COURSE IDENTIFICATION FORM

Course Code and Name: IM5071 / ELASTICITY THEORY				**Department of :** CIVIL ENGINEERING / MASTER PROGRAMME			
Semester	**Theoretic Hour**	**Practice Hour**	**Total Hour**	**Credits**	**ECTS**	**Education Language**	**Type: Compulsory Elective**
Atumn/Spring	3	0	3	3	5	Turkish	Optional
Prerequisite (s)							
Instructor		Assoc. Prof. Dr. Alper POLAT				**Mail : alperpolat@munzur.edu.tr Web :**	
Course Assistant						**Mail : Web :**	
Groups / Classes							
Course Aim	To provide theoretical framework for determination of the stress, strain, and displacement distribution in an elastic solid under the influence of external forces. Following the usual assumptions of linear, small-deformation theory, to establish the formulation for a mathematical model that allows solutions to elasticity problems that have applications in many engineering and scientific fields. .						
Course Goals	Rod equations, work of internal and external forces, potential and kinetic energy, shape function, equation of motion, strain element, torsion element, bending and frame elements, elastic stability, complex modelling with package programmes in structural engineering.						
Course Learning Outs and Proficiencies	• Be able to extend skills of scientific problem solving in engineering mechanics problems related to field of interest; • Be able to describe the general features of elastic systems. ; • Be able to overview of elastic analysis methods and able to do analytical solutions to typical structural problems. ; • Be able to derive approximation formulas using more advanced methods; • Be able to check the sufficiency of the strength, stiffness and stability of structural and machine elements; • Be able to solve elasticity problems faced in the field of interest by using the equations of elasticity theory and able to interpret the results in a way to develop new strategies;						

Course Basic and Auxiliary Contexts	• Theory of Elasticity, S. P. Timoshenko and J. N. Goodier, 3rd Edition, McGraw Hill Book Company, 1970, 1987. • Elasticity in Engineering Mechanics, 2nd Edition, A. P. Boresi and K. P. Chong, John Wiley & Sons, 2000. • Advanced Strength and Applied Elasticity, A. C. Ugural and S. K. Fenster, 2nd Edition, Elsevier Science Publishing Co., Inc., 1987. • Elasticity: Theory, Applications and Numerics, by M.H. Sadd, Elsevier Butterworth-Heinemann, 2005.
Methods of Give a Lecture	Face to Face

		If Available, to Sign (x)	**General Average Percentage (%) Rate**
Assessment Criteria	**Midterm Exam**	**X**	**50**
	1. Quiz		
	2. Quiz		
	3. Quiz		
	4. Quiz		
	Oral Examination		
	Practice Examination (Laboratory, Project etc.)		
	Final Exam	**X**	**50**

Semester Course Plan

Week	**Subjects**
1	Introduction
2	Mathematical Preliminaries Vectors, Indicial Notations, Coordinate Transfromation, Cartesian Tensors
3	Analysis of Strains Deformation, Displacement Transformation, Components of Strain
4	Analysis of Strains principal Strains, Equation of Compatibility
5	Analysis of Stresses Stress Tensor, Equation of Equilibrium,
6	Analysis of Stresses Principal Stresses, Special State of Stress
7	Constitutive Equation Stress-Strain Relations, Elastic Constants, I
8	Constitutive Equation Isotropic Media, Strain Energy
9	Problem classification Field Equations, Definition of Fundamental Problems
10	Basic Theorems Uniqueness Theorem, Reciprocal Theorem, Minimum Energy

11	Torsion Torsion of a Shaft, Torsion of Rectangular Cross Section
12	Flexure Flexure of Rectangular, Cylindrical Beams
13	Two Dimensional Problems Plane Strain, Generalized Plane Stress, Airy'sStress Function,
14	Two Dimensional Problems Boundary Value Problem in Plane Elasticity