CE 462
INTRODUCTION TO SOIL DYNAMICS
(Technical Elective) (3+0 Credits)
2025-2026 Spring

Instructor: Prof. Dr. Nurhan Ecemis, Civil Engineering Department, nurhanecemis@iyte.edu.tr, Phone: 750-6812

Lectures:

	Monday	Tuesday	Wednesday	Thursday	Friday
08.45-09.30					
09.45-10.30				LECTURE CZ12	
10.45-11.30				LECTURE CZ12	
11.45-12.30				LECTURE CZ12	
13.30-14.15					
14.30-15.15					
15.30-16.15					
16.30-17.15					

Description: To investigate dynamic properties of soils, we will study the fundamentals of vibration and wave propagation, and consider test methods to analyze the dynamics properties of soils in field and laboratory. In addition, we will also study methods to predict and estimate the liquefaction and design methods for geotechnical structures likely to experience dynamic loads.

Textbook: Fundamentals of Soil Dynamics, Das, B. 1993

Course Website: Students are required to register themselves at General | CE462 INTRODUCTION TO SOIL DYNAMICS | Microsoft Teams and enroll to CE 462. All announcements and course materials (lecture notes, homework etc.) will be uploaded on this site.

Course Content:
The topics to be covered are listed below:

1. INTRODUCTION TO SOIL DYNAMICS
   - Nature and types of dynamic loading
   - Importance of soil dynamics

2. VIBRATION PRINCIPALS - CHP 2
   - Single Degree of Freedom Systems
   - Undamped and damped free and forced vibrations
     - Equation of Motion
     - Numerical Technique for Solving the Equation of Motion
     - Computation of Response Spectra
   - Linear Multi-Degree of Freedom Systems (overview)

3. WAVE PROPAGATION – CHP 3

- One Dimensional Wave Propagation in Elastic Media
- Wave Propagation in Soils
- Characteristics of P-wave, S-wave, Rayleigh wave and Love waves
- Estimation of epicenter of earthquake

Midterm Exam I (the date will be announced)

4. DYNAMIC SOIL PROPERTIES – CHP 4
   - Stiffness, damping and plasticity parameters of soil

5. LIQUEFACTION OF SOIL – CHP 10
   - Liquefaction Phenomenon
   - Simplified Liquefaction Evaluation Procedure

6. SEISMIC DESIGN OF RETAINING STRUCTURES - CHP 8

Final Exam – Closed book (the date will be announced)

Grading Policy:
Assignments: 15%, Project: 15%, Midterm Exam: 35%, Final Exam: 35% - **Total 100 points**

References:
1. Geotechnical Earthquake Engineering, S. Kramer, 1999
2. Vibrations of Soils and Foundations, Richard, Hall and Woods
3. Geotechnical Earthquake Engineering Handbook, Robert W. Day, 2002

How to pass and do well in the course:
1. Pay attention. Ask questions.
2. Take good notes and understand what you wrote.
3. Before you attempt to solve your homework problems, read the appropriate chapter from the book as well as the class notes and try to understand (concept) solved problems.
4. Do **all** the homework on time.
5. Get help if you needed.
6. Prepare for each test beginning at least a week before the exam.

Cheating or copying:
If a student is found guilty of copying homework or cheating in tests, he/she will receive "FF" grade for the course.

Pre-requisite: Knowledge of basic soil mechanics.