1. Department, course number, title
ORE 603 Oceanography for Ocean Engineers

2. Designation
Core Course

3. Course Catalog Description
Physical, chemical, biological and geological ocean environments for ocean engineers. Introduction to ocean dynamical processes and general circulation. Ocean measurement techniques, theory of underwater acoustics. Sonar, swath bathymetry, and tomography applications. Pre: consent.

4. Prerequisites
Differential equations
Fluid mechanics

5. Textbooks
R.H. Stewart (2007), An introduction to physical oceanography.

Reference books

1. T. Garrison (2002), Oceanography: An Invitation to Marine Science, Brooks/Cole.
2. G.L. Pickard and W.J. Emery (1990), Descriptive Physical Oceanography: An Introduction, Butterworth- Heinemann.
3. S. Pond and G.L. Pickard (1993), Introductory Dynamical Oceanography, Butterworth-Heinemann.
4. R.J. Urich (1983), Principles of underwater sound, 3rd ed., Peninsula Publishing.

6. ABET Course Learning Outcomes

7. Topics Covered
1. Ocean Basins and Margins
2. Properties of Water / Sea Water Chemistry
3. Water, Salt and Heat Balance
4. Physical Laws and Equations of Motion
5. Effects of Rotation
6. Atmospheric Circulation
7. Ocean Circulation
8. Coastal Oceanography
9. Biological Oceanography
10. Instruments and Methods
11. Underwater Acoustics

8. Schedule
Two 1.25-hour sessions per week.

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

Assessment

Test 1	20%
Test 2	20%
Course Project	20%
Homework	40%

Contribution to Professional Component
Engineering Science: 3 credits

10. Relationship to Program Outcomes
Program Outcome 2: Basic science, mathematics, & engineering
Program Outcome 3: Ocean engineering core
Program Outcome 6: Problem formulation & solution
Program Outcome 10: Communication skills
Program Outcome 11: Research & contemporary issues

Student Learning Outcomes
Upon successful completion of ORE 603, students will be able to:
1. Identify, describe, and relate the physical processes and dynamics processes associated with surface and deep ocean circulation
2. Describe and relate sea-water chemistry, salinity, temperature, pressure, and density
3. Summarize the basic principles and implications of plate tectonics and marine sedimentation
4. Demonstrate a basic understanding of biological processes and production in the ocean
5. Explain the key elements associated with air-sea interaction
6. Balance oceanic water, heat, and salt budgets
7. Demonstrate a basic understanding of sound propagation in the ocean
8. Formulate and communicate (in writing and orally) a critical review of a research paper

11. Prepared by
E.-M. Nosal, Fall 2008

Course Objectives
To provide the ocean engineering student with an understanding of the ocean environment. The course will provide an overview of the physical, chemical, biological and geological processes that determine the state of the ocean and its dynamics. Topics of discussion will include description of the world's oceans and dynamic processes, introduction to analytical description, circulation and ocean measurement techniques. Theory of underwater acoustics will be examined along with sonar, swath bathymetry and tomography applications.