Florida Institute of Technology

ADDING A NEW COURSE TO THE CURRICULUM

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

SUBJECT OCE (*Alpha Prefix (e.g., CSE)*) COURSE NO. 4572 (*Number Choice (e.g., 1301)*) CREDIT HOURS 3 TERM TO BE ADDED TO THE FILE Spring 2010 (*e.g., Fall 2006*)

CLASS HOURS 45 LECTURE HOURS _____ 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 Project*)

- ☐ COLLEGE OF AERONAUTICS–23
- ☐ COLLEGE OF BUSINESS–24
- ☒ COLLEGE OF ENGINEERING–01
- ☐ COLLEGE OF PSYCHOLOGY AND LIBERAL ARTS–25
- ☐ COLLEGE OF SCIENCE–26
- ☐ UNIVERSITY COLLEGE EXTENDED STUDIES–27

COMPUTER TITLE *Restricted to 25 characters, including spaces* Des of Mar Vehicles

CATALOG TITLE Structural Design of Marine Vehicles

CATALOG DESCRIPTION OF COURSE *Limited to 350 characters, including spaces*

Provides a working knowledge of ship hull girder, longitudinal bending in still water and waves, and simple bending theory as it applies to ship structure. Culminates in the design of a mid-ship section to classification society rules. Covers concepts that predict bending moment in irregular waves and analyzes local and transverse strength.

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

RESTRICTIONS

- ☒ Prerequisite OCE 4571 (*Course Number*)
- ☐ Corequisite _____ (*Course Number*)
- ☐ Prerequisite _____ (*Course Number*)
- ☐ Corequisite _____ (*Course Number*)
- ☐ Prerequisite _____ (*Course Number*)
- ☐ Corequisite _____ (*Course Number*)

GRADES TO BE ISSUED

- ☒ A, B, C, D, F
- ☐ A, B, C, D, F, CEU
- ☐ CEU
- ☐ S, U
- ☐ P, F
- ☐ Other _____

ADDITIONAL RESTRICTION _____ (*e.g., Major, Class Level, Department Head Approval*)

If this course replaces a course currently offered in BANNER, please indicate old course information

SUBJECT *Alpha Prefix (e.g., CSE)* _____ COURSE NO. *(e.g., 1301)* _____

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.

B. SAHOO 08/27/09
Originator *Date*

Chair, Graduate Council *Date*

S. Mal 8.27.2009
Department Head/Program Chair

OR

9-1-09
Dean or Associate Dean *Date*

Chair, Undergraduate Curriculum Committee *Date*

CATALOG DIRECTOR

These changes/additions have been made for the _____ University/Extended Studies Catalog and entered into the BANNER term named above.

Catalog Director *Date*

REGISTRAR'S USE ONLY

SCACRSE _____ SCADETL _____ SCAPREQ _____ SCABASE _____
SCARRES _____ Operator Init _____ Date _____

DISTRIBUTION:
Original—Registrar
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To: The Undergraduate Curriculum Committee
Florida Institute of Technology
College of Engineering

From: Dr. Prasanta K Sahoo (Instructor)

Via: Prof. G. Maul (Head of the Department, DMES)

Dated: March 31, 2009

4572

Subject: Addition of New Course; OCE 45XX "Structural Design of Marine Vehicles"

RATIONALE:

The instructor is presently engaged in teaching of the course "Design of High-Speed Small Craft". As a result of my interaction with the senior students, it was apparent that they had only basic understanding of Ship's Hull Girder which they have obtained from the course "Fundamentals of Naval Architecture I". While the basic knowledge was adequate, this however did not prepare them to undertake rigorous analysis and calculations in greater detail to assess the structural strength of large vessels. During several informal discussions with the students it was apparent that a course such as this would reinforce fundamental aspects they have already studied as well undertake exercises in determining bending moments an section modulus, design of mid-ship section as per class rules and hence evaluate the structural strength for various types of marine vessels including application of theories and principles for local strength calculations.

OCE 45XX STRUCTURAL DESIGN OF MARINE VEHICLES
SPRING 2010

2009-10 Catalog Data: OCE 45XX STRUCTURAL DESIGN OF MARINE VEHICLES (3 credits). Provides an understanding and working knowledge of ship hull girder, longitudinal bending moment in still water and waves, application of simple bending theory as applicable to ship's structures culminating in design of a mid-ship section as per classification society rules. Concepts to predict bending moment in irregular waves and local and transverse strength analysis.

Prerequisites by Topic: Fundamentals of Naval Architecture I, OCE 4571

Textbook (T) and References (R):

A comprehensive set of lecture notes will be provided by instructor.

(R) Visser, W., The Structural Design of Offshore Jackets, The Marine Technology Directorate Ltd, UK, 1993

(R) Muckle, W., Strength of Ship's Structures, Edward Aronald, London, 1967.

(R) Hughes, O., Ship Structural Design, SNAME pub.

(R) Rawson, K.J. and Tupper, E.C.,Basic Ship Theory, Vol. 2, 3rd edition, Longman, 1986.

(R) Principles of Naval Architecture, SNAME pub., New York, 1980.

(R) Mather, A., Offshore Engineering, An Introduction, Witherby & Co. Ltd, UK, 1995

Course Learning Outcomes: The student will be able to:

- Specify why structural strength determination is necessary.
- Describe the various parameters of calm water and dynamic forces influencing the structural strength.
- Calculate the load on a ship's girder from buoyancy and weight along the length of the vessel.
- Classify and examine detail strength checks of tubular structures.
- Categorize the influence of CG of various weights and LCB position on trim of the vessel and estimate the bending moment at any position along the length of the vessel.
- Formulate procedures required to determine the effect of bending moment and moment of inertia on the stresses at deck and keel at any section.

- Evaluate the effects of stresses at different angles of heel or if the section is composite.
- Appraise the phenomenon of shear stress on bending stress and deflection of hull girder and learn the procedure to determine the shear stress distribution for a ship type section.
- Recommend various methods to solve local strength problems.

E- (electronic) resources

Library: It is recommended that students will avail themselves of the relevant boks and journals and conference proceedings.

ANGEL: A set of lecture will be available to download from ANGEL. Also lecture slides may be available to download before the lecture takes place if students so desire.

Other

Equipment & materials
It is expected that at the minimum students should have an equivalent of CASIO-FX82 calculator, rulers and pencils.

Computer hardware & software

Unit-specific software
It may be necessary at some stage to make use of s/w available on the network in the CAD lab. Specifically any CAD package may be necessary to make structural drawings.

Tutorials
There is no time allocated separately for tutorials. Tutorials form part of lectures in this course.

Workshops/seminars
Information on workshops/seminars will be intimated to all students through appropriate channels during the course of the semester.

Online activities
None planned at this stage.

Field trips
Not envisaged at this stage.

Course schedule (Topics Covered and Associated Time) :

Week	Date Beginning	Topic	Readings/Resources	Further Information
1		Intro to Course and Handout on Assignments		None
2		Background Theory on Ship Structures	Chapter 1	
3		Weight and Buoyancy distribution	Chapter 1 contd.	Problems to solve

4		Analysis Procedure for weight and buoyancy distribution	Chapter 1 contd.	Problems to solve
5		Load, Shear and BM distribution In still water	Chapter 2	Problems to solve
6		Shear Force and BM due to waves	Chapter 2 contd.	Problems to solve
7		Changes to SF and BM due to change in loading	Chapter 2	Numerical problems
		CLASS TEST (MID TERM EXM)		**20%**
8		Calculation of section modulus	Chapter 3	
9		Effect of adding/removing material	Chapter 3	Numerical problems
10		Effect of Inclination on Stress	Chapter 4	Numerical problems
11		Bending and Shear deflection of hull girder	Chapter 5	Numerical problems
12		Deflection contd.	Chapter 5 contd.	Numerical problems
13		Local Strength calculations	Chapter 6	Numerical problems
14		Local Strength Contd.	Chapter 6 contd.	
14		Classification rules for Structural Design	Chapter 7	
15		**Assignment submission**	**Design of mid-ship section**	**30%**
15		**END TERM EXAM**		**40%**
		Home work		**20%**

Assessment Schedule:
The assessment for this course will comprise of mid-term and end-term exam, assignment and home work. The percentage of marks allocated is as shown in the table above. Home work will be given on a continuous basis.

Class/Laboratory Schedule: Spring 2010, Tuesday/Thursday,

Class	Day	Time	Locations
Lecture	Tuesdays	0930-1045	
	Thursdays	0930-1045	
Field Trip	None		

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

Relationship of Course to Program Outcomes:

Course Outcomes															
Course Number - Course Name															
OCE 45xx Structural Design of Marine Vehicles	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O

	X	X			X		X		X			X	X		X	X

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: P K Sahoo, Ph.D., Associate Professor of Ocean Engineering, 4/2009