

**THE UNIVERSITY OF WESTERN ONTARIO
FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**

**CEE619 DYNAMICS OF SOILS AND FOUNDATIONS
COURSE OUTLINE 2011-2012**

Objectives: To develop understanding of the concepts, theories and procedures of design of foundations subjected to dynamic loads. The students will learn to calculate the stiffness and damping constants of different types of foundations. They will also learn to calculate the response of these foundations under the effect of different types of dynamic loading.

Topics:

1. Introduction

Design objectives, design procedure, basic notions, mathematical models, DOFs, types of dynamic loads, foundations types, excitation forces of machines, dynamic soil properties.

2. Shallow Foundations

Definition of stiffness, damping and inertia, circular shallow foundation, non-circular foundation, embedded footings, impedance functions of a layer on half-space.

3. Pile Foundations

Pile applications, mathematical models for pile analysis, stiffness and damping of piles, pile groups, interaction factors, impedance functions of pile groups, pile batter.

4. Dynamic Response of Machine Foundations

Response of rigid foundations in 1 DOF, effects of vibration, response of rigid foundations in 2 DOF and 6 DOF, response of structures on flexible foundations.

5. Dynamic Response of Hammer Foundations

Types of hammers and hammer foundations, design criteria, mathematical models, impact forces, response of one and two mass foundations, impact eccentricity.

6. Vibration Damage and Remedial Measures

Damage and disturbance, problem assessment and evaluation, remedial principles, examples from different industries, sources of error.

7. Computer Workshop – DYNA6

Types of foundations, types of soil models, types of load, types of analysis and types of output, practical considerations, computer work on DYNA6.

Prerequisite:

This course is intended for graduate students enrolled in civil and environmental engineering. It is expected that students will have basic understanding of soil mechanics and geotechnical engineering obtained by taking suitable courses at either the undergraduate or graduate level. Students without a suitable background in soil mechanics and geotechnical engineering should discuss this with the instructor prior to registering for the course.

Corequisite:

None

Antirequisite:

None

Note: It is the **student's responsibility** to ensure that all Prerequisite and Corequisite conditions are met or that special permission to waive these requirements has been granted by the Faculty. It is also the **student's responsibility** to ensure that they have not taken a course listed as an Antirequisite. The student may be dropped from the course or not given credit for the course towards their degree if they violate the Prerequisite, Corequisite or Antirequisite conditions.

Contact hours: Two 2-hour lectures/ week, Mondays 11:30 to 1:30pm, rm NCB114

Text: Course notes will be available in class.

Project: A design project will be assigned or critical review of some technical papers will be required.

Assignments: problems will be assigned and the solutions will be submitted by the specified due dates. Late assignments will not be marked.

Examination: A 3-hour examination is held during the examination period on all work covered during the course. Exam will be held on December 12, 2011.

Evaluation: The final grade is arrived at as follows:

| | |
|-------------------|-----|
| Project | 30% |
| Assignments | 30% |
| Final Examination | 40% |

Instructor: Professor: M.H. El Naggar, Ph.D., P. Eng., SEB2080, Tel: 519-661-4219
Secretary: Room 3005, (519-661-3344).

Use of English:

In accordance with Senate and Faculty Policy, students may be penalised up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Scholastic Offences:

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_grad.pdf.

Plagiarism:

University policy states that plagiarism, defined as the “act or an instance of copying or stealing another’s words or ideas and attributing them as one’s own.” (excerpted from Black’s Law Dictionary, West Group, 1999, 7th ed., p. 1170) is a scholastic offence. In submitting any written work as part of the coursework requirements for this course students must ensure that this work is written in their own words. Whenever students take an idea or a passage of text from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

A student who is found guilty of plagiarism in respect of any written work submitted as part of the coursework requirements for this course will be given a grade of zero for the submitted work. Repeated acts of plagiarism, either in this course or any other course subsequent to a first offence, will result in the student being given a failing grade for the course in which the subsequent offence occurs, and may also incur further penalties such as requiring the student to withdraw from the program in which they are enrolled in.

Attendance:

Any student who, in the opinion of the instructor, is absent too frequently from class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

Accessibility:

Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Conduct:

Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others. Late comers may be asked to wait outside the classroom until being invited in by the Instructor. Please turn off your cell phone before coming to a class, tutorial, quiz or exam.

On the premises of the University or at a University-sponsored program, students must abide by the Student Code of Conduct: <http://www.uwo.ca/univsec/board/code.pdf>.

Sickness and Other Problems:

Students should immediately consult with the Instructor or Department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see attached). The student should seek advice from the Instructor or Department Chair regarding how best to deal with the problem. Failure to notify the Instructor or Department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

For more information concerning medical accommodations, please see:

http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf.

Notice:

Students are responsible for regularly checking their email, and the course OWL site for new notices related to the course.