

ADVANCED STRUCTURAL DYNAMICS SPRING 2017

INSTRUCTOR:

Mehdi Ahmadizadeh, Assistant Professor
418 in Civil Engineering Department, ext 4241, email: ahmadizadeh@sharif.edu

LECTURE HOURS:

Sun, Tue 7:30 – 9:00 am

OFFICE HOURS:

Sun, Tue 9:00 – 10:00 am

REFERENCES:

Chopra, A.K. *Dynamics of Structures*, Prentice Hall.
Paz, M. and Leigh, W. *Structural Dynamics: Theory and Computation*, Springer.
Clough, R.W. and Penzien J. *Dynamics of Structures*, McGraw-Hill.
Gawronski, W.K. *Advanced Structural Dynamics and Active Control of Structures*, Springer

And a number of other books and papers depending on the discussion topics.

COURSE OBJECTIVES:

To provide a detailed review of the advanced topics in structural dynamics and earthquake engineering, focusing on buildings, bridges, industrial facilities and other types of civil engineering structures.

To better understand the dynamic behavior of linear and nonlinear structures and their components subjected to random excitations.

GRADING POLICY:

Homework Assignments (20%)
Midterm Exam (30%)
Final Comprehensive Exam (50%)

ACADEMIC INTEGRITY AND CONDUCT:

All submitted work must represent personal effort. Disciplinary action will be taken against the students that do not follow academic integrity guidelines.

COURSE OUTLINE:

	Topic	Sections	Lectures
1	Introduction and Definitions		
2	Systems with Distributed Mass and Elasticity		

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SPRING 2017

- 3 Analysis of Linear Systems in Frequency Domain
 - Complex Frequency Response Functions
 - Continuous, Discrete, and Fast Fourier Transforms
 - Solution of Coupled System Equations in Frequency Domain
- 4 Advanced Domain Transforms
 - Short-Time Fourier Transform
 - Wavelet Transform
- 5 Standard Models of Linear Structures
 - Second Order
 - Modal
 - Transfer Functions
 - State Space
- 6 Introduction to System Identification
 - Time Domain and Frequency Domain Methods
- 7 Nonlinearity in Structural Dynamics
 - Nonlinear Analysis of SDF Systems
 - Nonlinear Analysis of MDF Systems
- 8 Reduction of Degrees of Freedom
- 9 Damping in Structures
- 10 General Modal Analysis of Non-classically Damped Systems
- 11 Variational Formulation of the Equations of Motion
 - Hamilton's Statement
 - Lagrange Equations

TENTATIVE EXAMINATION SCHEDULE:

Exam	Material	Date and Time
Midterm	TBA	First Week of Ordibehesht (Tentative)
Final	Comprehensive	Finals Week

EXAMINATION FORMAT:

Course examinations are closed book, but note sheets of size A4 are allowed (one in midterm, two in final).

COURSE WEBSITE:

<http://sina.sharif.edu/~ahmadizadeh/courses/advstdyn/>

CORRESPONDENCE:

Correspondence via email or posted on the course website is considered received and observed by all students. Please update your email address in your university personal profile to ensure the receipt of the emails sent to you, and check the course website frequently.