MECH 360 –Mechanics of Materials

Instructor: Dr. Peter A. Cripton
Term 1, 2007/2008
Class Times: Tue/Thurs 9:30 – 11:00
Class Meeting Room: CEME 1202
(3) credits

Course Objective:

- To be able to perform advanced stress and calculations as described in the outline below.
- To consolidate conceptual framework established in Mech 2 / Mech 260.
- To improve "intuitive or common sense" feeling for stresses in mechanisms and structures and likely critical or problematic sections.
- To understand the role of analytic stress analysis solution in engineering design.
- To be able to understand the strengths of analytic approaches compared to FEA approaches and vice versa for a given engineering stress analysis problem.

Required Textbook:

R.C. Hibbeler – "*Mechanics of Materials",* 8th Edition, Prentice Hall, Upper Saddle River, New Jersey, 2010

Additional References (not required):

F.P. Beer, E. R. Johnston, J.T. DeWolf – "*Mechanics of Materials",* 4th Edition, McGraw-Hill, New York, 2006

A.P. Boresi, R.J. Schmidt – "*Advanced Mechanics of Materials*", 6th Edition, John Wiley & Sons, New York, 2003

R.D. Cook and W.C. Young - "*Advanced Mechanics of Materials*", 2nd Ed. Prentice-Hall, Upper Saddle River, New Jersey, 1999

J.R. Barber - "*Intermediate Mechanics of Materials*" McGraw-Hill, New York, 2001.

Tutorials:

Tutorials will be held every week on Monday between 10:00 – 11:00 in room CEME 1202. Attendance at the tutorials is mandatory.

Assignments:

Approximately ten homework assignments will be given during the term. These assignments are very important. Their purpose is to promote your understanding of the course material, and to provide needed practice with example problems that are too lengthy to discuss in class. It is your responsibility to complete each homework assignment within one week of distribution. The teaching assistant and Dr. Cripton will be available to help you with problems regarding these assignments. The teaching assistant will be present at the weekly tutorials and Dr. Cripton will be available during his office hours as listed below. The assignments will not be marked but weekly quizzes will be drawn from the assignment questions so it is in your best interest to complete the assignment prior to the weekly quiz each week. Homework solutions will be posted on WebCT after the corresponding weekly quiz.

Weekly Quizzes

Except for the week corresponding to the midterms, weekly quizzes will be given on Mondays during the first fifteen minutes of tutorial. In the Quiz, you will be expected to solve one of the questions from the previous week's assignment (possibly with slight alterations in the numbers). The weekly quizzes will be completely closed book although a calculator will be allowed.

Vista Blackboard

Please regularly check the Mech-360 Vista Blackboard site for notes, news, assignments, discussion postings and assignment solutions. If you are registered for the course Mech-360 should be listed as one of your courses when you log in to Vista (for example at: www.elearning.ubc.ca).

Midterms and Exam

Two midterms will be scheduled in addition to the final examination. Both Midterms and the exam will be closed book but a formula sheet will be provided to you. You will also be allowed to use a non-communicating calculator.

Grading Scheme

Weekly Quizzes:	20%
Mid-term exam 1:	20%
Mid-term exam 2:	20%
Final exam*:	40%

Note: each student must pass the final exam to pass the course. Students who receive less than 50% on their final exam will receive their final exam mark as a final course mark.

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Office Hours: Tuesday and Thursday 11:00 to 12:00

MECH 360 - Mechanics of Materials

Course Outline

The topics covered during the course are listed below:

		Hibbeler
1.	**Basics**: 1.1 Review of Mechanics of Materials, 1.2 Methods of Analysis	Ch 1, 2 & 3
2.	**Stress**: 2.1 Definitions, 2.2 stress tensor, 2.3 transformation of stress (2D and 3D), 2.4 Mohr's circle	9.1-9.5
3.	**Strain**: 3.1 Definitions, 3.2 strain tensor, 3.3 transformation of strain in two and three dimensions, 3.5 strain rosettes	10.1-10.6
4.	**Theories of Failure:** 4.1 Yielding of ductile metals, 4.2 General yielding, 4.3 brittle failure criteria,	10.7
5.	**Energy Methods:** 5.1 Castigliano's theorem for elastic deflections, 5.2 Statically indeterminate structures.	14.1-14.4, 14.8-14.10
6.	**Special Topics in Beam Bending:** 6.1 composite beams, 6.2 non-symmetric bending, 6.3 non-symmetric beams subjected to a distributed load	6.3-6.8
7.	**Shear stresses in Beams:** 7.1 Shear stresses, 7.2 thin-wall Members, 7.3 shear flow, 7.4 shear centre	Ch 7
8.	**Elastic Stability**: 8.1 elastic buckling, 8.2 inelastic buckling	13.1-13.3, 13.5
9.	**Stress Concentrations:** 9.1 Experimental Technique, 9.2 Theory of elasticity, 9.3 combined loads.	6.9 & handouts