AS205 Aug. 2:1

Ocean Dynamics

Instructor

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Department: Centre for Atmospheric and Oceanic Sciences

Course Time: Tue, Thu 11:30AM to 1:00PM Tue 2:3:30PM

Lecture venue: CAOS Seminar Hall

Detailed Course Page:

Announcements

Brief description of the course

This course is meant for first year M.Tech. and Ph.D. students. The course provides an introduction of ocean dynamics. Basic features of the large scale ocean circulation will be taught in the course. Then the dynamics that govern the observed features will be taught. The laboratory session will train the students to calculate and analyse the features of ocean dynamics and thermodynamics based on modern data sets using softwares commonly employed in research.

Prerequisites

B.Tech in Mechanical. Civil, Aero or similar branches. M.Sc. in Oceanography, Meteorology, Physics or Maths.

Syllabus

Introduction to physical oceanography, properties of sea water and their distribution, mixed layer, barrier layer, thermocline, stratification and stability, heat budget and air-sea interaction, ocean general circulation, thermohaline circulation, basic concepts and equations of motion, scale analysis, geostrophic currents, wind-driven ocean circulation, Ekman layer in the ocean, Sverdrup flow, vorticity in the ocean, waves in the

ocean, surface gravity waves, Rossby and Kelvin waves.

Course outcomes

An understanding of the basic properties of oceans, their distribution and annual cycle.

Processes controlling the evolution of sea surface temperature, mixed layer dynamics, thermocline structure.

Understatding of the basin-wide circulation of the Atlantic and Pacific Oceans.

Monsoon driven circulation of the Indian Ocean.

Basic equations, approximations, scale analysis and simple analytical solutions of the equations governing ocean circulation.

Classical theories of ocean circulation their simplicity and short-comings.

Grading policy

10% for lab. assignments. 10% for problem solving assignments. 30% for internal exams and 50% for final examination.

Assignments

Two assignment based on laboratory exercises.

Two assignments based on problem solving, based on theory classes.

Resources

Stewart, R.H., Introduction to Physical Oceanography, http://oceanworld.tamu.edu (online book)
Talley, L.D. Pickard, G.L., Emery, W.J., Descriptive Physical Oceanography, 6th Edn, Elsevier , 2011.
Gill, A.E., Atmosphere-Ocean Dynamics, Academic Press, 1982.
Cushman-Roisin, B., Introduction to Geophysical Fluid Dynamics, Prentice Hall, 1994.