

CE 499: Basic Coastal Engineering

Instructor

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Topics

Mechanics of wave motion; wave refraction, diffraction and reflection; wave forecasting; predicting waves from extreme events such as tsunamis and tropical cyclones; shore processes; planning of coastal engineering projects; beach nourishment; design of seawalls, breakwaters, and revetments; dredging; coastal sustainability

Objectives

- 1) Learn fundamentals of wave mechanics
- 2) To become familiar with the use of statistical and probability analysis for wave forecasting
- 3) Understand the processes of coastal wave transformation, and the effects of these transformations on the nearshore environment
- 4) To become experienced in the methods of hard and soft coastal protection design
- 5) Develop an understanding of the long-term thinking required of coastal design, including environmental and sustainability issues.

Textbook

Basic Coastal Engineering by Robert Sorensen, 2006

Other references

Coastal Engineering Manual, maintained by the Coastal & Hydraulics Laboratory and the Waterways Experiment Station, 2002.

Shore Protection Manual, published by Waterways Experiment Station, 1984

Prerequisites

CE 309 – Fluid Mechanics, or equivalent

Grading

Exam 1 (15%), Exam 2 (15%), Homework (15%), Design Project (25%), Final Exam (30%)

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Week 1:

Introduction to coastal engineering; Practical problems. Water wave theory (Reading: Sorensen Ch 1-2; CEM II-1-2) [HW#1]

Week 2:

Wave transformation (Sorensen Ch. 4; CEM II-3-3, CEM II-7-2) [HW#2]

Week 3:

Wave transformation (con't). Wave Analysis & statistics (Sorensen Ch 6, CEM II-1-3) [HW#3]

Week 4:

Wave Analysis (con't) Long-term wave analysis & statistics (CEM II-8) Tides (Sorensen, Ch. 5; CEM II-5)

Week 5:

Tides (con't). Exam Review. **Exam 1.**

Week 6:

Intro to Sediment Transport. (Sorensen Ch. 8) Cross Shore Transport. (Sorensen Ch. 8; CEM 3)

Week 7:

Longshore Transport. (Sorensen Ch. 8; CEM 3). Sediment Budgets. [HW#4]

Week 8:

Coastal Planning (CEM V Ch1-3); Design of Coastal Structures; Caissons. Design Projects Given.

Week 9:

Design of Rubble Mound Breakwaters; (Sorensen Ch. 7). [HW#5]

Week 10:

Introduction to Inlets. Inlet Hydraulics, Engineering Aspects of Inlets. (CEM II-6)

Week 11:

Inlets (con't). Exam Review. **Exam 2.**

Week 12:

Dredging. Coastal Pipelines (Sorensen Ch. 7)

Week 13:

Harbor Resonance. Overtopping & Coastal Flooding.

Week 14: Coastal zone management;

Environmental/Sustainability issues. Team work on design projects

Week 15: Design Project Presentations

Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

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