AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Theory of Elasticity								
Course Code	MCE520		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	8	Workload	200 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	This course is designed to give students derivation of field equations of linear elasticity theory , formulation and solution of typical problems of practicalinterest field. The objective of this course is to introduce the student to the analysis of linear elastic solids under mechanical and thermal loads. The material presented in this course will provide the foundation for pursuing other solid mechanics courses such as theory of plates and shells, elastic stability, composite structures and fracture mechanics.								
Course Content	Basic of Tensor Algebra and Transformation, Analysis of Stress, Analysis of Strain, Constituve Relations, Formulation of Problems in Elasticity, Two Dimensional Elasticity.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Case Study, Individual Study, Problem Solving								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	2	40
Final Examination	1	40
Assignment	4	20

Recommended or Required Reading	
1	Theory of Elasticity, by S.P. Timoshenko and J.N. Goodier, McGraw-Hill, Third Edition, 1970
2	R.W. Little, Elasticity, Prentice Hall, 1973
3	Elasticity in Engineering Mechanics, by A.P. Boresi and K.P. Chong, Wiley-Interscience, Second Edition, 2000

Week	Weekly Detailed Course Contents	
1	Theoretical	Definitions of scalars, vectors and tensors, Index notation , Vector transformation
2	Theoretical	Higher-order tensors ,The Kronecker delta, Tensor contraction, The alternating tensor, Gauss divergence theorem
3	Theoretical	Body and surface forces ,Traction vector and stress tensor ,Traction vector on an arbitrary plane , Equations of equilibrium
4	Theoretical	Stress transformation,Principal stresses and stress invariants,Mohr's circles
5	Theoretical	Displacement ,Strain and rotation tensors,Geometric construction of small deformation theory ,Strain transformation
6	Theoretical	Principal strains and strain invariants ,Strain compatibility
7	Theoretical	Generalized Hooke's law,Symmetry properties of the elasticity tensor, Planes of elastic symmetry
8	Theoretical	Monoclinic materials, Orthotropic materials
9	Theoretical	Tetragonal materials,Cubic materials,Isotropic materials,Lame's constants, Engineering constants of isotropic materials,Restrictions on elastic constants
10	Intermediate Exam	Midterm Exam
11	Theoretical	Review of field equations, Boundary conditions and fundamental problem classifications
12	Theoretical	Governing equations of elasticity, Displacement based formulation (Navier's equations)
13	Theoretical	Stress based formulation (Beltrami-Michell compatibility equations), Summary of three dimensional elasticity formulation
14	Theoretical	Principle of superposition
15	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	3	3	84
Assignment	6	0	4	24
Midterm Examination	2	26	3	58
Final Examination	1	31	3	34
			Total Workload (Hours)	200
			[Total Workload (Hours) / 25*] = **ECTS**	8
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	Indicial notation and Cartesian tensor analysis
2	Analysis of stress and deformation
3	Basic field equations of linear elastic solids
4	Formulations and solution strategies of various boundary value problems
5	To obtain and discuss the results of elasticity problems and compare them with those of elementary level.

Programme Outcomes *(Civil Engineering Master)*	
1	To be able to develop expertise knowledge in a Civil engineering area founded on their graduate competence.
2	To be able to use the theoretical and practical expertise knowledge gained in their specialty area.
3	To be able to use the information, problem solving and / or practical skills from the field, in interdisciplinary studies.
4	To be able to create new knowledge by integrating their knowledge area with the knowledge coming from different disciplines; and solve problems that need expertise by using scientific research methods
5	To be able to solve the problems related to his/her area by using appropriate research methods
6	To be able to devise a problem in their specialty area, develop a solution methodology, solve the problem, and interpret the results and take action if necessary
7	To be able to criticize the knowledge in their specialty area, guide the learning process, and independently direct high level studies
8	To be able to systematically communicate the recent developments in their specialty area and their own studies to groups both inside and outside their specialty area, orally, in writing and visually
9	To be able to use computer software at a level required by their specialty area with drawing upon information and communication technology at a high level
10	To be able to introduce scientific, technological, social and cultural advancements in the field of civil engineering and to contribute to the process of being an information of the society and to sustain it.
11	To be conscious of professional and ethical responsibility and contribute to the establishment of this consciousness.
12	To be able to protect social, scientific, and ethical values during collection, interpretation, and dissemination stages of the data associated with their specialty area; instruct and supervise these values
13	To be able to use at least one foreign language in a level to follow current developments related to the field.

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	4	5
P2	4	5	4	5	4
P3	5	4	5	4	5
P4	4	5	4	5	4
P5	5	4	5	4	5
P6	4	5	4	5	4
P7	5	4	5	5	5
P8	4	5	4	4	4
P9	5	4	5	5	5
P10	4	5	5	4	4
P11	5	4	4	5	5
P12	4	5	5	4	5
P13	5	4	4	5	4