



**CE219 Aug. 3:0**

## **Soil Dynamics**

### **Instructor**

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**Department: Civil Engineering**

Course Time:

Lecture venue:

Detailed Course Page:

## **Announcements**

### **Brief description of the course**

The aim of the course to train the students, with the background of basic degree in civil engineering, in the field of soil dynamics. The emphasis is given for (i) the design of foundations and isolation systems subjected to different kinds of vibrations, (ii) determination of dynamic properties of soils by using laboratory and non-destructive field tests, and (iii) liquefaction assessment.

### **Prerequisites**

B. Tech in Civil Engineering.

### **Syllabus**

Fundamental of vibrations; analysis of free and forced vibrations using spring dashpot model; equations' formulation and solution; block vibration test for determining stiffness and damping coefficient of soil mass; formulation of the problem for the multi-degree freedom system. Theories for foundations on elastic half space; effect of different pressure distribution; comparison with spring-dashpot model. Wave propagation in bar and elastic media; different types of waves; dynamic tests for determination of elastic and shear modulus. Geophysical survey using reflection, refraction, steady state vibration and cross hole shear tests. Liquefaction

analysis; cyclic shear test; assessment of zone of liquefaction. Seismic bearing capacity of foundations and seismic earth pressures. Vibration isolations.

### **Course outcomes**

The student usually learns as to how to (i) design foundations and isolation systems subjected to different kinds of vibrations, (ii) determine dynamic properties of soils by using laboratory and non-destructive field tests, and (iii) assess the liquefaction potential of a given site.

### **Grading policy**

50% for the final Exam

50% for the internal assessment with at least two sets of tests and assignments

### **Assignments**

### **Resources**

1. Richart, F.E., Woods, R.D. and Hall, J.R. Vibrations of soils and foundations. Prentice-Hall, 1970.
2. Major, A. Vibration Analysis and Design of Foundations for Machines and Turbines. Collets, 1962.
3. Robert W. Day. Geotechnical Earthquake Engineering Handbook McGraw-Hill.