REGULAR COURSE SYLLABUS

School of: Professional Studies

Department: Engineering Technology

Prefix & Course Number: MET 3215

Crosslisted With*: ____

Course Title: Composites Manufacturing

Banner course title (24 characters): Composites Manufacturing

Check All That Apply: Required for Major: ____ Required for Minor: ____ Specified Elective: ____

Required for Concentration: ____ Elective: ____ Service Course: ____

To receive Title IV financial aid funds, all institutions of higher education must comply with the federal definition of a credit hour. The Higher Learning Commission requires institutions to maintain policies and procedures for verifying compliance with this definition.

Federal Credit Hour Definition: A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:

(1) one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or

(2) at least an equivalent amount of work as required in paragraph (1) of this definition for other activities as established by an institution, including laboratory work, internships, practica, studio work, and other academic work leading toward the award of credit hours. 34CFR 600.2 (11/1/2010)

Credit Hours: 3 (2+2)

Face-to-Face or Equivalent Hours per course:

Lecture 30  Lab 30  Internship ____  Practicum ____  Other (please specify type and hours): ____

Additional Student Work Hours per course: 90

Schedule Type: B  Grade Mode: L

Variable topics umbrella course: No  X Yes ____  If Yes, number of credit hours allowed ____

Specified repeatable course: No  X Yes ____

APPROVED:

[Signature] for Dr. Ke

Date 01/29/14

Department Chair OR Program Director

[Signature]

Date 01/30/14

Dean OR Associate Dean

[Signature]

Date 03/13/14

Associate VP, Academic and Student Affairs

[Signature]

Date

*If crosslisted, attach completed Course Crosslisting Agreement Form
Prefix and Course Number: MET 3215

Prerequisite(s): MET 1010 and MET 2200, or permission of instructor

Corequisite(s):
Prerequisite(s) or Corequisite(s):

Banner Enforced:
Prerequisite(s): MET 1010 and MET 2200, with a grade “C” or better.
Corequisite(s): __
Prerequisite(s) or Corequisite(s): __

Registration restrictions: Level _____ Class _____ Program/Major _____ Student attribute _____

Catalog Course Description:
This course is designed to provide students with working knowledge in design, manufacturing and selection of fiber-reinforced composite materials for engineering applications. The course introduces the various manufacturing methods utilized in modern industries such as aerospace, automotive and renewable energy. Topics will include inspection, damage control and repair techniques as well as material handling, safety and environmental requirements. The course contains laboratory modules designed to provide hands on experience to emphasize practical aspects of the topics covered.

Specific Variable Topics Course Description (if applicable, umbrella course description included above):

Required Reading and Other Materials will be equivalent to:

Specific, Measurable Student Behavioral Learning Objectives:
Upon completion of this course the student should be able to:

1. Demonstrate an understanding of the theory of anisotropic elasticity.
2. Calculate materials properties depending on the structure configuration and reinforcement orientation.
3. Determine the appropriate manufacturing process for a new product based on engineering analysis of the product requirements, basic components characteristics and factory operations.
4. Perform basic damage assessment and identify options for sustainability of fiber-reinforced composites.
5. Construct samples and demonstrate finishing techniques common to the fabrication of composite products.
6. Document laboratory team project work in a clearly written and well structured technical report.
7. Apply “rework and repair methods” common to the fabrication of composite products.
8. Identify the health and safety issues and environmental regulations that currently relate to a composites manufacturing facility.

Detailed Outline of Course Content (Major Topics and Subtopics) or Outline of Field Experience/Internship (experience, responsibilities and supervision):
I. Introduction to Composite Materials
   A. Definition and Properties
   B. Type of composites
   C. Constitute materials
   D. Tooling
Prefix and Course Number: MET 3215

II. Physical Characterization Composite Materials:
   A. Density
   B. Fiber Volume
   C. Void Volume Ratio (Porosity)
   D. Coefficient of Thermal & Moisture Expansion
   E. Glass Transition Temperature
   F. Anisotropy Elasticity

III. Pre-cure Manufacturing Processes
   A. Lay-up processes
   B. Open molding, close molding
   C. Resin transfer molding
   D. Spray-up processes
   E. Filament winding
   F. Pultrusion
   G. Prepreg lay-up autoclave processing
   H. Other processes

IV. Post-curing Processes
   A. Drilling
   B. Milling
   C. Turning
   D. Sanding
   E. Bonded Joint
   F. Assembly

V. Basics of Damage Assessment and Repairs

VI. Quality Assessment and Specifications

VII. Basics of factory operations
   A. Project planning
   B. Business of composites
   C. Recycling of composites
   D. Sustainability in composites

VIII. EPA Regulations and Recent Advances

Evaluation of Student Performance:
1. Homework
2. Quizzes
3. Tests
4. Laboratory projects and reports