CE 630 / OC 630 - Ocean Eng. Wave Mechanics
3 Credits

Fall 2011

Time:	MW 10:00 – 11:20a
Location:	KEARNEY 205
Instructor:	David Hill, Associate Professor
Office:	207 Graf Hall, 737-4939, david.hill@oregonstate.edu
Office Hours:	MW 1:30 – 3:00p or by appointment.
Text (required):	Water Wave Mechanics for Engineers and Scientists, Dean, R.G. and R.A. Dalrymple, World Scientific, Singapore, 353 pp., 1991. The Wave Casey, Susan, Doubleday, 352 pages, 2010
Text (recommended):	CRC Standard Mathematical Tables and Formulae, 30th Edition
Web Resources:	http://www.coastal.udel.edu/coastal/coastal.html (The Coastal Eng. Page) http://www.coastal.udel.edu/faculty/rad/ (Dalrymple's Java Applets)

Description:

Waves represent one class of motion that is created when a dynamical system is perturbed from its equilibrium state. Once perturbed, one or more restoring forces generally seek to return the system to its equilibrium state. In the case of water waves, the equilibrium state is a flat surface and the perturbation can originate from the action of wind blowing across the water surface, a seismic disturbance, or a boat propagating along the surface, among other sources. Restoring forces include gravitational acceleration and surface tension, or interfacial tension in the case of interfacial waves.

With regards to coastal processes, water waves are of enormous significance. Storm waves attack coasts, leading to erosion and to infrastructure damage. Tides, which are very long waves, create significant currents and can induce oscillations in semi-enclosed basins such as harbors and ports. Recently, there has been growing interest in the feasibility of extracting energy from waves, as they represent a clean, renewable energy source.

This course is intended to cover the fundamental boundary value problem governing the hydrodynamics of water waves. Attention will be paid to the basic characteristics and propagation of waves at the water's surface. Processes related to the propagation of waves into coastal environments (shoaling, refraction, diffraction, breaking, etc.) will be studied in detail.

Some of the basic aspects of wave nonlinearity will also be considered. Assessment of student performance will include regular homework assignments and exams, plus in-class discussion of book reading assignments.

Grades:

Homework	50%
Mid-term Exam	20%
Final	20%
Book Reading Assignments	10%

Learning Objectives:
At the end of this course, students should be able to:

1. Demonstrate a basic understanding of the hydromechanic principles underlying the Linear Wave Boundary Value Problem (for example, by applying the Euler Equations to a fluid flow problem).
2. Identify the appropriate boundary conditions for use in the Linear Wave Boundary Value Problem for specific applications (*e.g.* flat impermeable bottom, or an oscillating wave paddle).
3. Demonstrate the ability to calculate wave-induced water particle velocities, accelerations, displacements, and/or pressure using linear wave theory.
4. Synthesize theory governing the transformation of linear waves in variable water depth in order to calculate the effects of shoaling, refraction, and diffraction.
5. Create a MATLAB algorithm that will predict basic wave transformation based on the wave energy balance and the linear wave dispersion relation. Evaluate this algorithm for accuracy.
6. Critically evaluate popular media writing on coastal and wave processes.

Academic Integrity:
Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas: cheating- use or attempted use of unauthorized materials, information or study aids; fabrication- falsification or invention of any information; assisting- helping another commit an act of academic dishonesty; tampering- altering or interfering with evaluation instruments and documents; plagiarism- representing the words or ideas of another person as one's own. For more information about the University's policies and procedures in this area see the Student Conduct web site at: http://oregonstate.edu/admin/stucon/achon.htm . The CCE Honor Code and Code of Conduct may be found at:
http://cce.oregonstate.edu/students/undergrad/honorcode.html

Special Assistance:
Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD; Kerr Admin. Building). Students with accommodations approved through SSD are responsible for contacting the faculty member in charge of the course prior to or

during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098.