CVEN 3161-010

Mechanics of Materials I
Fall 2008

- Instructor: Kaspar J. Willam; Office: ECOT 456, Tel: 2-7011
- Office Hrs: MWF 9:00-10:00am; e-mail: willam@colorado.edu
- Teaching Assistant: Mohammadreza Mostafa; TA Office: ECCE 164
- Office Hrs: Wednesday 4:00-6:00pm; e-mail: mohammadreza.mostafa@colorado.edu
- Lab Assistant: Volkan Isbuga; ECCE 1B52, e-mail: volkan.isbuga@colorado.edu
- Textbook: *"Mechanics of Materials"*
  Ray R. Craig, Jr., John Wiley & Sons, Inc., New York, 2nd Ed. 1999.
- Lectures: MWF 8:00-8:50am, ECCR 245
- Laboratory: Three lab sessions during semester (plus one lab for mixing concrete):
  - Lab Groups 1-3, L-011 : W 1:00-2:00 pm, ECCE 1B52
  - Lab Groups 4-6, L-011 : W 2:00-3:00 pm, ECCE 1B52
  - Lab Groups 7-9, L-012 : W 3:00-4:00 pm, ECCE 1B52
- Assignments: Weekly Homework Problem Sets [10 out-of 11] (20%).
- Term-Projects: Three Individual Laboratory Reports (30%).
- Three Midterm Examinations: ECCR 245
  Wednesday 8:00-8:50am: Sept. 24, Oct. 22, Nov. 19, 2008 (30%).
- Final Examination: ECCR 245, Wednesday, Dec. 17, 2008, 4:30 -7:00pm (20%).
- Disabilities: Students with disabilities who need academic accommodations should discuss options with the instructor during the first two weeks of class.

Course Outline

1. Introduction: August 25 - 27, 2008 — Chapter 1
   - Fundamental Concepts of Mechanics of Materials — 1.1-1.2
   - Review of Static Equilibrium — 1.4
2. Stress and Strain, Design: August 29 - September 12, 2008 — Chapter 2
   - Normal Stress — 2.1-2.2
   - Extensional Strain — 2.3
   - Normal Stress-Strain Diagrams — 2.4
   - Elasticity and Plasticity — 2.5
   - Linear Elasticity, Hooke's Law and Poisson's Ratio — 2.6
   - Shear Stress and Shear Strain — 2.7
   - Stresses on an Inclined Plane — 2.8
   - Generalized Hooke's Law (E, ν, G, K) — 2.10
   - Allowable Stress Design — 2.12

3. Axial Deformation: September 15 - 22, 2008 — Chapter 3

- Axial Deformation of Uniform and Non-Uniform Bars — 3.1-3.3
- Stiffness and Flexibility of Uniform Bars — 3.4
- Serial and Parallel Axial Bar Assemblies (Composite Bars) — 3.5

Midterm #1: September 24, 2008

4. Torsion: September 26 - October 8, 2008 — Chapter 4

- Elastic Torsion of Circular Bars — 4.1-4.3
- Serial and Parallel Torsion Bar Assemblies (Composite Torsion Bar) — 4.4-4.5
- Inelastic Torsion of Circular Bars — 4.9

5. Equilibrium of Beams: October 10 - 13, 2008 — Chapter 5

- Equilibrium using Free Body Diagrams — 5.1-5.2
- Differential Equilibrium Relationships — 5.3
- Interrelationship of Shear Force and Bending Moment Diagrams — 5.4

6. Stresses in Beams: October 15 - November 5, 2008 — Chapter 6

- Kinematics of Bending: Euler-Bernoulli Theory — 6.1-6.2
- Flexural Stresses in Elastic Beams — 6.3
- Allowable Stress Design of Beams, Elastic Section Modulus — 6.4

Midterm #2: October 22, 2008

- Bending of Composite Beams (Sandwich Beams) — 6.5
- Inelastic Bending of Beams, Plastic Section Modulus — 6.7
- Shear Stresses in Beams — 6.8
- Limitations of Elastic Shear Stress Formula — 6.9
- Shear Connectors in Built-Up Beams — 6.11

7. Deflections of Beams: November 7 - 17, 2008 — Chapter 7

- Elastic Moment-Curvature Relation — 7.1
- Differential Equations of Beam Deflection — 7.2
- Deflection Analysis by Direct Integration — 7.3
- Statically Indeterminate Deflection Problems — 7.4

Midterm #3: November 19, 2008

8. Transformation of Stress and Mohr's Circle: November 21 - Dec 5, 2008 — Chapter 8

- Transformation Relationships of Plane Stress — 8.1-8.3
- Principal Stresses and Maximum Shear Stress — 8.4
- Mohr's Circle for Plane Stress — 8.5

9. Stresses due to Combined Loading: December 8 - 12, 2008 — Chapter 9

- Thin-Walled Pressure Vessels — 9.1-9.2
- Stresses in Frame Members due to Combined Loading — 9.4