AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Advance Heat Convection								
Course Code	MME502		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	8	Workload	202 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The objective of the course is to provide students with insight into the nature of convection problems physically and mathematically, and ability to understand and explain convection phenomena.								
Course Content	The conduction general rate equation. Multidimensional heat conduction. Heat transfer from extended surfaces. Multidimensional steady state heat conduction. Numerical methods on steady state heat conduction. Finite difference methods steady state conduction. Transient heat conduction. Laplace transformation methods. Numerical methods in Transient heat conduction								
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)									

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	Kays, W.M.,Crawford M.E., ConvectiveHeatandMass Transfer, 3rd edition, McGraw-Hill.
2	Kakaç, S., Yener Y., ConvectiveHeatTranfer, 2nd edition, CRC-Press, 1995.
3	Bejan, A.,ConvectionHeatTranfer, Wiley, 3rd edition, 2004.

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction to Advanced Heat Convection
2	Theoretical	Heat Convection Coefficient
3	Theoretical	Boundary Layer Theory: Hydrodynamic Boundary Layer
4	Theoretical	Thermal Boundary Layer, Laminar and Turbulent Flows
5	Theoretical	Conservation Equations: Continuum Equation, Impulse Equation, Energy Equation
6	Theoretical	Conservation Equations: Continuum Equation, Impulse Equation, Energy Equation
7	Theoretical	Boundary Layer Similarities
8	Intermediate Exam	Midterm Exam
9	Theoretical	Reynolds-Colburn Similarities
10	Theoretical	Forced Convection: External Flow
11	Theoretical	Laminar Boundary Layer Over Flat Plates
12	Theoretical	Energy Integral Equation, Turbulent Parallel Flows Over Flat Plate
13	Theoretical	Energy Integral Equation, Turbulent Parallel Flows Over Flat Plate
14	Theoretical	Staggered Flows Around Cylinders and Spheres, Internal Flows, Velocity Profiles in Laminar and Turbulent Flows
15	Theoretical	Boundary Conditions and Energy Equations for Internal Flows, Natural Convection.
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	Ability to compute the heat convection
2	Ability to generate boundary conditions
3	Ability to use solution methods of heat convection mechanisms
4	Ability to use variables separate method
5	Ability to compute numerical heat convection
6	Ability to use 2D and 3D modeling technics

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	L6
P1	4	5	5	4	3	5
P2	5	4	4	5	4	4
P3	4	4	5	4	3	5
P4	3	5	4	3	5	3
P5	5	4	3	4	4	4
P6	4	3	4	5	5	5
P7	3	4	5	3	4	4
P8	5	5	4	5	3	3
P9	5	4	3	3	5	5
P10	4	3	5	5	5	4
P11	5	5	5	5	5	3
P12	4	4	4	5	4	4