

# **ORE 664 Nearshore Processes and Sediment Transport**

Spring Semester, 2003  
Instructor: Geno Pawlak

## **Class Schedule:**

MW 4:30-5:45pm  
Room 241 Holmes Hall

## **Course Description:**

Sediment transport by waves and currents in coastal areas and its effect on morphological processes. Effect of man-made structures on littoral drift and shoreline.

## **Goals:**

The aim of the course is to provide engineers working in the coastal environment with the understanding of wave and sediment processes and their effects on the morphology of beaches and coastlines. We will explore the dynamics of the nearshore environment in detail, including consideration of wave boundary layer processes and sediment particle dynamics and examine how these can be considered using engineering models.

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## **Primary References:**

*Beach Processes and Sedimentation*, P.D. Komar, 2nd Edition, Prentice-Hall, Inc. 1998.

*Coastal Bottom Boundary Layers and Sediment Transport*, Advanced Series on Ocean Engineering, Vol. 4, P. Nielsen, World Scientific, 1992.

*Coastal Engineering Manual*, Army Corps of Engineers, 2002; online at [bigfoot.wes.army.mil/cem001.html](http://bigfoot.wes.army.mil/cem001.html)

## **Additional References:**

*Water Wave Mechanics for Engineers and Scientists*, Advanced Series on Ocean Engineering, Vol. 2, R.G. Dean and R.A. Dalrymple, World Scientific, 1992.

*Waves, Tides and Shallow-water Processes*, The Open University & Pergamon Press, 1989.

*Coastal Processes with Engineering Applications*, R.G. Dean and R.A. Dalrymple, Cambridge University Press, 2001.

*Sea Bed Mechanics*, J.F.A. Sleath, John Wiley & Sons, 1984.

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## **Tentative Outline:**

### **I. The Nearshore Environment:**

Coastal Morphology: Hawaiian coastal geology, sea level changes

Fluid Dynamics and Wave Theory Review

Nearshore Currents: rip currents, longshore currents, shear instabilities

Boundary Layer Dynamics: laminar and turbulent steady and oscillatory boundary layers, wave-current boundary layer interactions

### **II. Particle Dynamics and Sediment Transport**

Sediment Dynamics: motion initiation, bedforms dynamics, bedload transport, particle dynamics

Cross-shore Transport: equilibrium beach profiles, bar formation

Longshore Transport: processes, response to coastal structures

Sediment Transport Models

Nearshore Morphodynamics

### **III. Laboratory Projects**

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#### **Grading:**

Class Participation:	10%
Final Exam:	30%
Homework Projects	30%
Lab Project	30%