

İndirilme Tarihi

01.09.2026 13:41:51

CE573 - STRUCTURAL DYNAMICS - İnşaat Mühendisliği ABD

General Info

Objectives of the Course

1. Knowing the basic principles of structural dynamics and applying for structural design. 2. Finding the solutions of dynamic analysis and designs for applications by using physical and mathematical modeling according to dynamic effects. 3. Knowing the dynamic characteristics of the structures and understanding the effects on the structural response. 4. Understanding the importance of the dynamic effects on the structure subjected to an earthquake.

Course Contents

Dynamic equilibrium equations. Single and multi degree of systems under harmonic, periodic and general dynamic loading. Energy methods. Modal analysis. Earthquake response of structures.

Recommended or Required Reading

K. Chopra, Dynamics of Structures, 2000, Prentice Hall, ISBN 978-0130869739 ,R. W. Clough, J. Penzien, Dynamics of Structures,1990, McGraw Hill, 2nd Edition, ISBN 0-07-113241-4 ,Structural Dynamics, Roy. R. Craig, 1981, Wiley, ISBN 0-471-87715-8 ,Vedat Yerlici, Hilmi Luş, Yapı Dinamiğine Giriş, 2007, Mart Matbaacılık Sanatları, ISBN975-6193-68-6

Planned Learning Activities and Teaching Methods

Vibration frequency of simply supported beams will be obtain by measure different aspects of the setup.

Recommended Optional Programme Components

Not applicable

Instructor's Assistants

The teaching assistant will be announced at the beginning of the semester.

Presentation Of Course

Face-to-face

Dersi Veren Öğretim Elemanları

Prof. Dr. Gürsoy Turan

Program Outcomes

1. Students will be able to understand and use the basic principles of the structural dynamics for analysis
2. Students will be able to Construct the structural models for dynamic analysis and evaluate the dynamic characteristics of the structures.
3. Students will be able to recognise the importance of dynamic effects such as earthquake and wind for structural design, and calculate the structural response under these effects.
4. Students will able to identify the effects of earthquake on the living standarts of people in the national and international level and will be able to recognize the importance of structural dynamics concepts in earthquake resistant structural design.
5. Students will able to use the basic physical and mathematical methods for analysis.

Order	Preparation	Info	Laboratory	Teaching	Methods	Theoretical	Practise
1						Dynamic Response of Single-Degree-of-Freedom Systems:	
2						Response to Arbitrary, Step and Pulse Excitations. Numerical Evaluation of Dynamic Response.	
3						Structural Damping	
4						Dynamic response of SDOF systems subjected to forcing functions: Resonance, transmissibility and vibration isolation, accelerometer design	
5						Dynamic response of SDOF systems subjected to general forcing functions: Impulse, Duhamel's Integral, Constant Force, Rectangular Pulse.	
6						Shock Spectra, Earthquake Spectra: Linear Response Spectra	
7						Midterm	
8						Vibration of Multi Degree of freedom (MDOF) Systems: Generalized Coordinates, Properties of mode shapes.	
9						Forced vibration of undamped and damped MDOF systems.	
10						Approximate Method for determining mode shapes.	
11						Finite Element Design, Reduction, and Dynamic Analysis of 2-D structures	
12						Dynamic analysis of three dimensional structures.	
13						Dynamic Response of Systems with Distributed Mass.	
14						Approximate Methods for estimating mode shapes and frequencies in continuous Systems	

Workload

Activities	Number	PLEASE SELECT TWO DISTINCT LANGUAGES
Vize	1	3,00
Proje	1	20,00
Final	1	3,00
Ödev	14	8,00
Derse Katılım	14	3,00
Ders Öncesi Bireysel Çalışma	14	1,00
Ders Sonrası Bireysel Çalışma	14	1,00
Laboratuvar	3	1,00
Uygulama / Pratik	4	1,00
Ara Sınav Hazırlık	1	6,00
Final Sınavı Hazırlık	1	4,00

Assesments

Activities	Weight (%)
Vize	20,00
Ödev	50,00
Final	30,00

İnşaat Mühendisliği ABD / İNŞAAT MÜHENDİSLİĞİ(Tezli Y.Lisans) X Learning Outcome Relation

	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11
L.O. 1	4	4		3	4		3		3		
L.O. 2	4	4		3	4		3		3		
L.O. 3	4	4		3	4		3		3		

	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11
L.O. 4	4	4		3	4		3		3		
L.O. 5	4	4		3	4		3		3		

Table :

- P.O. 1 :** The ability to possess sufficient knowledge in mathematics, science, and civil engineering and effectively use this knowledge to solve complex engineering problems.
- P.O. 2 :** The ability to identify, formulate, and solve complex multi-component engineering problems by selecting and applying appropriate analysis and modeling methods.
- P.O. 3 :** The ability to design a complex system or process that meets needs under realistic constraints such as economic, environmental, health, safety, manufacturability, and sustainability.
- P.O. 4 :** The ability to select and use the necessary techniques, analysis, and modeling methods for solving complex problems encountered in civil engineering applications; the ability to effectively use modern engineering tools and information technologies to solve complex problems.
- P.O. 5 :** The ability to design and conduct experiments, collect data, analyze, and interpret data for the analysis and solution of complex civil engineering problems or research topics.
- P.O. 6 :** The ability to work in teams composed of civil engineers and/or multidisciplinary teams.
- P.O. 7 :** Effective verbal and written communication skills in English, including writing and understanding reports, preparing design and production reports, making effective presentations, and giving and receiving clear and understandable instructions.
- P.O. 8 :** The ability for lifelong learning, accessing information, keeping up with technological developments in the field, and self-renewal.
- P.O. 9 :** Awareness of professional and ethical responsibilities; knowledge of the standards used in civil engineering applications.
- P.O. 10 :** Knowledge of project management, risk management, and change management; understanding of entrepreneurship, innovation, and sustainability.
- P.O. 11 :** Knowledge of current issues and the impact of professional practices on the environment, health, and safety in a universal and societal context; awareness of the legal consequences of professional activities.
- L.O. 1 :** Students will be able to understand and use the basic principles of the structural dynamics for analysis
- L.O. 2 :** Students will be able to Construct the structural models for dynamic analysis and evaluate the dynamic characteristics of the structures.
- L.O. 3 :** Students will be able to recognise the importance of dynamic effects such as earthquake and wind for structural design, and calculate the structural response under these effects.
- L.O. 4 :** Students will able to identify the effects of earthquake on the living standarts of people in the national and international level and will be able to recognize the importance of structural dynamics concepts in earthquake resistant structural design.
- L.O. 5 :** Students will able to use the basic physical and mathematical methods for analysis.

İnşaat Mühendisliği ABD / İNŞAAT MÜHENDİSLİĞİ(DR.) X Learning Outcome Relation

	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11
L.O. 1											
L.O. 2											
L.O. 3											
L.O. 4											
L.O. 5											

Table :

- P.O. 1 :** The ability to possess sufficient knowledge in mathematics, science, and civil engineering and effectively use this knowledge to solve complex engineering problems.
- P.O. 2 :** The ability to identify, formulate, and solve complex multi-component engineering problems by selecting and applying appropriate analysis and modeling methods.
- P.O. 3 :** The ability to design a complex system or process that meets needs under realistic constraints such as economic, environmental, health, safety, manufacturability, and sustainability.
- P.O. 4 :** The ability to select and use the necessary techniques, analysis, and modeling methods for solving complex problems encountered in civil engineering applications; the ability to effectively use modern engineering tools and information technologies to solve complex problems.

- P.O. 5 :** The ability to design and conduct experiments, collect data, analyze, and interpret data for the analysis and solution of complex civil engineering problems or research topics.
- P.O. 6 :** The ability to work in teams composed of civil engineers and/or multidisciplinary teams.
- P.O. 7 :** Effective verbal and written communication skills in English, including writing and understanding reports, preparing design and production reports, making effective presentations, and giving and receiving clear and understandable instructions.
- P.O. 8 :** The ability for lifelong learning, accessing information, keeping up with technological developments in the field, and self-renewal.
- P.O. 9 :** Awareness of professional and ethical responsibilities; knowledge of the standards used in civil engineering applications.
- P.O. 10 :** Knowledge of project management, risk management, and change management; understanding of entrepreneurship, innovation, and sustainability.
- P.O. 11 :** Knowledge of current issues and the impact of professional practices on the environment, health, and safety in a universal and societal context; awareness of the legal consequences of professional activities.
- L.O. 1 :** Students will be able to understand and use the basic principles of the structural dynamics for analysis
- L.O. 2 :** Students will be able to Construct the structural models for dynamic analysis and evaluate the dynamic characteristics of the structures.
- L.O. 3 :** Students will be able to recognise the importance of dynamic effects such as earthquake and wind for structural design, and calculate the structural response under these effects.
- L.O. 4 :** Students will able to identify the effects of earthquake on the living standarts of people in the national and international level and will be able to recognize the importance of structural dynamics concepts in earthquake resistant structural design.
- L.O. 5 :** Students will able to use the basic physical and mathematical methods for analysis.