Faculty / Institute	School of Engineering
Department	Mechanical Engineering
Course Code	MAK503
Course Title	Elasticity Theory
Course Credit	3
ECTS Credit	9
Prerequisites	
Course Type	Elective
Instructional Language	Turkish
Programs that can take the course	
Course Description	Cartesian tensors. Stress and equilibrium. Deformation: displacement and strain. Material behavior - linear elastic solids. Formulation and solution methods for elasticity problems. Strain energy and related principles. Solution of two-dimensional problems in Cartesian and polar coordinates. Introduction to three-dimensional elasticity.
Textbook and / or References	1. "Introduction to Continuum Mechanics, Fourth Edition", W. Michael Lai, David Rubin and Erhard Krempl, Butterworth-Heinemann, 2010. eBook ISBN: 9780080942520; Hardcover ISBN: 9780750685603. 2. "Introduction to the Mechanics of a Continuous Medium", Lawrence E. Malvern, Prentice-Hall, 1977. ISBN 0134876032; ISBN13: 9780134876030. 3. "Elasticity: Theory, Applications, and Numerics, Third Edition", Martin Sadd, Academic Press, 2014. eBook ISBN: 9780124104327; Hardcover ISBN: 9780124081369. 4. "Mathematical Methods: For a First Course in Continuum Mechanics, Elasticity and Plasticity", Ali Ünal Erdem, LAP LAMBERT Academic Publishing, 2017. ISBN-10: 6202062185; ISBN-13: 978-6202062183.
Course Objectives	- will be able to use index notation for Cartesian vector and tensor equations. - Understand basic strain and stress measures and their coordinate transformations. - Solve boundary value problems of elasticity in Cartesian and polar coordinates - Will be able to calculate stress and deflection for hyperstatic systems. - Will be able to determine the limits of analytical solutions. - Will be able to read and understand journal articles presenting elasticity solutions to structural mechanics problems.

<table>
<tr><td>Course Outcomes</td><td>1. Will be able to use index notation for Cartesian vector and tensor equations.
2. Understand basic strain and stress measures and their coordinate transformations.
3. Solve boundary value problems of elasticity in Cartesian and polar coordinates
4. Will be able to calculate stress and deflection for hyperstatic systems.
5. Will be able to determine the limits of analytical solutions.
6. Will be able to read and understand journal articles presenting elasticity solutions to structural mechanics problems.</td></tr>
<tr><td>Tentative Course Plan</td><td>Week 1: Aim and scope of the course. Cartesian tensors.
Week 2: Cartesian tensors.
Week 3: Stress and equilibrium.
Week 4: Stress and equilibrium.
Week 5: Deformation: displacement and strain.
Week 6: Deformation: displacement and strain.
Week 7: Material behavior - linear elastic solids.
Week 8: Formulation and solution methods for elasticity problems.
Week 9: Strain energy and related principles.
Week 10: Solution of two-dimensional problems in Cartesian and polar coordinates using Airy stress function.
Week 11: Solution of two-dimensional problems in Cartesian and polar coordinates using the Airy stress function.
Week 12: Introduction to three dimensional problems.</td></tr>
<tr><td>Tentative Assesment Methods</td><td></td></tr>
<tr><td></td><td>
<table>
<tr><th>Mathematics and Basic Sciences</th><th>Engineering Topics</th><th>General Education</th><th>Other</th></tr>
<tr><td>20</td><td>80</td><td>0</td><td>0</td></tr>
</table>
</td></tr>
<tr><td>Lesson Outcomes-Program Outcomes Table</td><td>
<table>
<tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>1</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>6</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
</table>