Physics 3300
Intermediate 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. How does water move about the ocean and how long does it take? Why is the ocean stratified? How are the ocean and atmosphere coupled? What role does the ocean play in regulating the earth’s climate? Is the ocean climate changing?

Activity:

Assignments (4) 25%
Term Paper 15%
Test 20%
Final Examination 40% (with no supplementary exam)

Course outline:

1) Introduction, scaling the problem, some examples

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) Wind 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/resources/ocng_textbook/PDF_files/book.pdf)

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

Schedule –

Assignments will be set out roughly every two weeks and due ten to twelve days later:
Assignment 1 – Out 12 January
Due 25 January

Assignment 2 – Out 23 February
Due 9 February

Assignment 3 – Out 16 February
Due 7 March

MidTerm Test – 16 February 2017

Assignment 4 – Out 9 March
Due 21 March

Term Project – 4 April 2017 (last class)

General information from the University
It is the student’s responsibility to acquaint themselves with these items. Please read.

Student Code of Conduct.
http://www.mun.ca/student/conduct/

Exemptions From Final Examinations
http://www.mun.ca/regoff/calendar/sectionNo=REGS-0628

Academic Misconduct
http://www.mun.ca/regoff/calendar/sectionNo=REGS-0748

Accommodations for Students with Disabilities
http://www.mun.ca/blundon/accommodations/