

# Introduction to Geotechnical Earthquake Engineering

<b>Course Code</b> CE- 429	<b>Credit Hours</b> 3-0
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## Course Description

The subject of earthquake engineering requires significant knowledge in the fields of structural engineering, engineering geology and geotechnical engineering, this course however will focus on the aspects related to geotechnical engineering. The students taking the course will learn to apply the fundamental concepts of computational dynamics and earthquake engineering to analyze seismic hazard and ground response..

## Text Book:

1. Geotechnical Earthquake Engineering. 1st Edition, Prentice Hall, New Jersey, USA

## Reference Book:

1. Principles of Soil Dynamics
2. Prakash (1981) Soil Dynamics.
3. Soil Mechanics in Engineering Practice

## Prerequisites :

CE-324 Soil Mechanics-II

## ASSESSMENT SYSTEM FOR THEORY

	<b>Without Project (%)</b>	<b>With Project/Complex Engineering Problems (%)</b>
Quizzes	15	10-15
Assignments	10	5-10
Mid Terms	25	25
Project	-	5-10
End Semester Exam	50	45-50

## ASSESSMENT SYSTEM FOR LAB

Lab Work/ Psychomotor Assessment/ Lab Reports	70%
Lab Project/ Open Ended Lab Report/ Assignment/ Quiz	10%
Final Assesment/ Viva	20%

## Teaching Plan

<b>Week No</b>	<b>Topics/Learning Outcomes</b>
1	Introduction: Nature and type of dynamic loading on soils, Importance of soil dynamics Fundamentals of vibration: Properties of harmonic motion
2-3	Fundamentals of vibration: Free vibrations of a spring-mass system, free vibration with viscous damping , forced vibrations with viscous damping, frequency dependent exciting force, determination of damping ratio, vibration measuring instruments
4-6	Seismic hazard analysis: Introduction, deterministic seismic hazard analysis, probabilistic seismic hazard analysis, prediction of seismic hazard using artificial intelligence
7-8	Wave propagation in an elastic medium: Wave propagation in elastic rock, Wave propagation in an elastic infinite medium, Wave propagation in a semi-infinite elastic half-space, waves generated by a surface footing
9	<b>Mid Semester Exam</b>
10-11	Dynamic soil properties: Laboratory techniques, field tests, Factors affecting shear modulus, elastic modulus and elastic constants
12-14	Ground response analysis: One-dimensional ground response analysis, Local site effect on two- and three- dimensional ground response, Soil-structure interaction
15-16	Liquefaction of soils: Introduction, flow liquefaction and cyclic mobility, Evaluation of liquefaction potential, Liquefaction mitigation techniques, Prediction of liquefaction potential of a site using artificial intelligence.
17-18	End Semester Exam

**Practical:** Nil.