

The University of Western Ontario
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CEE9718A- Finite Element Analysis for Solids I
COURSE OUTLINE- 2018/19

OBJECTIVES:	<p>This course is designed to achieve the following objectives:</p> <ol style="list-style-type: none">1. Provide the basic knowledge of the theory of elasticity.2. Provide an understanding of the foundations of the finite element method.3. Train the student in deriving and coding finite element formulations.4. Train the student in solving problems in solid mechanics using the finite element method.
TOPICS:	<ol style="list-style-type: none">1. Introduction to the theory of elasticity: stress and strain tensors; constitutive relations; plane elasticity problems; beam bending problems.2. Introduction to the Finite Element Method: Strain energy; principle of minimum potential energy; virtual work principle; Rayleigh-Ritz method.3. Bar element. Beam bending element.4. Convergence criteria in the finite element method.5. Plane elasticity finite element; four node rectangular element; constant stress triangular element; natural coordinates and Co shape functions.6. Isoparametric 2-D elements; general formulation; eight-node isoparametric element; Gauss-Quadrature numerical integrations.7. Thin Plate Bending Problems8. Introduction to nonlinear problems
PREREQUISITE	B.Sc. Degree in Structural Engineering
ANTIREQUISITE	CEE 9512
CONTACT HOURS:	3 hours lecture once or twice per week (personal study- 9 hours).
TEXT:	NONE.
LECTURE NOTES:	Will be available to the students. It is strongly recommended to bring a copy of the notes during lectures.

- REFERENCES: Will be provided in the first lecture.
- COMPUTING: Assignments will include modification of a basic finite element program written in FORTRAN.
Assignments might include application of the commercial program SAP2000 which is available at the engineering computer lab.
- UNITS: SI units will be used in lectures and examinations.
- EVALUATION:

Assignments	35%
Class Participation	5%
Final Examination	60%

An Open Book mid-term test might be scheduled during the term. It will have the same weight as a typical assignment
The final examination is OPEN BOOK. Students must obtain a grade of 50% in the final examination to pass this course.
- ATTENDANCE: Any students who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, 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 examination in the course.
- CHEATING: University policy states that cheating is a scholastic offense. The commission of a scholastic offense is attended by academic penalties which might include expulsion from the program. If you are caught cheating, there will be no second warning.
- 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.
- INSTRUCTOR: Dr. A. El Damatty, P.Eng., SEB3006, Ext.82345
e-mail: damatty@uwo.ca
- CONSULTATION: Students are encouraged to discuss problems with the instructor during regular office hours to be set during the first lecture of the course.
- SICKNESS OR 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. 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.

NOTICE:

Students are responsible for regularly checking their e-mails, the course owl site and notices posted outside the Civil and Environmental Engineering Department Office.