Composites Manufacturing (4 credits) - Fall 2012 - MFGE 438/MFGE 538

Instructor / Office Hours
Roberto Albertani, Dearborn 221D, roberto.albertani@oregonstate.edu / M, W 1330-1430

Teaching Assistants
TBD

Prerequisites
ENGR 213.

Class Schedule
Lectures: Section 01 CRN 18645 M, W 1000-1050 OWEN 103
Labs: Section 010 CRN 18650 T, R 0800-0950 GRAF 107
Section 011 CRN 18656 T, R 1000-1150 GRAF 107
Section 012 CRN 18661 T, R 1400-1550 GRAF 107

Course Description:
Introduction to fiber-reinforced composite materials and their applications. Topics include matrices; properties and forms of reinforcement; open and closed molding manufacturing processes; and introduction to resin transfer molding, filament winding, and quality, testing and damage assessment. Basics of factory operations and sustainability of composites are also addressed. Students will complete a design-manufacturing project involving application of fiber-reinforced laminates.

Required Textbook:

Reference Materials:

Software for Class Projects:

Topics:

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<th>Week</th>
<th>Topic</th>
<th>Laboratory</th>
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<tr>
<td>2</td>
<td>Basics of linear elasticity of anisotropic materials; residual stresses. Concepts of volume and weight fraction of fiber and matrix.</td>
<td>Lab 01</td>
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<td>3</td>
<td>Matrices and their properties. Polyester resins.</td>
<td>Lab 01 , Lab 02</td>
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<td>4</td>
<td>Reinforcements characteristics. Epoxy resins.</td>
<td>Lab 03</td>
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<td>5</td>
<td>Reinforcements forms. Sandwich structures.</td>
<td>Lab 04</td>
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<td>6</td>
<td>MIDTERM (IN CLASS). Joints.</td>
<td>Lab 05</td>
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<td>7</td>
<td>Open molding, closed molding. Filament winding.</td>
<td>Lab 05</td>
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<td>8</td>
<td>Testing. Resin infusion</td>
<td>Lab 06</td>
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<td>9</td>
<td>Quality. Basics of damage assessment and repairs. Factory operations. Sustainability</td>
<td>Lab 07</td>
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<td>10</td>
<td>PRESENTATIONS of Graduate Students Projects</td>
<td>Lab 07</td>
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<td>FINAL EXAM (TAKE HOME).</td>
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Electronic File Access
Files, assignments and announcements will be posted on Blackboard.

Homework
There will be 3-5 graded homework assignments.

Laboratory Reports and Project
All students will submit for each laboratory project a short technical report. Students enrolled in MFGE 538 will also complete a team project and submit a research paper and give a group presentation on the paper topic.

Exams
The midterm in-class exam is closed book, except for one 8.5"x11" page of notes, written in any density on both sides (you may bring a magnifier if you wish to write very small). The final exam is take-home. No make-up exams except for a medical emergency, e.g. illness or accident, in which case a physician’s certification is required and you must notify the instructor in advance of the scheduled exam.

Grading
• MFGE 438: 20% homework, 30% lab reports, 25% mid term exam (in class), 25% final exam (take home).
• MFGE 538: 10% homework, 25% lab reports, 20% mid term exam (in class), 20% final exam (take home), 25% project paper and presentation.

Grades are on an absolute scale (A=92+, B+=86+, B=81+, C+=76+, C=71+, D+=66+, D=61+).

Learning Outcomes
Students, upon successfully completion of this course, will be able to:
• Determine the appropriate manufacturing process for a new product based on analysis of the product requirements, basic components characteristics and factory operations.
• Use a commercial software package to apply the Analysis-Check-Manufacture group process for fiber-reinforced composites.
• Perform basic damage assessment and identify options for sustainability of fiber-reinforced composites.
• Document laboratory team project work in a clearly written and well structured technical report.

Additional learning outcome for graduate students (MFGE 538)
• Demonstrate the ability to independently analyze and extend a given course subject, compose a report paper and effectively communicate the essentials through an oral presentation.

Academic Dishonesty
You will be expected to conduct yourself in a professional manner. Academic dishonesty such as plagiarism and cheating will not be tolerated. Therefore, students are expected to be honest and ethical in their academic work.
Academic dishonesty is defined as an intentional act of deception in one of the following areas:
* cheating- use or attempted use of unauthorized materials, information or study aids,
* fabrication- falsification or invention of any information,
* assisting- helping another commit an act of academic dishonesty,
* tampering- altering or interfering with evaluation instruments and documents, or
* plagiarism- representing the words or ideas of another person as one's own.
For more information about academic integrity and the University's policies and procedures in this area, please refer to the Student Conduct web site at: http://oregonstate.edu/admin/stucon/achon.htm and the section on Academic Regulations in the OSU Schedule of Classes.

Statement Regarding Students with Disabilities:
Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.