MEMORANDUM

Date: 7 February 2012

For: Dr. Edward Kalajian

From: George A. Maul

Subj: Adding a course to the curriculum – OCE 4515 Composite Design

Attached please find a request to add OCE 4515 to the curriculum.

The course was taught as a special topics course by Dr. Ron Reichard for two years, and is an important area of expertise for ocean engineers and others. Ron is an excellent teacher, and will continue to teach the course once a year in addition to his duties as COE Lab Director.

Thank you for your attention to this matter.

cc: K. Johnson, DMES
Florida Institute of Technology

ADDITIONAL COURSE TO THE CURRICULUM

This course is available for student registration only after the approval process has been completed.

SUBJECT __O__ C__E__
COURSE NO.* 4515
CREDIT HOURS 3
TERM TO BE ADDED TO THE FILE Fall 2012 (e.g., Fall 2010)

CLASS HOURS 45/semester LECTURE HOURS 45/semester LAB HOURS CONTACT HOURS (CEU ONLY)

DEPARTMENT Marine and Environmental Systems (e.g., Computer Sciences)

SCHEDULE TYPE Lecture (A) (e.g., Lecture, Lab or Special Topics/Project)

☐ COLLEGE OF AERONAUTICS – 23 ☐ COLLEGE OF PSYCHOLOGY AND LIBERAL ARTS – 25
☐ NATHAN M. BISK COLLEGE OF BUSINESS – 24 ☐ COLLEGE OF SCIENCE – 26
☒ COLLEGE OF ENGINEERING – 1 ☐ EXTENDED STUDIES DIVISION / NATHAN M. BISK COLLEGE OF BUSINESS – 90

COMPUTER TITLE Restricted to 25 characters, including spaces Composite Design

CATALOG TITLE Composite Design

CATALOG DESCRIPTION OF COURSE Restricted to 350 characters, including spaces

Introduces the design process for structures using fiber reinforced plastic materials. Includes material properties and selection, design methodology and manufacturing processes. Examines a number of design case studies and requires completion of a design project. (Requirement: Senior standing in ocean, mechanical, aerospace or civil engineering.)

This description has been approved by the catalog office.

Catalog Director

In addition, please attach a course syllabus and/or more detailed description.

RESTRICTIONS ☒ Prerequisite MAE 3083 ☐ Corequisite Course Number ☐ and ☐ or GRADES TO BE ISSUED

☐ Prerequisite Course Number ☐ Corequisite Course Number ☐ and ☐ or ☐ A, B, C, D, F

☐ Prerequisite Course Number ☐ Corequisite Course Number ☐ and ☐ or ☐ A, B, C, D, F, CEU/Audit

☐ Prerequisite Course Number ☐ Corequisite Course Number ☐ and ☐ or ☐ CEU

☐ and ☐ or ☐ S, U

☐ and ☐ or ☐ P, F

☐ and ☐ or ☐ Other

ADDITIONAL RESTRICTION

Senior standing in ocean, mechanical, aerospace or civil engineering

(e.g., Major, Class Level, Department Head Approval)

if this course replaces a course currently offered in BANNER, please indicate old course Information and the date/term the course may be removed from the system.

SUBJECT Prefix (e.g., CSE) COURSE NO. (e.g., 1301) TERM TO INACTIVATE

APPROVALS: Upon completion of appropriate department approvals, submit form to Chair, Graduate Council, or Chair, Undergraduate Curriculum Committee for approval below and forward to Catalog Director.

Originator 2-17-2012

Chair, Graduate Council Date

Dean or Associate Dean 2-19-12

Chair, Undergraduate Curriculum Committee Date

CATALOG DIRECTOR

These changes/additions have been made for the University Catalog/policy management system and entered into the BANNER term named above.

Catalog Director

REGISTRAR'S USE ONLY

SCACRSE SCADTL SCAPREQ SCABASE

SCARBES Operator Init. Date

Florida Institute of Technology • Office of the Registrar

150 West University Boulevard, Melbourne, FL 32901-6975 • (321) 674-8114 • Fax (321) 674-7827

RGR-122101
OCE 4515 COMPOSITE DESIGN

2012-2013 Catalog Data: OCE 4515 COMPOSITE DESIGN. (3 credits). Introduces the design process for structures utilizing fiber reinforced plastic materials, including material properties and selection, design methodology and manufacturing processes. A number of design case studies are examined, and a design project is completed.

Elective

Prerequisites by Topic: MECHANICS OF MATERIALS; STRESS (STRAIN); FAILURE CRITERIA

Textbook (T) and References (R):

Course Learning Outcomes: The student will be able to:

1. Select materials
2. Select manufacturing process
3. Determine the physical and mechanical properties of a laminate
4. Design a laminate
5. Design structural joints
6. Design a composite structure

Topics Covered:

1. Introduction 1
2. Material Properties 4
3. Design Process 2
4. Joints 3
5. Bending Properties and Equations 3
6. Manufacturing Processes 3
7. Case Studies 23
8. Design Project 6

Total: 45 lectures

Class Schedule: Fall,

Contribution of Course to Meeting the Professional Component: Engineering Science: 1 credit or 33%. Engineering Design: 2 credits or 67%.
**Relationship of Course to Program Outcomes:**

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<th>Course Outcomes</th>
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<td>OCE 4xxx Composite Design</td>
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**Program Outcomes**

A. Ability to apply knowledge of mathematics, science and engineering
B. Ability to design and conduct experiments, as well as to analyze and interpret data
C. Ability to design a system, component or process to meet desired needs
D. Ability to function on multi-disciplinary teams
E. Ability to identify, formulate and solve engineering problems
F. Understanding of professional and ethical responsibility
G. Ability to communicate effectively
H. Broad education to understand the impact of engineering solutions in global and societal context
I. Recognition of the need for, and an ability to engage in life-long learning
J. Knowledge of contemporary issues
K. Ability to use the techniques, skills, and engineering tools necessary for engineering practice
L. Knowledge and skills to apply principles of probability and statistics
M. Knowledge and skills to apply the principles of oceanography, waves and acoustics to engineering problems
N. An ability to integrate multiple technical areas
O. An understanding of the necessity for design optimization

**Prepared By:** R. Reichard, Ph.D., Professor of Ocean Engineering, 2/2012
COMPOSITE DESIGN

Spring 2012 Room: U-111 WWF 11:00 to 11:50
Professor: Dr. Ronnal P. Reichard
Office: F.W. Olin Engineering Bldg, Rm 356B
Phone: 321-674-7349
Email: reichardr@fit.edu
Office Hours: M-F 10:00 to 11:00 and open door policy outside posted hours
Prerequisites: MAE 3075 MECHANICS OF MATERIALS


Course Description: COMPOSITE DESIGN. Introduces the design process for structures utilizing fiber reinforced plastic materials, including material properties and selection, design methodology and manufacturing processes. A number of design case studies are examined, and a design project is completed.

Grading: Homework 50%, Design Project 50%

Topics: 50 minute lectures
Introduction 1
Material Properties 4
Design Process 2
Joints 3
Bending Properties and Equations 3
Manufacturing Processes 3
Case Studies 23
Design Project 6
Total: 45 lectures
Schedule

9 January  Introduction, Materials (Chapters 1&2)
11 January  Ply Properties (Chapter 3)
13 January  Ply Properties (Chapter 3)
16 January  Holiday
18 January  Sandwich Structures (Chapter 4)
20 January  Sandwich Structures (Chapter 4)
23 January  Design Process, Safety Factors (Chapter 5)
25 January  Good and Bad Design Practices (Chapter 5)
27 January  Modulus of Elasticity of a Laminate (Chapter 5)
30 January  Joining and Assembly (Chapter 6)
1 February  Mechanical Fasteners (Chapter 6)
3 February  Adhesive Joints (Chapter 6)
6 February  Bending Properties (Chapter 18)
8 February  Sandwich Bending (Chapter 18)
10 February  Beam Formulas (Chapter 18)
13 February  Manufacturing Processes
15 February  Manufacturing Processes
17 February  Manufacturing Processes
20 February  Holiday
22 February  Case Study #1 – Composite Drive shaft
24 February  Case Study #1 – Composite Drive shaft
27 February  Case Study #2 – Filament Wound Pipe
29 February  Case Study #3 – Lamp Post
2 March  Case Study #4 – Thermal Stress
5-9 March  Spring Break
12 March  Final Design Project Assignment
14 March  Case Study #5 – 24 ft boat hull
16 March  Case Study #6 – Emergency Shelter
19 March  Final Design Project Discussion
21 March  Case Study #7 – Ship Hatch
23 March  Case Study #7 – Ship Hatch FEA
26 March  Final Design Project Discussion
28 March  Case Study #8 – Bridge Deck
30 March  Case Study #8 – Bridge Deck FEA
2 April  Final Design Project Discussion
4 April  Case Study #9 – Fifth Wheel RV Chassis & Floor
6 April  Case Study #9 – Fifth Wheel RV Chassis & Floor FEA
9 April  Final Design Project Discussion
11 April  Case Study #10 – Lunar Rover Road Grader Blade
13 April  Case Study #10 – Lunar Rover Road Grader Blade FEA
16 April  Final Design Project Discussion
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<tr>
<td>18 April</td>
<td>Final Design Project Discussion</td>
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<td>20 April</td>
<td>Critical Design Review</td>
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<tr>
<td>23 April</td>
<td>Critical Design Review</td>
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<td>25 April</td>
<td>Critical Design Review</td>
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<tr>
<td>27 April</td>
<td>Final Design Final Report Due</td>
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