

# Atmospheric and Oceanic Sciences

## Preface

AS 216 ( AUG ) 3 : 0

### Introduction to climate system

Equations of motion for the atmosphere and oceans, observed mean state of the atmosphere and oceans, exchange of momentum, energy and water between the atmosphere and surface, angular momentum cycle, global water cycle, radiation, energetics, entropy in climate system, climate variability, The global carbon cycle, Climate System Feedbacks

**Govindasamy Bala**

**Pre-requisites :** None

**References :** J. Peixoto and A.H. Oort, Physics of Climate,, American Institute of Physics

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### Environmental Fluid Dynamics

An overview of the field of fluid mechanics and description of the physics governing fluid flow. Principles of buoyancy-driven flow: Free-surface flows, gravity currents, stratified flows, gravity waves. Heat transfer and fluid instability: Convection, turbulence, and mixing. The course has four major components: (i) Waves in fluids: interfacial waves and internal gravity waves. (ii) Vertical flows: turbulent plumes, filling box, double-diffusive convection. (iii) Horizontal flows: shallow water approximation, single-layer hydraulics, gravity currents, two-layer flows, and (iv) Turbulent mixing: mixing across very stable interfaces and turbulent convection. The course consists of Lectures, tutorials, and simple laboratory experiments.

**Bishakhdatta Gayen**

**Pre-requisites :** None

**References :** Fluid Mechanics 3rd Edition: Authors: Ira Cohen and Pijush Kundu: Academic Press, Published Date: 2004~Buoyancy Driven Flow: Authors: J. S. Turner: Cambridge University Press, Published Date: 1979~Waves in the Ocean and Atmosphere: Introduction to Wave Dynamics: Authors: J. Pedlosky, Springer Verlag, Published Date: 2003