

DEPARTMENT OF CIVIL ENGINEERING  
COURSE SYLLABUS

Course Details				
<b>Code</b>	<b>Academic Year</b>			<b>Semester</b>
BAU550	1			2
<b>Title</b>	<b>T</b>	<b>A</b>	<b>L</b>	<b>ECTS</b>
Computational Mechanics 2	3	-	-	8
<b>Language</b>	English			
<b>Level</b>	<b>Undergraduate</b>		<b>Graduate</b>	✓
				<b>Postgraduate</b>
<b>Department / Program</b>	Civil Engineering			
<b>Forms of Teaching and Learning</b>	Formal			
<b>Course Type</b>	<b>Compulsory</b>		<b>Elective</b>	✓
<b>Objectives</b>	<p>At the end of this course, students will be able to;</p> <ul style="list-style-type: none"> <li>• Understand the concepts of functionals and variational analysis,</li> <li>• Learn the energy principles of structural mechanics,</li> <li>• Apply the classical plate theory to analyze circular and rectangular plates,</li> <li>• Analyze structural members using nonlinear finite element method,</li> <li>• Find the critical buckling load of structural members,</li> <li>• Apply the basic concepts of artificial intelligence to civil engineering problems</li> </ul>			
<b>Content</b>	<ul style="list-style-type: none"> <li>• Introduction to Variational Principles</li> <li>• Nonlinear Finite Element Analysis</li> <li>• Analysis of Plates</li> <li>• Dynamic Analysis</li> <li>• Structural Stability</li> <li>• Introduction to Machine Learning</li> </ul>			
<b>Prerequisites</b>	-			
<b>Coordinator</b>				
<b>Lecturer(s)</b>	Dr. Celal Çakıroğlu			
<b>Assistant(s)</b>				
<b>Work Placement</b>				
Recommended or Required Reading				
<b>Books / Lecture Notes</b>	Crisfield, M.A. (1991) Non-Linear Finite Element Analysis of Solids and Structures, Essentials (Volume 1)			
<b>Other Sources</b>	-			
Additional Course Material				
<b>Documents</b>	-			
<b>Assignments</b>	-			
<b>Exams</b>	-			
Course Composition				

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Mathematics und Basic Sciences		%
Engineering	50	%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences	50	%
Health Sciences		%
Expert Knowledge		%

**Assessment**

Activity	Count	Percentage (%)
Midterm Exam	1	50
Quiz		
Assignments		
Attendance		
Recitations		
Projects		
Final Exam	1	50
<b>Total</b>		<b>100</b>

**ECTS Points and Work Load**

Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	14	3	42
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations			
Laboratory			
Projects			
Final Exam	1	3	3
<b>Total Work Load</b>			<b>90</b>
<b>ECTS Points (Total Work Load / Hour)</b>			<b>8</b>

**Learning Outcomes**

1	Understanding the concepts of functionals and variational analysis.
2	The students will learn the energy principles of structural mechanics.
3	Classical plate theory, governing equations and analysis of circular and rectangular plates.

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4	Analysis of structural members using nonlinear finite element analysis.
5	The ability to find the critical buckling load of structural members.
6	Learning the basic concepts of artificial intelligence and their applications to civil engineering.
7	
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11	
12	

**Weekly Content**

1	Functionals
2	Calculus of Variations
3	Virtual Work Principles
4	Introduction to nonlinear finite element analysis
5	Nonlinear finite element analysis of frames
6	Dynamic analysis
7	Governing Equations and Analysis of Circular Plates
8	Midterm I
9	Governing Equations and Analysis of Rectangular Plates
10	Structural Stability
11	Introduction to Artificial Intelligence
12	Classification using Support Vector Machines
13	
14	
15	

**Contribution of Learning Outcomes to Program Objectives (1-5)**

	P1	P2	P3	P4	P5	P6	P7
1							
2							
3							
4							
5							
6							



**DEPARTMENT OF CIVIL ENGINEERING  
COURSE SYLLABUS**

7							
8							
9							
10							
11							
12							
<b>Contribution Level</b>	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High						
<b>Compiled by:</b>							
<b>Date of Compilation:</b>							