

# **Physics 3300**

## **Introduction to Physical Oceanography**

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**Physics 3300 Introduction to Physical Oceanography** deals with the physics of the processes in the ocean, providing an integrating view of the whole field of oceanography. The importance of physical processes to other aspects of oceanography is treated.

Our goal in this course is to learn about some of the key features of how the ocean works. Why do the large scale currents work as they do? Why is the ocean stratified? How long does it take water to move around in the ocean? How are the ocean and atmosphere coupled? What role does the ocean play in regulating the earth's climate?

### **Activity:**

Assignments (4)	15%
Term Paper	15%
Test	20%
Final Examination	50 %

### **Course outline:**

- 1) Introduction, historical remarks, scaling the problem
- 2) Properties of seawater
  - Salinity, what is it and how to measure it
  - TS diagrams and the mixing of water
  - Equation of state, density, stability
- 3) Oceanic heat budget

- Fluxes and processes
  - Geographic distributions
- 4) Equations of motion
    - Dominant forces and coordinate system
    - Derivatives and momentum equation
    - Conservation equations
    - Fundamental solutions
  - 5) Motion with viscosity
    - Turbulence
    - Reynolds stresses
    - Mixing and stability
  - 6) Winds in the ocean
    - Inertial motion
    - Ekman dynamics
  - 7) Geostrophic currents
    - Balance of forces
    - Calculation of geostrophic forces
    - Current measurements
  - 8) Wind Driven Ocean Circulation
    - Sverdrup, Munk and Stommel
    - Western Boundary Currents
  - 9) Climate dynamics
    - Long time scales in the ocean
    - Linking across time scales
  - 10) What don't we know? What's next?

## **Texts :**

Robert H. Stewart, Introduction to Physical Oceanography, Robert H. Stewart – available either in the bookstore bound or on the web (see [oceanworld.tamu.edu/home/course\\_book.htm](http://oceanworld.tamu.edu/home/course_book.htm))

The course web page will offer assignments, solutions and special readings for the course.

**Schedule** – Note that we can adjust this schedule if we all agree to do so but this will give you an idea of how things should go.

Assignments will be set out roughly every two weeks and due ten to twelve days later:

**Assignment 1** – Out 12 January  
Due 21 January

**Assignment 2**– Out 26 February  
Due 9 February

**Assignment 3** – Out 9 March  
Due 18 March

**MidTerm Test – 2 March 2010**

**Assignment 4** – Out 11 March  
Due 25 March

**Term Project** – 6 April 2010 (last class)