

OCNG 410-501 — INTRODUCTION TO PHYSICAL OCEANOGRAPHY  
TUESDAYS AND THURSDAYS — 11:10 - 12:25  
O&M BUILDING, ROOM 206

**Instructor:** Professor Robert Hetland  
**Office:** O&M Building Room 618d  
**Phone:** 458-0096  
**E-mail:** hetland@tamu.edu  
**Office hours:** MWF from 1:00 to 2:00 pm, or by appointment

## **Description:**

This course is a survey of basic physical oceanography. We will discuss ocean relevant topics like the composition of seawater and global climate change. In this particular section, there will be an emphasis on oceanographic processes in the coastal ocean.

## **Course Outline:**

### *Introduction:*

**Week 1:** History of oceanography, why we study the ocean

### *Physical setting:*

**Week 2:** The geography of the sea floor, ocean basins and coastal landforms, the composition of seawater

### *Budgets:*

**Week 3:** Heat budgets, kinds of heat fluxes, the greenhouse effect

**Week 4:** Water budgets, the hydrological cycle, why is the ocean salty?

**Week 5:** Momentum budgets, wind stresses, global wind patterns, winds in the coastal ocean

## **QUIZ 1**

### *Kinematics:*

**Week 6:** Continuity, Incompressibility, Eulerian vs. Lagrangian views of flow

### *Dynamics:*

**Week 7:** The Navier-Stokes equations of motion, rotating coordinates, forces in fluids

**Week 8:** The bousinesque approximation, the hydrostatic approximation

### *Turbulence:*

**Week 9:** The closure problem, statistical views of turbulence

### *Waves:*

**Week 10:** Basic properties of waves, wavenumber, frequency, dispersion relations

### *Large-scale circulation:*

**Week 11:** Ekman dynamics, rotational frictional boundary layers, wind-driven flow

**Week 12:** The Stommel model of the Gulf Stream, thermohaline circulation, Rossby waves

## **QUIZ 2**

### ***Tides:***

**Week 13:** Celestial forces on the ocean, Diurnal and semi-diurnal tides

### ***Coastal processes:***

**Week 14:** Shelf scale coastal processes, waves on the shelf, buoyancy driven flow

**Week 15:** Surface waves, breaking waves and surf zone dynamics

### ***Numerical modeling:***

**Week 16:** Numerical approximations to the dynamical equations, commonly used models

## **Grading:**

Homework will be assigned for each of the broad topics discussed, and will account for 25% of your final grade. There will be two tests (each 20% of your grade) and a final exam (25% of your grade). Participation in class discussions is important, and worth 10% of your grade. I am willing to make accommodations for late assignments or missed tests if arrangements are made *before* the due date.

## **Text:**

I will use a textbook by Prof. Robert Stewart. One copy will be available in the Working Collection in O&M Room 1103. A printed, bound version of the text will be for sale at cost of reproduction through Kinko's at 509 University, College Station. Cost is approximately \$25. This book is also available electronically at [http://oceanworld.tamu.edu/ocean410/ocng410\\_text\\_book.html](http://oceanworld.tamu.edu/ocean410/ocng410_text_book.html).

## **ADA statement:**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room 126 of the Koldus Building. The phone number is 845-1637.