MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 446: Composite Materials (3 credit): Elective Course

Course Description (2008-2010 Catalog):

Overview of matrix and fiber systems, processing techniques, anisotropic elasticity, unidirectional lamina, multidirectional laminate theory, failure theories, and design of composite structures.

Prerequisite Course: ME 302, MATH 431

Prerequisite by Topic:

- Mechanics of Materials
- Differential Equations

Textbook: "Fiber Reinforced Composites: Materials, Manufacturing, and Design", P.K. Mallick, 3rd Edition, CRC Press, 2007, ISBN 9780849342059

Other Reference Material: N/A

Course Coordinator: Brendan O'Toole, Associate Professor

Course learning outcomes:

(a) Identify the materials used in modern composite materials and their important properties
(b) Understand how the different manufacturing methods affect design parameters such as strength and stiffness
(c) Use micromechanics to predict lamina properties
(d) Use laminate analysis to predict laminated structural response

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal 1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**L**	**M**	**L**	**H**	**L**	**L**	**H**	**M**	**L**			**L**

(L)ow (M)edium (H)igh

Topics Covered:

1. Composite Applications
2. Fiber and Matrix Properties
3. Fiber Reinforced lamina Properties
4. Laminate Analysis
5. Software for Lamina and Laminate Analysis
6. Overview of Mechanical Properties of Composites
7. Manufacturing Methods for Composites
8. Failure Predictions
9. Design
10. Special Topics (Varies by semester)

Laboratory Projects: This is a lecture course but I try to schedule informal laminate fabrication exercises related to on-going research or design projects.

Class/Laboratory Schedule: **170 minutes lecture one session per week (sometimes it is taught in twice per week format)**

Assessment of Student Progress toward Course Objectives

Six quizzes, Homework assignments, a group design project

Class/Laboratory Schedule: F 10:00 – 12:50 AM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	3 credit
(c) General Education:	0 credit
(d) Others:	0 credits

Prepared By:	**Date:**
Brendan O'Toole	October 12, 2009