CVEN 3161-010

Mechanics of Materials I
Spring 2004

- Instructor: Kaspar J. Willam; Office: ECOT 456, Tel: 2-7011
- Office Hrs: MWF 10:00-11:00 am; e-mail: willam@colorado.edu
- Teaching Assistant: Scott Hamel; Office: ECST 320-TA Room 3rd Floor
- Office Hrs: WR 12:00-2:00 pm; e-mail: hamels@colorado.edu
- Laboratory Manager: Tom Bowen; Thomas.Bowen@colorado.edu, ECCE 1B10, Tel: 2-2558
- Textbook: *"Mechanics of Materials"*
  Ray R. Craig, Jr., John Wiley & Sons, Inc., New York, 2nd Ed. 1999.
- Lectures: MF 9:00-9:50 a.m., ECCR 245
- Laboratory: W 9:00-9:50 a.m., ECCR 245
  Three lab sessions during semester (plus one lab for mixing concrete):
  - Lab # 1, L-011 : W 2:00-2:50 am, ECCE 1B52, Groups A,
  - Lab # 2, L-011 : W 3:00-3:50 am, ECCE 1B52, Groups B,
  - Lab # 3, L-012 : W 4:00-5:50 pm, ECCE 1B52, Groups C.
- Assignments: Weekly Homework Assignments [10 out-of 11](10%).
- Term-Projects: Three Laboratory Reports (30%).
- Three Midterm Examinations: ECCR 105,
  Wednesday 9:00-9:50 am: Feb. 11, March 17, April 14 (30%).
- Final Examination: ECCR 245, Tuesday May 4, 2004, 4:30 - 7:00 pm (30%).
- 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: Jan 12 - Jan 14, 2004 — Chapter 1
   - Fundamental Concepts of Mechanics of Materials — 1.1-1.2
   - Review of Static Equilibrium — 1.4
2. Stress and Strain, Design: Jan 16 - Jan 30, 2003 — 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: Feb 2 - 9, 2004 — 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: Feb 11, 2004

4. Torsion: Feb 13 - 25, 2004 — 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: Feb. 27 - March 3, 2004 — 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: March 5 - March 19, 2004 — 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: March 17, 2004

- 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: March 29 - April 9, 2003 — 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: April 14, 2004

8. Transformation of Stress and Mohr's Circle: April 12 - 21, 2004 — 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: April 23 - April 30, 2004 — Chapter 9

- Thin-Walled Pressure Vessels — 9.1-9.2
- Stresses in Frame Members due to N, M, and V (Combined Loading) — 9.4