



AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

Course Title		Energy Conversion in Thermal Engines							
Course Code		MME603		Course Level		Third Cycle (Doctorate Degree)			
ECTS Credit	9	Workload	228 (Hours)	Theory	3	Practice	0	Laboratory	0
Objectives of the Course		Purpose of this course is to advance knowledge the graduate student about thermal engines and to help their graduation study.							
Course Content		Units and basic thermodynamic concepts, first and second law of thermodynamics , energy sources fuel and specifications, illustrate solar energy and power systems cycles, cycle performance parameters and steady state flow work processes producing of work and power							
Work Placement		N/A							
Planned Learning Activities and Teaching Methods				Explanation (Presentation), Demonstration, Discussion, Case Study, Individual Study, Problem Solving					
Name of Lecturer(s)									

Prerequisites & Co-requisites

Language Requisite	Yes
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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	1. Energy Conversion, Rainer Decher, Oxford University Press, 1994.
2	2. Energy Conversion-The E-book Kenet C. Weston, 1992.

Week	Weekly Detailed Course Contents	
1	Theoretical	Units, Basic thermodynamic concepts (Temperature, Pressure, Density, Specific weight, Ideal gas, Heat, Work, Kinetic, Potential and Internal Energy, Specific heat, Enthalpy, Efficiency, Effectiveness), State Changes of Ideal Gases.
2	Theoretical	Units, Basic thermodynamic concepts (Temperature, Pressure, Density, Specific weight, Ideal gas, Heat, Work, Kinetic, Potential and Internal Energy, Specific heat, Enthalpy, Efficiency, Effectiveness), State Changes of Ideal Gases.
3	Theoretical	Energy and power, Energy sources, Users demand, Fossil fuels and compositions, Power production in combustion, Solar energy, Mechanic power sources.
4	Theoretical	Efficiency, Process performance, Conversion of heat to mechanical power, Power systems, Heat upgrade cycles, Power parameters in heat engines.
5	Theoretical	Properties of gases and gas mixtures, JANAF thermochemical data tables, Combustion chemistry, Heat formation, Formation enthalpy of reactants and products, Adiabatic flame temperature, Combustion in constant volume
6	Theoretical	One-dimensional compressible flow, Nozzles and diffusers.
7	Theoretical	Steady flow work processes, Work interactions with flowing media, Turbines and compressors, Thrust power.
8	Intermediate Exam	Midterm Exam
9	Theoretical	Heat limited cycles, Brayton cycle analysis, Closed Brayton cycle, Performance characteristic, Regeneration, Ericsson cycle, Heat and work interaction
10	Theoretical	Sıcaklık sınırlı çevrimler, Brayton çevrimi analizi, Kapalı Brayton çevrimi, Performans karakteristikleri, Rejenerasyon, Ericsson çevrimi, Isı ve iş etkileşimi
11	Theoretical	Fluid property limited cycles, Thermodynamic properties of vapor, Vapor cycles, Cycle combinations, Critical cycle.
12	Theoretical	One-dimensional compressible flow, Nozzles and diffusers.
13	Theoretical	Steady flow work processes, Work interactions with flowing media, Turbines and compressors, Thrust power.



14	Final Exam	Final Exam
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Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	16	5	3	128
Assignment	5	0	3	15
Term Project	1	15	10	25
Quiz	4	3	1	16
Midterm Examination	1	20	2	22
Final Examination	1	20	2	22
Total Workload (Hours)				228
[Total Workload (Hours) / 25*] = ECTS				9
*25 hour workload is accepted as 1 ECTS				

Learning Outcomes

1	To define and make solution of the Units and Basic thermodynamic concepts.
2	To apply on the problem of First and second law of thermodynamics
3	To arrange energy sources, Fuel and specifications.
4	To arrange and make problem of the solar energy and Power systems
5	To apply problem of cycles, Cycle performance parameters and steady state flow work processes.
6	To summarize the producing of work and power.

Programme Outcomes (Mechanical Engineering (English) Doctorate)

1	1. In Mathematics, natural sciences and mechanical engineering, department has the sufficient infrastructure; the ability to use the theoretical and practical information for engineering solutions
2	2. The ability to identify, define, and solve the formula for complex engineering problems; the ability to select and apply for the appropriate analytical methods and modelling techniques
3	3. To meet desired needs of a system, system component, or process, analysing and designing skill under realistic constraints; in this respect, the ability to apply the methods of modern design
4	4. The ability to use and choose modern techniques and tools for required engineering applications and; the ability to use information technology effectively
5	5. The ability to design the experiment, collect the data for the experiment and interpret to analysing results
6	6. The ability to use computer software and hardware information, access to information and other information sources
7	7. The ability to work individually and with multidisciplinary teams effectively, taking responsibility self-confidence for complex situations
8	8. The ability to communicate with foreign colleagues by having high level of foreign language knowledge in the field of engineering
9	9. Monitoring the science and technology developments and the ability to renew itself with innovative ideas constantly
10	10. Professional and ethical responsibility awareness
11	11. Having an adequate information and awareness in the subjects of occupational safety, occupational health, social security rights, quality control and management issues of environmental protection
12	12. The ability to appreciate the effects of engineering solutions and applications in universal and social dimensions
13	13. The ability to be enlightened to the experts or non-expert audience groups on the issues related with engineering problems and solutions written and oral
14	14. The ability to have adequate knowledge and skills in the project development and application, manage the activities planning, including the projects to the employees having the responsibility of the project by increasing vocational awareness

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	5	5	4	5	4	3
P2	4	4	4	5	4	5
P3	5	4	4	5	4	5
P4	5	4	5	4	5	5
P5	3	5	4	4	5	5
P6	4	5	4	5	5	4
P7	5	5	5	5	5	4
P8	5	4	5	5	4	4



P9	5	4	3	5	5	5
P10	5	5	3	3	3	4
P11	4	5	5	5	5	4
P12	3	5	5	4	5	5
P13	4	5	5	4	5	5
P14	5	4	4	5	5	4

