DEPARTMENT OF CIVIL ENGINEERING

Course Details				
Code	**Academic Year**			**Semester**
BAU458	4			Fall
Title	**T**	**A**	**L**	**ECTS**
Building Dynamics I	3	1	1	6

Language	German					
Level	**Undergraduate**	✓	**Graduate**		**Postgraduate**	
Department / Program	Civil Engineering					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**		**Elective**	✓		
Objectives	This course aims to teach students the fundamental understanding of the dynamic behavior of structures. It focuses on developing the ability to analyze and model how structures respond under dynamic loads. Additionally, students gain the capability to examine the vibration behavior of structures and evaluate these behaviors in terms of engineering design and safety. The course aims to teach fundamental principles and analysis methods in structural dynamics. Through this course, students will be able to accurately model and analyze the dynamic behavior of structures, enabling them to design safer and more efficient structural systems.					
Content	This course covers the fundamental principles required to understand the dynamic behavior of structures. It includes topics such as the response of structures under dynamic loads and the execution of vibration analyses. Moreover, the course covers frequency response, mode analyses, and forced vibrations of structures. The seismic behavior of structures and its influence on design are also included. Students will learn structural dynamic analysis methods and gain the competence to design safe and efficient structures by accounting for dynamic effects in civil engineering projects.					
Prerequisites	BAU209					
Coordinator	Prof.Dr. Erkan Çelebi					
Lecturer(s)	Prof.Dr. Erkan Çelebi					
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	„Baudynamik-Praxis: Mit zahlreichen Anwendungsbeispielen (Bauwerk)“, Björn Haag und Lothar Stempniewski
Other Sources	

Additional Course Material	
Documents	
Assignments	

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Exams		
Course Composition		
Mathematics und Basic Sciences	20	%
Engineering	50	%
Engineering Design	20	%
Social Sciences		%
Educational Sciences		%
Natural Sciences	10	%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	2	40
Quiz		
Assignments		
Attendance		
Recitations		
Projects		
Final Exam	1	60
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	14	6	84
Assignments	1	10	10
Presentation / Seminar Preparation			
Midterm Exam	2	1	2
Recitations	14	1	14
Laboratory	14	1	14
Projects			
Final Exam	1	2	2
		Total Work Load	**168**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Students learn to interpret and critically evaluate results obtained from basic dynamic calculations.

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2	Students analyze a building under dynamic loads.
3	Students determine the dimensions of structural elements subjected to dynamic loads.
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Weekly Content	
1	Introduction to Structural Dynamics
2	Introduction to Linear Single-Degree-of-Freedom (SDOF) Systems
3	Free Vibrations: Natural Vibration Analysis of Undamped SDOF Systems
4	Free Vibrations: Natural Vibration Analysis of Damped SDOF Systems
5	Forced Vibrations: Harmonic Excitation Analysis of Undamped SDOF Systems
6	Forced Vibrations: Harmonic Excitation Analysis of Damped SDOF Systems
7	Forced Vibrations: Impulse Excitation and General Loading in Damped SDOF Systems – Dynamic Amplification Function
8	Midterm Exam
9	Equivalent Static Earthquake Load and Response Spectrum Analysis for SDOF Systems
10	Introduction to Linear Multi-Degree-of-Freedom (MDOF) Systems
11	Natural Vibration Analysis of Undamped MDOF Systems
12	Natural Vibration Analysis of Damped MDOF Systems
13	Seismic Behavior of MDOF Systems
14	Classical Modal Analysis Methods
15	Response Spectrum Method using Modal Analysis

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

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**
1	4		4				
2		4	4				
3	4			4			
4							

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