DEPARTMENT OF CIVIL ENGINEERING
COURSE SYLLABUS

Course Details				
Code		**Academic Year**		**Semester**
BAU521		1		1
Title		**T**	**A**	**L**	**ECTS**
Computational Mechanics		3	-	-	8

Language	English					
Level	**Undergraduate**		**Graduate**	✓	**Postgraduate**	
Department / Program	Civil Engineering					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**		**Elective**	✓		
Objectives	At the end of this course, students will be able to; • Understand the concepts of stress and strain in a three dimensional setting, • Apply various numerical techniques for the solution of differential equations in engineering • Use the Python programming language for the programming of the finite element method • Use interpolation techniques such as Lagrange, Hermitian and Spline interpolation • Analyse the stress distribution in structural frames using the finite element method					
Content	• Introduction to Vectors and Tensors • The Concepts of Stress and Strain • Interpolation Techniques • Numerical Integration • Finite Element Approximation • Analysis of Bars, Beams and Frames					
Prerequisites	-					
Coordinator						
Lecturer(s)	Dr. Celal Çakıroğlu					
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	[1] Hughes, T.J.R. (2000) Finite Element Method: Linear Static And Dynamic Finite Element Analysis (Dover Civil and Mechanical Engineering) 1st Edition
Other Sources	-
Additional Course Material	
Documents	-
Assignments	-

DEPARTMENT OF CIVIL ENGINEERING
COURSE SYLLABUS

Exams	-

Course Composition		
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
	Total	**100**

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
		Total Work Load	**90**
		ECTS Points (Total Work Load / Hour)	**8**

Learning Outcomes	
1	Understanding the concepts of stress and strain in a three dimensional setting

DEPARTMENT OF CIVIL ENGINEERING
COURSE SYLLABUS

2	The students will learn various numerical techniques for the solution of differential equations in engineering
3	The usage of the Python programming language for the programming of the finite element method
4	Familiarity with interpolation techniques such as Lagrange, Hermitian and Spline interpolation
5	The ability to analyse the stress distribution in structural frames using the finite element method
6	Learning numerical integration of functions of several variables
7	
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12	
Weekly Content	
1	Vectors and Matrix Algebra
2	Linear Spaces
3	Linear elastic material behaviour
4	Nonlinear material behavior
5	Lagrange, Newton and Hermite Interpolation
6	Spline Interpolation
7	Numerical Integration of functions of a single variable
8	Midterm I
9	Numerical integration of functions of several variables
10	Finite Element Approximation
11	Analysis of Bars and Beams
12	Analysis of Frames
13	
14	
15	

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

	P1	P2	P3	P4	P5	P6	P7
1							
2							

DEPARTMENT OF CIVIL ENGINEERING
COURSE SYLLABUS

3							
4							
5							
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12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	