			**4 High**			**5 Very High**				