CIVIL 725 – GEOTECHNICAL EARTHQUAKE ENGINEERING
(15 Points, SC 2012)

COURSE CO-ORDINATOR: Rolando Orense
(Room 1.1103, ext. 88437)

TIMES: LECTURES: Thursday 3:00-6:00pm 3.407

PHILOSOPHY:
Seismic considerations are a significant factor in the design of much of the infrastructure in seismically active countries like New Zealand. This course combines the fundamental ideas learned in previous Geomechanics courses (Geomechanics 1, Geomechanics 2, Introductory Engineering Geology) and apply these ideas in analyzing and understanding the seismic effects on soil structures. Various concepts, theories and practices of modern geotechnical earthquake engineering will be introduced. In this course, the student will get an overall view of the nature of seismic hazards, the methods used to assess their impacts on society and the techniques available to mitigate their damaging effects.

LABORATORIES:
None

ASSESSMENT:
- Final Examination 3 hours 60%
- Test (around mid-semester break) 1 hour 10%
- Homework/Assignment 15%
- Design Project 15%

LEARNING OBJECTIVES:
In covering the above materials, it is intended that the student will
- become familiar with the terminology used in geotechnical earthquake engineering
- understand the fundamental principles and practical methods associated with each topic
- demonstrate the ability to apply the understanding gained
- appreciate the assessment, remedial and monitoring techniques in relation to seismic hazards

Case studies, homeworks and a design project will be used to promote the learning objectives.

COURSE OUTLINE:
- Geotechnical problems encountered during earthquakes
- Seismology and earthquake engineering
- Seismic hazard and analysis
- Wave propagation and local site effects
- Dynamic properties of soils
- Ground response analysis
- Seismic stability of slopes and embankments
- Seismic earth pressure and behaviour of earth-retaining structures
- Soil liquefaction and permanent ground deformations
- Soil remediation and mitigation techniques
- Seismic monitoring
There is no recommended text for this course. The following are available in the Engineering Library:

- Kramer, S: Geotechnical Earthquake Engineering (Prentice Hall, 1996)
- Towhata, I.: Geotechnical Earthquake Engineering (Springer-Velag, 2008)
- Ansal, A. Recent Advances in Earthquake Geotechnical Engineering and Microzonation (Kluwer Academic, 2004)