AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title		Fatigue Behaviors of Materials							
Course Code		MME534		Couse Level		Second Cycle (Master's Degree)			
ECTS Credit	8	Workload	200 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course		Evaluation of fatigue failure of machine parts subjected to cyclic loads and in design against to fatigue, to gain presentation of knowledge and skill about the relevant parameters based on material, heat treatment and part. To gain design experience with problems and/or examples on to students							
Course Content		Definition of fatigue failure and mechanism. Types of fatigue loading. Fatigue strength of materials and calculation of experimentally. Fatigue strength diagrams. In design against to fatigue classic method and applications. Low-cycle fatigue. Basics of fracture mechanics. Crack growth relations and in design against to fatigue fractue mechanics approach							
Work Placement		N/A							
Planned Learning Activities and Teaching Methods				Explanation (Presentation), Discussion, Case Study, Individual Study, Problem Solving					
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	30
Final Examination	1	50
Seminar	1	10
Assignment	1	10

Recommended or Required Reading	
1	Çelik ve dökme demirlerin yorulma dayanımı, Çev. Ş.Güleç, A.Aran, Tübitak Yayınları, 1983.
2	Fundamentals of Metal Fatigue Analysis, J.A. Bannantine, J.J. Comer, Prentice Hall, New Jersey 1990.
3	N.E. Dowling, Mechanical Behavior of Materials: Engineering Methods of Deformation, Fracture, and Fatigue, 2nd ed., Prentice-Hall, , New Jersey, 1999.

Week	Weekly Detailed Course Contents	
1	Theoretical	Fatigue loading and fatigue fracture, mechanism, impotance and basis effects
2	Theoretical	Microscopic data of fractured parts and loading relations
3	Theoretical	To determine fatigue strength, wohler curve, low-cycle fatigue and long-cycle fatigue areas, to get strain-cycle number curve, statistic methods
4	Theoretical	Using of SMITH diagram in design
5	Theoretical	Material selection for fatigue loading, fatigue properties of steel and cast ironand their diffrences, Wohler and Smith diagrams, basic acceptance on determining materials properties
6	Theoretical	Fatigue behaviour of welded link, effects of heat treatments and results
7	Theoretical	Fatigue of materials in corrosive condition and results
8	Intermediate Exam	Midterm
9	Theoretical	Effects of coatings in corrosion fatigue
10	Theoretical	Effect of constructive notchs on fatigue behaviour
11	Theoretical	Effects of surface hardening processes in plain and notched parts to fatigue strength
12	Theoretical	Fatigue properties of plastic and composite materials. Calculation of fatigue strength for machine parts
13	Theoretical	Fracture mechanics approach and its applications in determining fatigue life for cracked parts
14	Theoretical	Fatigue phase diagram, numerical examples belogn to classical design in fatigue, to take preventive measures in point of increasing fatigue strength and applications
15	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	13	7	3	130
Assignment	6	2	1	18

Individual Work	6	1	0	6
Midterm Examination	1	20	3	23
Final Examination	1	20	3	23
			Total Workload (Hours)	200
			[Total Workload (Hours) / 25*] = **ECTS**	8
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	Evaluate the application limits of miner rule and the assumptions made
2	Acquires knowledge about fatigue force and fracture, mechanism, importance and basic factors
3	Ability to utilize SMITH diagrams
4	Understands the fatigue properties of plastics and composite materials
5	Assessment of knowledge about fatigue phase diagram, quantitative examples of classical design in fatigue, measures to be taken in fatigue resistance incremental direction and applications

Programme Outcomes *(Mechanical Engineering (English) Master)*	
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 be 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 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	5	4	5	5	4
P2	4	5	4	4	5
P3	4	4	5	4	4
P4	5	3	4	5	3
P5	3	5	3	4	5
P6	3	4	5	3	4
P7	5	3	4	5	5
P8	4	5	5	4	5
P9	5	4	4	5	4
P10	4	5	5	5	3
P11	5	5	3	4	5
P12	5	5	5	5	5