MecE 380 Advanced Strength of Materials I
Fall 2013 – September 4 to December 4

Lectures:	Tuesday & Thursday	9:30-10:50	MEC 2-1
Seminars:	Friday	11:00-11:50	MEC 2-3

Instructor: Dr. Rong Long
Office: 5-8R Mech. Eng. Building, Tel: 780-492-6534
Email: rlong2@ualberta.ca
Office hours: Thursday 11:00-13:00 or by appointment

Course Description: Stress, strain, stress-strain relation, time-independent and time-dependent behavior, virtual work and energy theorems, deformations, indeterminate systems, matrix methods.

Prerequisite: MecE 260, CivE 270. It is up to you to check if you have the prerequisite. **If you do not, withdraw from the course. No exemptions will be given by the instructor**.

Teaching Assistants: Kamrul Islam, kamrul1@ualberta.ca; Yi Zhang, yz4@ualberta.ca
Office hours: Monday & Friday 3-5pm, Help Desk on 3rd floor of MecE Building

Textbook: A.C. Ugural, S.K. Fenster, *Advanced Strength and Applied Elasticity*, Fifth Edition, Prentice Hall.

Examinations: Seminar Quizzes (2): 11:00-11:50 Oct.4 & Nov. 22 (seminar hours)
Midterm Exam: 9:30-11:00 Oct. 24 (lecture hours)
Final Exam: 9:00-12:00 Dec.13 (Tentative date)

- *All exams are "open book":* the textbook and a formula sheet are allowed.
- *Sample problems will be provided before the midterm and final exams.*
- *It is necessary to pass the final exam to pass the course.*
- *If you miss the midterm exam or any of the quizzes, for a valid reason, the weight of the midterm exam or the quiz will be added to the final exam. "Make-up" tests will NOT be provided.*

Assignments: Assignments should be handed into the MecE 380 box (outside the MecE main office 4-9) before 5:30pm on the specified due date. Late assignments will NOT be accepted.

Mark Distribution:

Assignment (best 10 of 11)	10%
Quizzes	10%
Midterm Exam	30%
Final Exam	50%

All assignments and exams will be recorded as a percentage grade and the total will be converted to a letter grade and will follow a distribution.

Webpage: Available on e-class

University Policy:
"Policy about course outlines can be found in §23.4(2) of the University Calendar".

"The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.governance.ualberta.ca) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University."

"Audio or video recording of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Recorded material is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the instructor."

Course Outline:
Section 1: Introduction & Review
- Scope of course; Free Body Diagram; stresses for simple structure members.

Section 2: Stress and Strain (Chapter 1 & 2)
- Multi-axial stress components; transformation of stress components; Mohr's Circle; multi-axial strain components; compatibility equation; transformation of strain components; strain gauges.

Section 3: Stress-strain relations (Chapter 2)
- Typical engineering materials and their properties; basic assumptions and principle of superposition; generalized Hooke's law.

Section 4: Problems in Elasticity (Chapter 3)
- General Formulation of elasticity problems; two-dimensional problems (plane strain & plane stress); thermal stresses; stress concentration factors.

Section 5: Failure Criteria (Chapter 4)
- Failure by yielding and fracture; ductile and brittle materials; yield criterions for ductile materials; failure criterions for brittle materials.

Section 6: Energy Method (Chapter 10)
- Strain energy and complementary strain energy; Castigliano's theorem and applications; statically determinate systems; statically indeterminate systems.

Section 7: Beams (Chapter 5)
- Beams with asymmetrical cross section; transverse shear stress; shear center for thin-walled cross sections; composite beams; curved beams.

Section 8: Torsion of prismatic bars (Chapter 6)
- Torsion of circular and non-circular bars; Prandtl's stress function.

TENTATIVE LECTURE SCHEDULE

Week	Date	Lecture	Content	Seminar	Assignment
1	Sep 5	1	Section 1	Section 1	
2	Sep 10	2	Section 2	Section 2	1 (Due Sep 20)
	Sep 12	3	Section 2		
3	Sep 17	4	Section 2	Section 2	2 (Due Sep 27)
	Sep 19	5	Section 2 & 3		
4	Sep 24	6	Section 3	Section 3	3 (Due Oct. 4)
	Sep 26	7	Section 4		
5	Oct 1	8	Section 4	Quiz 1	4 (Due Oct 11)
	Oct 3	9	Section 4		
6	Oct 8	10	Section 5	Section 4	5 (Due Oct 18)
	Oct 10	11	Section 5		
7	Oct 15	12	Section 6	Section 5	6 (Due Nov. 1)
	Oct 17	13	Section 6		
8	Oct 22	14	Section 6	Section 6	
	Oct 24	--	Midterm Exam in class		
9	Oct 29	15	Section 6	Section 6	7 (Due Nov. 8)
	Oct 31	16	Section 6		
10	Nov 5	17	Section 7	Section 7	8 (Due Nov 15)
	Nov 7	18	Section 7		
11	Nov 12	--	Fall Break, no class	Section 7	9 (Due Nov 22)
	Nov 14	19	Section 7		
12	Nov 19	20	Section 7	Quiz 2	10 (Due Nov 29)
	Nov 21	21	Section 7		
13	Nov 26	22	Section 8	Section 8	11 (Due Dec 4)
	Nov 28	23	Section 8		
14	Dec 3	24	Review	No Seminar	

- **The above lecture schedule is tentative and may be adjusted during the semester.**