



## AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

Course Title		Advanced Solar Engineering							
Course Code		MME618		Couse Level		Third Cycle (Doctorate Degree)			
ECTS Credit	9	Workload	227 (Hours)	Theory	3	Practice	0	Laboratory	0
Objectives of the Course		The course introduces students to the applications of solar energy as an alternative source of energy, and aims at enhancing the students understanding on solar energy availability, collection, and potential utilization of solar energy.							
Course Content		Solar radiation angles, radiation out of atmosphere, solar radiation components, calculation of solar radiation daily and hourly in different sky conditions, solar radiation models in tilted planes and sun following planes shadow analysis, fundamental heat transfer mechanisms in solar energy applications							
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)									

### Prerequisites & Co-requisites

Language Requisite	Yes
--------------------	-----

### 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	Kalogirou, S., Solar Energy Engineering: Processes and Systems, Academic Press, 2009.
2	Duffie, J.A., Beckman W.A., Solar Engineering of Thermal Processes, 3rd edition, Wiley, 2006.
3	Goswami, D. Y., Krethi, F., Kreider J.F., Principles of Solar Engineering, , 2nd edition, CRC Press, 2000.

Week	Weekly Detailed Course Contents	
1	Theoretical	Solar Radiation
2	Theoretical	Solar Radiation
3	Theoretical	Available solar radiation
4	Theoretical	Selected heat transfer topics
5	Theoretical	Selected heat transfer topics
6	Theoretical	Radiation characteristics of opaque materials
7	Theoretical	Radiation transmission through glazing, absorbed radiation
8	Intermediate Exam	Midterm Exam
9	Theoretical	Flat-plate collectors
10	Theoretical	Flat-plate collectors
11	Theoretical	Concentrating collectors
12	Theoretical	Energy storage
13	Theoretical	System thermal calculations
14	Theoretical	System thermal calculations
15	Theoretical	Solar water heating active and passive
16	Final Exam	Final Exam

### Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	16	6	2	128



Assignment	5	1	3	20
Term Project	1	15	10	25
Quiz	4	6	1	28
Midterm Examination	1	12	2	14
Final Examination	1	10	2	12
Total Workload (Hours)				227
[Total Workload (Hours) / 25*] = <b>ECTS</b>				9
*25 hour workload is accepted as 1 ECTS				

### Learning Outcomes

1	Ability to understand solar radiation principles and equations
2	Modeling of solar radiation systems
3	Ability to calculate and compare of incomes and outcomes of solar energy systems
4	To be able to solve solar energy problems
5	To be able simulate the solar energy problems

### 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
P1	4	3	5	3	4
P2	5	4	4	4	3
P3	4	5	3	5	5
P4	4	5	4	5	4
P5	4	4	5	4	5
P6	5	3	5	3	4
P7	4	3	4	4	4
P8	3	4	3	5	3
P9	4	5	5	4	4
P10	5	5	4	5	5
P11	4	4	3	5	4
P12	5	3	4	4	5
P13	4	4	5	5	4
P14	3	5	4	4	4

