**Course name:** MCE – 508  
**ADVANCED MECHANICS OF MATERIALS**  
**Department:** Mechanical Engineering

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**Language:** English  
**Compulsory/Elective:** Elective  
**Prerequisites:** None  
**Course Contents:** Strain and stress-strain relationships; two-dimensional problems in elasticity; torsion of prismatic bars; numerical methods; plastic behavior of materials.  
**Course Objectives:** To present analytical and numerical methods used in the real analysis of the stresses in structural and machine members.  
**Learning Outcomes and Competences:** At the end of the course, attendants should be able to find exact solutions for the problems where the configurations of loading and boundary are relatively simple and also find approximate solutions employing numerical methods for the complex problems.  
**Textbook and/or References:** Ugural, A. C., S. K. Fenster; Advanced Strength and Applied Elasticity (Main Textbook)  
**Assessment Criteria:**  
- Midterm Exam: X, 30%  
- Quizzes: X, 10%  
- Homeworks: X, 20%  
- Projects: X, 20%  
- Laboratory work  
- Other  
- Final Exam: X, 40%  

**Instructors:** Prof. Dr. Osman YİĞİT  
**Week** | **Subject**  
|-----|-----|  
| 1   | Analysis of Stress  
| 2   | Equations of Compatibility, Strain Transformations  
| 3   | Stress-Strain Relations  
| 4   | Strain Energy in Structural Members  
| 5   | Plane Strain and Plain Stress Problems  
| 6   | Airy's Stress Function, Solution of Elasticity Problems  
| 7   | Thermal Stresses  
| 8   | Basic Relations in Polar Coordinates  
| 9   | Stresses due to Concentrated Loads  
| 10  | Torsion of Prismatic Bars - Midterm Exam  
| 11  | Prandtl's Stress Function and Membrane Analogy  
| 12  | Equation of Finite Differences  
| 13  | Analyzing the Torsion of a Bar using Finite Difference Technique  
| 14  | Plastic Behavior of Materials