AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Turbulence Modlling and Applications								
Course Code	MME525		Couse Level		Second Cycle (Master's Degree)				
ECTS Credit	8	Workload	195 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The fundamentals of turbulence and solution procedures of turbulent flows. Recognition of different turbulence models								
Course Content	Fundamentals of turbulent flows. The statistical description of turbulence. Algebraic models. The models based on Reynolds averaged Navier Stokes (RANS) equations. Reynolds stress equation models. Direct numerical simulation (DNS). Large eddy simulation (LES).								
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	25
Final Examination	1	25
Term Assignment	1	50

Recommended or Required Reading	
1	1. Turbulence, J. O. Hinze,McGraw-Hill , 2005.
2	2. A First Course in Turbulence, H. Tennekes, MIT pres, 1999
3	3. Blazek, J., 2001, Computational Fluid Dynamics: Principles and Applications, Elsevier, United Kingdom.
4	4. Ders Notları

Week	Weekly Detailed Course Contents	
1	Theoretical	What is turbulence? The features of turbulent flows.
2	Theoretical	Unsteadiness and transition to turbulence
3	Theoretical	Equations of turbulent flows and closure problem
4	Theoretical	Turbulence Modelling
5	Theoretical	Composing mesh in turbulence flow domain, an example in Gambit
6	Theoretical	Zero, one and two equation turbulence models
7	Theoretical	
8	Theoretical	Determination of turbulence constants
9	Theoretical	1st Midterm Exam
10	Theoretical	Determination of wall functions
11	Theoretical	Reynolds Stress Models
12	Theoretical	Direct Numerical Simulation (DNS)
13	Theoretical	Large Eddy Simulation (LES)
14	Theoretical	Determination of turbulence model for a sample case and FLUENT practice
15	Theoretical	Submission of term paper and its presentation
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	1. Knows the nature of turbulent flows
2	2. Knows Turbulent flow equations, such as continuity, Navier Stokes and Energy equations.
3	3. Knows Reynolds Stress and the other type turbulence flow models
4	4. Knows the modeling of turbulent flow domain and define the relation between the wall boundary conditions and turbulence flow domain.
5	5. Knows how to choose the turbulence model for different type of flow conditions.
6	6. Have experience about turbulence modeling with a commercial code.

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