



A POLYTECHNIC INSTITUTION

School of Manufacturing, Electronics & Industrial Processes
Program: Mechanical Engineering Technology
Option: Design

Mech 3345
Computer Aided Engineering

Start Date: September 6, 2006 End Date: December 15, 2006
Total Hours: 60 Total Weeks: 15 Term/Level: 3 Course Credits: 4.0
Hours/Week: 4 Lecture: 2 Lab: 2 Shop: Seminar: Other:

Prerequisites Mech 3345 is a prerequisite for:
Course No. Course Name Course No. Course Name
Mech 2240 Strength Of Materials Mech 4495 Engineering Design Process
Math 2491 Calculus for Mechanical

Course Description

The course introduces the finite element analysis (FEA) method and its applications in the design of machineries and structures. Simple classical engineering problems are solved by hand using both FEA and analytical methods. Typical engineering problems are solved by developing and analyzing computer models using commercial FEA software.

Evaluation

Table with 2 columns: Evaluation Item and Percentage. Rows include Final examination (30%), 2 lab tests (30%), 1 written test (15%), Assignments / labs (25%), and TOTAL (100%). Includes a comment: 'Comments: Lab handouts are given out weekly. Assignments are based on lab work and are due in one week.'

Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

- Explain concepts of finite element analysis (FEA),
Calculate simple static forces / stress manually using FEA method,
Create 2D and 3D FEA computer models,
Perform FEA linear static stress analysis of machine components under loads,
Interpret analysis results generated by FEA software,
Import CAD models into FEA software for analysis,
Verify accuracy of FEA computer models.

Verification

I verify that the content of this course outline is current.



Authoring Instructor



Date

I verify that this course outline has been reviewed.



Program Head/Chief Instructor



Date

I verify that this course outline complies with BCIT policy.



Dean/Associate Dean



Date

Note: Should changes be required to the content of this course outline, students will be given reasonable notice.

Instructor(s)

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Learning Resources

Required:

Text: Mech 3345 Computer Aided Engineering Course Notes, by Ken Y Wong, BCIT Bookstore.

Information for Students

Assignments/Mark Discrepancy: Late assignments, lab reports or projects will be devalued 20% per day late. Assignments/labs which are more than 5 days late will not be accepted. Assignments, lab reports or projects must be done on an individual basis unless otherwise specified by the instructor. Any errors and discrepancies in marks must be submitted to the instructor within 2 weeks of receiving marked papers, after which no tests, labs, or quizzes will be reassessed.

Makeup Tests, Exams or Quizzes: There will be **no** makeup tests, exams or quizzes. If you miss a test, exam or quiz, you will receive zero marks. Exceptions may be made for **documented** medical reasons or extenuating circumstances. In such a case, it is the responsibility of the student to inform the instructor **immediately**.

Ethics: BCIT assumes that all students attending the Institute will follow a high standard of ethics. Incidents of cheating or plagiarism may, therefore, result in a grade of zero for the assignment, quiz, test, exam, or project for all parties involved and/or expulsion from the course.

Attendance: The attendance policy as outlined in the current BCIT Calendar will be enforced. Attendance will be taken at the beginning of each session. Students not present at that time will be recorded as absent.

Illness: A doctor's note is required for any illness causing you to miss assignments, quizzes, tests, projects, or exam. At the discretion of the instructor, you may complete the work missed or have the work prorated.

Attempts: Students must successfully complete a course within a maximum of three attempts at the course. Students with two attempts in a single course will be allowed to repeat the course only upon special written permission from the Associate Dean. Students who have not successfully completed a course within three attempts will not be eligible to graduate from the appropriate program.

Course Outline Changes: The material or schedule specified in this course outline may be changed by the instructor. If changes are required, they will be announced in class.

Advancement: Students who fail three or more courses in a term cannot advance to the next term and may be asked to discontinue from the program.

Schedule

Week of/ Number	Outcome/Material Covered	Reference/ Reading	Lab	Due Date
1	Introduction to FEA concepts		1	
2	FEA terminologies and applications. Application of Matrix algebra in FEA analysis.		2	
3	Analysis of a simple 2D truss by static force equilibrium and manual FEA calculations.		3	
4	Introduction to Algor FEA software and analysis modules.		4	
5	Algor FEA Element types. Truss and beam elements.			
6	Analysis results for beam and truss elements.		Lab test 1	
7	Membrane, 2D Elasticity, Plate/shell and solid elements.		5	
8	Analysis results for plate/shell and solid elements.		6	
9	FEA Modeling techniques		7	
10	FEA Modeling techniques			
11	Loads, boundary conditions, boundary elements, gap and cable elements.		Lab test 2	
12	Result interpretation – Von Mises stress, Tresca stress, principal stresses and deflections.		8	
13	Plate element stress interpretation.		9	
14	FEA result interpretation – precision, reaction vector, principal direction.			
15	Examination			