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Falk Feddersen: Class Nearshore Physical Oceanography (SIO 219, Winter 2014)

Nearshore Physical Oceanography

SIO 219 Section 792572
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Meetings Tuesday/Thursday 1:00pm-2:20pm, Center for Coastal Studies Basement Conference Room

Course Requirements Completing of all the assigned homework and a final exam. The final grade will be based 2/3 on problem sets and 1/3 on final exam. Students should enroll in four (4) units as either letter or S/U.

Description This new course, *Nearshore Physical Oceanography*, will cover the basic physics of the nearshore region spanning the surfzone to the inner-shelf. Topics covered will include monochromatic and random waves, wave shoaling, and breaking across the surfzone, wave driven flows in the surfzone and inner-shelf, undertow, and infragravity waves. Additional topics are also possible.

Syllabus

- Week 1A: Review of linear surface gravity waves
- Week 1B: Flux-conservation equations, wave energy, energy flux, and mass flux
- Week 2A: Wave momentum flux: Radiation Stresses
- Week 2B: Wave induced setdown and setup
- Week 3A: Random waves 1.
- Week 3B: Random waves 2. Directionally spread
- Week 4A: Cross-shore wave transformation - shoaling
- Week 4B: Cross-shore wave transformation - wave breaking
- Week 5A: Shallow water equations for nearshore processes
- Week 5B: Edge Waves
- Week 6A: Bottom stress in the nearshore
- Week 6B: Cross-shore Momentum Balances: revisit wave setdown and setup
- Week 7A: Alongshore Currents 1. Surfzone
- Week 7B: Alongshore currents 2. Inner-shelf
- Week 8A: Stokes-Coriolis Force
- Week 8B: Undertow - surfzone to inner-shelf
- Week 9A: Wave boundary layers and steady streaming
- Week 9B: Current boundary layers
- Week 10A: Nonlinear wave shoaling 1.
- Week 10B: Nonlinear wave shoaling 2.

Lecture notes, and homeworks will be posted here.

- Lecture 1 + HW
- Lecture 2 + HW

Resources There are some books that have relevant material in them. These include

- Kundu, Chapter on Gravity Waves
- Mei, CC, The Applied Dynamics of Surface Gravity Waves
- Svendsen, IA, Nearshore Hydrodynamics
- Dean and Dalrymple, Water Wave Mechanics for Scientists and Engineers

If you have any questions or comments, please contact me at falk@coast.ucsd.edu.
