ME450 – Intro to Composite Materials and Design

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Lectures: MWF, 12:30–1:20pm, Loew 216
Course Web Site: http://courses.washington.edu/mengr450/

Course Description: Stress and strain analysis of continuous fiber composite materials. Orthotropic elasticity, lamination theory, failure criterion, and design philosophies, as applied to structural composites. Recommended: MSE 475.

Course Format:
Lectures: 3 one-hour lectures per week
Homework:
- Combination of hand-graded and computer-graded (details TBA)
- Late homework will not be accepted without prior arrangements
Exams:
- Combination of hand-graded and computer-graded (details TBA)
- Time allotment: 1 hr for midterm, 2 hrs for final. Time adjustment for out-of-town (EDGE) students
Labs:
- Optional lab(s) will be held to illustrate hand lay-up techniques, autoclave cure, and composite tensile testing.

Grading Policy:
Homework: 30%
Midterm Exam: 35%
Final Exam: 35%

Topics (Subject to Adjustments as Necessary):
- Brief Introduction and Overview of:
  - Categories of composite materials
  - Constituents used in polymeric composites
  - Manufacturing processes used to produce polymeric composite structures
- Review of stress and strain
- Constitutive models/anisotropic elasticity
- Unidirectional composite plies subjected to plane stress
- Composite failure theories
- Theory of plates
- Unidirectional composite laminates
- Multi-angle composite laminates (Classical Lamination Theory, aka “CLT”)
- Composite laminate failure predictions