ENGR213 – STRENGTH OF MATERIALS
OREGON INSTITUTE OF TECHNOLOGY
WINTER 2009

Instructor: Professor C.J. Riley
Office: Owens 113
Office Hours: 9-11am Wednesdays, 9am-12pm Fridays, anytime my door is open, or by appointment
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Class Meetings: Mondays, Wednesdays, and Fridays in Boivin 115
Lab Meetings: Tuesdays or Thursdays 8 – 11am in Cornett 115C – Strengths Lab

Text: Gere and Goodno – Mechanics of Materials, 7th Edition (ISBN 978-0-534-55397-5)

Prerequisites: ENGR211 - Statics with a C or better

Objectives:

- Develop an understanding of the relationships between force, stress, strain, and displacement in linear elastic solids
- Apply simplified mathematical models to engineering problems of design of axial, bending, and torsion members
- Understand the link between stress and strain and be able to transform measures of these in different coordinate systems
- Effectively communicate an engineering problem solution by clearly showing (1) the problem, (2) the basis and method of solution, and (3) the result
- Develop skills required to prepare, measure, test, and document a laboratory experiment
- Develop a working knowledge of traditional engineering materials and their behavior under load and deformation

Grading: This may vary depending on the success of the class in general, but you can guarantee your minimum grade by compiling simple weighted averages of your work (e.g. A: 90-100%, B: 80-90%, C: 70-80%, etc). Actual grades will be made available as the course progresses. The weighting of assigned work is as follows:

- Homework: 10% - Assigned Monday through Wednesday as covered and due every Friday at the beginning of class
- Midterm Exams (3): 30%
- Final (Comprehensive): 10%
- Lab: 50% (primarily lab reports graded 50% on presentation and 50% on technical content)

Topics:

- Basic concepts of stress and strain
- Constitutive laws (relation between stress and strain)
- Mechanics of axially loaded bars, including statically indeterminate systems
- Mohr's circle and transformation of stress and strain

- Shear in beams and beam flexure
- Bending moment and shear diagrams in beams
- Beam deflections
- Thin-walled pressure vessels
- Torsion of circular sections, including statically indeterminate members
- Torsion of thin-walled hollow sections
- Elastic stability of beam-columns
- Engineering properties of materials

Comments:

- We will be covering a lot of material in this course. Both the theory of mechanics and the impact of material properties will be introduced. Laboratory exercises will reinforce the content provided during lecture and new material may be presenting during the laboratories that will be tested during exams.
- Material covered in lecture will be reinforced in the laboratory and vice versa so your attendance in both lab and lecture is a highly recommended. If you must miss a class or laboratory, notify your instructor as far in advance as possible and make every effort to catch up on your own.
- I encourage working together to solve problems, but what you turn in should be your individual work. Formulating a strategy with others is a great way to learn, but you should write the solution based on your own efforts. Any problem solutions that match in format and in error will be cause for concern on my part. Don't put yourself or me in the position of having to deal with cheating. It's not worth it. I am available and willing to help with any comprehension issues you have. Take full advantage of me in that regard via office hours and class participation!
- Using the solution manual provided by our textbook publisher to solve homework problems is strictly prohibited and will result in no credit earned for the problem set in question. Any indication that the solution manual is being used will be dealt with individually.