1. Department, Course Number, Title

ORE 783 (Alpha) Capstone Design Project

2. Designation as a Required or Elective Course

Coastal Engineering Required Course (B)
Offshore Engineering Required Course (C)
Ocean Resources Engineering Required Course (D)

3. Course Catalog Description

Major design experience based on knowledge and skills acquired in earlier coursework incorporating realistic constraints that include economic, environmental, ethical, social, and liability considerations. Emphasis is placed on teamwork and consultant-client relationship. (B) coastal engineering; (C) offshore engineering; (D) ocean resources engineering. Repeatable one time.

4. Prerequisites

1. All students: hydrostatics, at-sea experience, oceanography, water wave mechanics, wave-structure interaction, and engineering economics.
2. Coastal engineering students: coastal and harbor structures, coastal processes, and sediment transport.
3. Offshore engineering students: structural analysis and dynamics of floating structures.
4. Ocean resources engineering students: OTEC system and marine mineral resources.

5. Textbooks and/or Other Reading Material

Textbook: None
Reference books: Applicable design manuals

6. ABET Course Learning Outcomes

The course familiarizes the students with the planning and design of a real-life engineering project in a consulting firm setting. Emphasis is placed on teamwork, risk management, decision making with insufficient information, consultant-client relation, ethics, and environmental and economic aspects of engineering design. Specific learning outcomes include:

1. Appreciation of professional and ethical responsibilities
2. Ability to work independently and function on multi-disciplinary teams
3. Ability to design and optimize ocean and resources engineering systems
4. Ability to use techniques, tools, and data necessary for ocean engineering practice
5. Ability to communicate effectively to technical and non-technical audiences

7. Topics Covered

The topic varies every semester and reflects the latest engineering projects in Hawaii. The course is team taught with practicing professional engineers including:

1. Warren Bucher, PhD, PE, Senior Engineer, Oceanit Laboratory Inc.
2. David Rezachek, PhD, PE, President, Rezachek and Associates, Inc.
3. Joe Van Ryzin, PhD, PE, President (former), Makai Ocean Engineering Inc.
4. Dayan Vithanage, PhD, PE, Vice President, Oceanit Laboratory Inc.

5. Healy Tibbitts Builders Inc., a major marine contractor in Hawaii, has been supporting the capstone design class by providing feedback to student designs and up-to-date cost and construction data.

The following is a list of capstone design projects performed by students since the last review:

1. Waikiki War Memorial Natatorium: Coastal Engineering Evaluation – Fall 2004 (Cheung/Bucher)
2. Preliminary Design of a Cooling Facility and Seawater Pipe System for the 20,000-ton (nominal) Downtown Honolulu Seawater Air Conditioning District Cooling System – Spring 2005 (Cheung/Rezachek)
3. Flood Insurance Rate Map (FIRM) Modernization Project – Spring 2006 (Cheung)
4. Mitigation of Erosion at Kahala Beach – Fall 2007 (Cheung/Bucher)
5. Evaluation and Design of the Kahului Harbor Improvements – Fall 2008 (Cheung/Vithanage)
6. Preliminary Design of a Cooling Station, Seawater Pipe System, and Chilled Water Distribution System for an Up to 20,000-ton Seawater Air Conditioning (SWAC) District Cooling System for Pearl Harbor/Hickam/Honolulu International Airport – Spring 2009 (Cheung/Rezachek/Van Ryzin)

8. Schedule

The course is conducted as a series of meetings and informal presentations and culminates in a major presentation analogous to a public hearing at a department seminar attended by the faculty, students, and visitors from the local engineering community.

9. Contribution of Course to Meeting the Requirements of Criterion 5

Assessment

Informal presentations and discussions at meetings, formal presentation in front of audience, progress reports, final report, and mutual evaluation among students.

Usage of Engineering Tools and Computers

Varies and depends on the project.

Contribution to Professional Component

Engineering Design: 3 credits

10. Relationship to Program Outcomes

Program Outcome 2: Basic science, mathematics, & engineering
Program Outcome 3: Ocean engineering core
Program Outcome 4: Ocean engineering specialization
Program Outcome 5: Use of latest tools in ocean engineering
Program Outcome 6: Problem formulation & solution
Program Outcome 7: Design & optimization in ocean engineering
Program Outcome 8: Independent & teamwork
Program Outcome 9: Professional issues
Program Outcome 10: Communication skills

11. Prepared by

K.F. Cheung, Spring 2009