AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Sensor Materials and Design								
Course Code	MME514		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	8	Workload	202 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	Using the electronic properties of materials (capacitance, impedance, current, voltage, etc.) sensors, in accordance with the design of the physical measurement principles. In this context, the electronic properties of materials, theoretical and practical use of sensors. Learning of the sensor making use of metal and ceramic materials.								
Course Content	Characteristics of physical and electric for sensors and working principle. Production methods of sensor materials, sensor materials and production methods, working principles of sensor and transducer for determining of temperature, pressure, light, strain, chemical composition, frazzle and chemical ambiance, quantum theory of atoms, molecules and solids and using in electronic and sensor materials, applications, evaluation of the signals from sensors, errors in analysis and separation power sensors, selection and design of sensor for specific problems								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Case Study, Project Based Study, Individual Study, Problem Solving								
Name of Lecturer(s)	Prof. İsmail BÖĞREKCİ								

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	15
Final Examination	1	60
Quiz	4	15
Assignment	5	5
Term Assignment	1	5

Recommended or Required Reading	
1	Jacob Fraden, “Handbook of Modern Sensors: Physics, Designs, and Applications” Springer; 3rd edition (December 4, 2003) ISBN-10: 0387007504 ISBN-13: 978-0387007502.
2	Graham M. Broker, “Introduction to Sensors” SciTech Publishing; First edition (August 25, 2008), ISBN-10: 189112174X ISBN-13: 978-1891121746
3	Jon S. Wilson, “Sensor Technology Handbook” Newnes (December 22, 2004), ISBN-10: 0750677295 ISBN-13: 978-0750677295.

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction to sensors and transducers.
2	Theoretical	Sensors, Signals, Systems, classification, units of measure.
3	Theoretical	Sensor Characteristics; Transfer Function;, Accuracy Precision Repeatability, calibration, resolution, satisfaction, environmental factors, reliability, error, application characteristics
4	Theoretical	Physical Characteristics of perception; Electric charge, field and potential, capacitance, magnetism, Induction, Resistance, Piezoelectric effect, Pyroelectric effect, Hall effect, Seebeck and Peltier effects, sound waves, temperature and thermal properties of the material; Light.
5	Theoretical	Optical sensors are the components of radiometry, photometry, optical fibers and waveguides, thermal coatings for absorption; interferometer.
6	Theoretical	Interface electronic circuits, the sensor output / input characteristics of the interface electronics, amplifiers, excitation circuits, oscillators, AD / DA converters that digitize directly from systems; proportional circuits, bridge circuits, and circuit noise for these sensors.
7	Theoretical	Temperature Sensors; Termoresistif sensors; thermoelectric contact sensors, semiconductor sensors are pn junction
8	Intermediate Exam	Midterm Exam
9	Theoretical	Temperature sensors, optical temperature sensors, acoustic sensors are temperature, Piezoelectric temperature sensors
10	Theoretical	Chemical Sensors, characteristics, classification according to detection mechanisms.
11	Theoretical	Chemical sensors, sensor materials classifications Pattern recognition methods.
12	Theoretical	Sensor Materials

13	Theoretical	Sensor technologies
14	Theoretical	Sensor technologies
15	Theoretical	Sensör Teknolojileri
16	Final Exam	Final Exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	4	3	98
Assignment	5	0	4	20
Term Project	1	15	10	25
Quiz	4	4	1	20
Midterm Examination	1	15	2	17
Final Examination	1	20	2	22
			Total Workload (Hours)	202
			[Total Workload (Hours) / 25*] = **ECTS**	8

**25 hour workload is accepted as 1 ECTS*

Learning Outcomes

1	To learn sensors and systems.
2	Comprehend the use of metals as a sensor materia
3	To learn gas sensors, humidity sensors, pressure sensors
4	To learn temperature sensors, magnetic sensors, optical sensors
5	Sensors on the basic fabrication techniques will gain skills
6	Understand Transducer applications

Programme Outcomes *(Mechanical Engineering (English) Master)*

1	To be able to access wide and deep information with scientific researches in the field of Engineering, evaluate, interpret and implement the knowledge gained in his/her field of study
2	To be able to complete and implement “limited or incomplete data” by using the scientific methods
3	To be able to consolidate engineering problems, develop proper method(s) to solve and apply the innovative solutions to them
4	To be able to develop new and original ideas and method(s), to develop new innovative solutions at design of system, component or process
5	To be able to gain comprehensive information on modern techniques, methods and their borders which are being applied to engineering
6	To be able to design and apply analytical, modeling and experimental based research, analyze and interpret the faced complex issues during the design and apply process
7	To be able to gain high level ability to define the required information and data
8	To be able to work in multi-disciplinary teams and to take responsibility to define approaches for complex situations
9	To be able to transfer of the process and results of studies at national and international environments systematic and clear verbal or written
10	To be able to be aware of social, scientific and ethical values guarding adequacy at all professional activities and at the stage of data collection, interpretation, and announcement
11	To be able to become aware of new and developing application of profession and ability to analyze and study on those applications
12	To be able to interpret engineering application’s social and environmental dimensions and it’s compliance with the social environment

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5	L6
P1	4	4	3	4	3	3
P2	4	5	4	5	4	4
P3	4	3	5	3	4	5
P4	3	4	4	4	3	5
P5	3	5	5	3	5	5
P6	4	3	4	4	5	4
P7	5	5	5	5	4	3
P8	4	4	3	5	4	4

P9	5	4	4	4	5	5
P10	3	5	5	4	5	4
P11	4	5	3	3	4	4
P12	5	4	4	5	5	5