Department: CEMS (Ceramic Engineering and Material Science)
Course Number: 446
Title: Composites

Designation: required course

Course Description: The mechanics and design of composite bodies, members subjected to tension, compression, flexure and torsion. Orthotropic plate, beam, and torsion topics. Readings and design project for analysis and design with applications. 3 Credit Hours

Prerequisites: MECH 211 and MECH 241

ISBN: 0387984097

Other Ref. Texts  

Course Learning Outcomes: see ABET documentation : b, c, e, l

Homework: Problems/projects/papers will be assigned by the instructor.

Grading: Exams = 50%, Project(s) = 30%, Paper(s) = 20%

Topics:

- Introduction to Composites
- Orthotropic Stress and Strain
- Analysis of Axial and Flexural Composites
- Matrix Materials and Reinforcement Materials
- Design Project
- Calculation of Interfacial Stresses
- Modes of Failure in Composites
- Mechanics of Composites

Class/Laboratory Schedule: 3 lectures per week (each 50 minutes)

Contribution of course to meeting curriculum requirements:
- contributes to analytic techniques for composites of materials
- advances the students capability for formulation and design of composites

Relationship of course to program outcomes:
- design and conduct experiments (composite design/testing project) as well as analyze and interpret data (match data to composite theory)
- introduces the design of a process (construction of composite) to meet desired (mechanical) needs within constraints (boundary)
- advances efforts to formulate (constitutive and equilibrium based stress equations) and solve (linear algebra and matrix techniques) engineering (composite) problems
- advanced use of glass based materials (application of fibers in composites)

Prepared by: W. B. Carlson  Date: January 2012