AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Fundamentals and Applications of Hydrogen Energy								
Course Code	MME509		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	8	Workload	195 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The objective of the course is to teach the fundamentals and applications of hydrogen energy.								
Course Content	Advantages and applications of hydrogen energy, hydrogen energy production methods, storage and transport of hydrogen energy, applications of hydrogen energy, working principle and advantages of fuel cell, fuel cell types, fuel cell applications and project planning								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Project Based Study, Individual Study, Problem Solving								
Name of Lecturer(s)									

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	Press, R.J., Santhanam K.S.V., Miri J.M., Bailey, A.V., Takacs, G.A., Introduction to Hydrogen Technology, Wiley-Interscinece, 2008.
2	Williams, L.O., Hydrogen Power: An Introduction to Hydrogen Energy and Its Applications, 1st edition, Pergamon Pr, 1980.
3	Lymberopoulos, N., Hydrogen-based autonomous power systems: techno-economic analysis of the integration of hydrogen in autonomous power systems, 1st edition, Springer, 2008.

Week	Weekly Detailed Course Contents	
1	Theoretical	Hydrogen Production Techniques
2	Theoretical	Steam reforming of hydrocarbons
3	Theoretical	Partial oxidation, solar generation of hydrogen from water
4	Theoretical	Photovoltaic cell plus electrolyzer, photoelectrochemical cells
5	Theoretical	Photovoltaic cell plus electrolyzer, photoelectrochemical cells
6	Theoretical	Photobiological systems, photodegradation systems
7	Theoretical	Hydrogen usage as fuel in internal combustion engines
8	Intermediate Exam	Midterm Exam
9	Theoretical	Hydrogen usage steam generation for steam turbines and in fuel cells
10	Theoretical	Hydrogen usage steam generation for steam turbines and in fuel cells
11	Theoretical	Hydrogen storage techniques: Gas storage, Liquid storage, Storage in porous media
12	Theoretical	Hydrogen storage techniques: Gas storage, Liquid storage, Storage in porous media
13	Theoretical	Hydrogen storage techniques: Gas storage, Liquid storage, Storage in porous media
14	Theoretical	Hydrogen safety
15	Theoretical	
16	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	16	2	4	96
Assignment	5	0	3	15
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)	195
			[Total Workload (Hours) / 25*] = **ECTS**	8
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	To be able to understand the principles and concepts of Hydrogen Energy and its Applications
2	To be able to learning the importance about Hydrogen Energy and its Applications
3	Assessment of utilization areas for Hydrogen Energy
4	Assessment of required technological advances in order to utilize Hydrogen Energy effectively
5	Assessment of knowledge about current Hydrogen Energy Systems

Programme Outcomes *(Mechanical Engineering Master's Without Thesis)*	
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 become 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 gain ability 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
P1	4	4	5	4	5
P2	5	4	4	4	4
P3	4	5	3	3	4
P4	5	4	4	4	4
P5	5	4	3	3	5
P6	4	4	3	4	3
P7	4	4	3	5	5
P8	4	4	4	4	3
P9	4	4	5	3	5
P10	5	5	4	4	4
P11	5	4	3	3	5
P12	5	5	5	4	5