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

Course Objectives:
(numbers shown in the parentheses are the course learning outcomes)
1. Knowing the basic principles of structural dynamics and application to structural design.
2. Finding the solutions of dynamic analysis and structural designs by using physical and mathematical modeling according to dynamic effects.
3. Knowing the dynamic characteristics of structures and understanding the effects on the structural response.
4. Understanding the importance of dynamic effects on the structure subjected to earthquakes.

Course Learning Outcomes:
(numbers shown in the parentheses are the program outcomes)
1. Knowing and using the basic principles of structural dynamics for analysis.
2. Constructing the structural models for dynamic analysis and evaluating the dynamic characteristics of the structures.
3. Knowing the importance of dynamic effects such as earthquake and wind for structural design, calculating the structural response under these effects.
4. Knowing the effects of earthquakes on the living standarts of people in the national and international level and knowing the importance of structural dynamics concepts in earthquake resistant structural design.
5. Using the basic physical and mathematical methods for analysis.

Ders Kitabı (Textbook):
-K. Chopra, Dynamics of Structures, 2000, Prentice Hall, ISBN 978-0130869739

Diğer Kaynaklar (Other References):
- Sekaran Rajasekaran (2009) Structural dynamics of earthquake engineering: Theory and application using Mathematica and Matlab
- 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 Matbacılık Sanatları, ISBN975-6193-68-6

İşlenen Konular (Course Plan)	
Hafta(Week)	**Konu(Topics)**
1	Numerical Integration of an ordinary differential equation. Single-Degree-of-Freedom (SDOF) Systems: Equations of Motion, Problem Statement and Solution Methods. Free Vibration.
2	Free vibration response of damped SDOF systems. Response to Arbitrary, Step and Pulse Excitations. Numerical Evaluation of Dynamic Response.
3	Dynamic response of SDOF systems subjected to forcing functions: Resonance, transmissibility and vibration isolation, accelerometer design
4	Dynamic response of SDOF systems subjected to general forcing functions: Impulse, Duhamel's Integral, Constant Force, Rectangular Pulse.
5	Shock Spectra, Earthquake Spectra: Linear Response Spectra
6	Earthquake Response of Linear Systems.
7	Midterm Exam 1

8	Vibration of Multi Degree of freedom (MDOF) Systems: Generalized Coordinates, Properties of modal shapes.
9	Forced vibration of undamped and damped MDOF systems.
10	Approximate Method for determining modal shapes.
12	Introduction to Finite Element Method. Dynamic analysis of three dimensional structures.
13	Earthquake Response of MDOF Systems
14	Earthquake Response of MDOF Systems

Ölçme ve Değerlendirme(Assessment Criteria)

	Faaliyetler(Activities)	Adedi (Quantity)	Değerlendirmedeki Katkısı, % (Effects on Grading, %)
	Yıl İçi Sınavları (Midterm Exams)	1	%20
	Kısa Sınavlar (Quizzes)	4	%5
	Ödevler (Homework)	~20	%50
	Final Exam	1	%25

Program Çıktıları İlişkisi* (Relationship with Programme Outcomes)

	PÇ1	PÇ2	PÇ3	PÇ4	PÇ5	PÇ6	PÇ7	PÇ8	PÇ9	PÇ10	PÇ11	PÇ12	PÇ13
CE 423	4	4	2	3						2	2		

*sayılar 4" yüksek olacak şekilde dersin program çıktılarını karşılama derecesini gösterir(numbers indicate the level of the programme outcomes are fulfilled by the course "4" being high)

Hazırlayan Kişiler (Prepared by):   Dr. Gürsoy Turan

Tarih (Date)   : 18 Ağustos 2011 (18 August 2011)
Modified   : 06.10.2022

Letter Grade and Explanation (adopted from www.houghton.edu)

Assignment Category	AA	BB	CC	DD	FF
Problem Sets and Tests	Understands and utilizes correct physical principles and appropriate mathematical tools to correctly solve problems or answer questions.	Typically understands and uses correct physical principles and appropriate mathematical tools, but makes significant errors	Displays a basic understanding of the material, but often confuses physical principles, misuses equations, or fails to perform the required mathematical steps.	Typically does not correctly apply physical principles or mathematical tools.	Does not apply appropriate principles or mathematical tools in a meaningful way.
Labs	Correctly performs, analyzes, and discusses the given experiments with clear skill and understanding.	Performs, analyzes, and discusses the given experiments with some skill and understanding, but does not completely troubleshoot problems or understand results.	Partially performs, analyzes, and discusses the given experiments, but does little troubleshooting or analysis.	Does not correctly perform, analyze, and discuss most of the experiment.	Does not perform or analyze the experiment.
Research	Recognizes and clearly defines problems and is able to propose/implement multiple solutions. Displays true craftsmanship, creativity, and skill.	Usually identifies at least one possible solution. Displays some evidence of skill.	Identifies problems, but rarely develops successful solutions. Does not adequately carry out given task.	Does not typically identify problems or offer solutions. Does not carry out given task.	Does not carry out given task.
Communication	Clearly states background, significance, methodology, results, and discussion using appropriate language and figures in a polished work.	States background, significance, methodology, results, and discussion using mostly appropriate language and figures.	Does not sufficiently state background, significance, methodology, results, and discussion. Language and/or figures need significant improvement.	Much of background, significance, methodology, results, or discussion is missing, unclear, or incorrect. Inappropriate language and/or figures.	Little or no reasonable explanations are given. Little or no appropriate language or figures used.