

ME/Ch E 463 Composite Materials Syllabus, Fall Semester 2009

Text: *Introduction to Composite Materials Design*, Ever J. Barbero, Taylor and Francis, Philadelphia, PA, 1998
Class: T, R, 11:00-12:15, Roberts Hall 121
Instructors: Doug Cairns 112 Roberts, 994-6050
Lab Supervisor: Dan Samborsky, 301 Cobh, 994-3597

Catalog Info: **ME 463 COMPOSITE MATERIALS**

F alternate years, to be offered 2007 3 cr. LEC 3

PREREQUISITE: CH E 213.

-- Structure and properties of composite materials and design procedures for composite structures. Cross-listed with CH E 463.

- I. Introduction**
General characteristics of composites; advantages and disadvantages, application trends.
- II. Basic Materials**
Characteristics of fibers, matrices, interface bonding, adhesives; microstructure of composites.
- III. Processing/Manufacturing**
Traditional and novel approaches; process fundamentals.
- IV. Composite Micromechanics**
Basic concepts, stiffness, strength, thermal and moisture expansion.
- V. Composite Mechanics Theory**
Laminate theory; use of a computer based analysis package; macromechanical behavior of a ply, out-of-plane effects.
- VI. Failure and Strength Design**
Failure criteria, Laminate Strength, Stress Concentrations
- VII. Composite Behavior and Applications**
How do actual composites for aerospace, automotive, sporting goods, high temperature applications behave? Problem areas, long-term performance, influence of structural geometries
- VIII.* Design Project**
Design concepts; small group design problem using composites (design, build, and test)

Grading (Assessment and Evaluation)

Midterm and Final (50%), Project (30%), Homework and class participation (20%). Homework will include applications of a laminate software analysis package.

ME students who are exempt from the Board of Regents C- policy must understand that a D- grade is not considered passing by the M&IE Department. A grade of D- in any required course must be repeated, with a D or higher grade earned, for it to apply to degree requirements.

Computer and Laboratory Usage

Students will use a computer program for composite lamination theory. Students will make composite structures in ME and ChE laboratories, as appropriate, for their design projects.

Special Needs

Students with special needs or requiring special accommodations should contact the instructor or the campus Disabled Student Services Office at the earliest opportunity.

* Introduction and updates will be presented periodically throughout the semester.