

**NPTEL : Introduction to Atmospheric Science (Atmospheric Science)**

**Co-ordinators : Prof. C. Balaji**

Lecture 1 - Introduction

Lecture 2 - Atmosphere-A brief survey (Pressure, Temperature and Chemical composition)

Lecture 3 - Atmosphere-A brief survey (Continued...) (Vertical structure of the atmosphere)

Lecture 4 - Vertical structure of atmosphere (Continued...) and The Earth system - Oceans

Lecture 5 - The Earth system - Oceans (Continued...) and Marine biosphere

Lecture 6 - The Earth system - Hydrological cycle

Lecture 7 - The Earth system - Hydrological cycle (Continued...) and Carbon cycle

Lecture 8 - The Earth system - Carbon cycle (Continued...), and Carbon in the oceans Earth's crust

Lecture 9 - The Earth system - Carbon in the oceans Earth's crust

Lecture 10 - Atmospheric Thermodynamics- Introduction

Lecture 11 - The hydrostatic equation

Lecture 12 - Hypsometric equation and pressure at sea level

Lecture 13 - Basic Thermodynamics

Lecture 14 - Concept of air parcel and dry adiabatic lapse rate

Lecture 15 - Potential temperature

Lecture 16 - Skew-T In-P chart

Lecture 17 - Problems using Skew-T In-P chart

Lecture 18 - Problems using Skew-T In-P chart (Continued...)

Lecture 19 - Problems using Skew-T In-P chart (Continued...)

Lecture 20 - Lifting Condensation Level (LCL)

Lecture 21 - Lifting Condensation Level (LCL) (Continued...)

Lecture 22 - Saturated Adiabatic and Pseudo-adiabatic processes

Lecture 23 - Equivalent potential temperature and wet bulb potential temperature

Lecture 24 - Föhn's rule - Chinook winds

Lecture 25 - Problems on Chinook wind and static stability

Lecture 26 - Static stability-Brunt-Väisälä frequency

Lecture 27 - Conditional and convective instability

Lecture 28 - Static stability - Problems using radiosonde data and skew T In P chart

Lecture 29 - The second law of thermodynamics – Clausius Clapeyron relation

Lecture 30 - Clausius Clapeyron relation (Continued...)

Lecture 31 - Atmospheric radiation – Radiation laws

[Lecture 32 - Planck's distribution and Inverse square law](#)

[Lecture 33 - Physics of scattering, emission and absorption](#)

[Lecture 34 - Physics of scattering, emission and absorption \(Continued...\)](#)

[Lecture 35 - Radiative Transfer Equation " Derivation](#)

[Lecture 36 - Radiative Transfer Equation \(Continued...\)](#)

[Lecture 37 - Radiative heating profiles of the atmosphere](#)

[Lecture 38 - Climate Dynamics " Introduction](#)

[Lecture 39 - Climate sensitivity and feedback](#)

[Lecture 40 - Climate change](#)

[Lecture 41 - Atmospheric dynamics](#)

Lecture 1 - Introduction

Lecture 2 - Blackbody radiation

Lecture 3 - Properties of real surfaces

Lecture 4 - Spectral and directional variations

Lecture 5 - Shape factor

Lecture 6 - Triangular enclosure

Lecture 7 - Evaluation of shape factors

Lecture 8 - Radiation in enclosures

Lecture 9 - Electrical analogy

Lecture 10 - Applications

Lecture 11 - Non-gray enclosures

Lecture 12 - Enclosure with Specular surfaces

Lecture 13 - Integral method for enclosures

Lecture 14 - Introduction to gas radiation

Lecture 15 - Plane parallel model

Lecture 16 - Diffusion approximation

Lecture 17 - Radiative equilibrium

Lecture 18 - Optically thick limit

Lecture 19 - Radiation spectroscopy

Lecture 20 - Isothermal gas emissivity

Lecture 21 - Band models

Lecture 22 - Total Emissivity method

Lecture 23 - Isothermal gas enclosures

Lecture 24 - Well-stirred furnace model

Lecture 25 - Gas radiation in complex enclosures

Lecture 26 - Interaction between radiation and other modes of heat transfer

Lecture 27 - Radiation heat transfer during flow over flat plate

Lecture 28 - Radiation and Climate

Lecture 29 - Radiative-convective equilibrium

Lecture 30 - Radiative equilibrium with scattering

Lecture 31 - Radiation measurement

[Lecture 32 - Radiation with internal heat source](#)

[Lecture 33 - Particle scattering](#)

[Lecture 34 - Scattering in the atmosphere](#)

[Lecture 35 - Non-isotropic scattering](#)

[Lecture 36 - Approximate methods in scattering : 1](#)

[Lecture 37 - Approximate methods in scattering : 2](#)

[Lecture 38 - Monte Carlo method](#)

**NPTEL : The monsoon and its variability (Atmospheric Science)**

**Co-ordinators : Prof. Sulochana Gadgil**

Lecture 1 - Preamble and Introduction to the Indian Monsoon

Lecture 2 - Nature of the variability of the Indian Monsoon

Lecture 3 - Monsoon variability through the eye in the sky, seasonal variation of the surface wind and pressure

Lecture 4 - Background about the atmosphere and rotating systems

Lecture 5 - Rainfall and clouds over the tropics

Lecture 6 - Organization of clouds over mesoscale, synoptic scale and planetary scales

Lecture 7 - The Indian monsoon: is it a gigantic land-sea breeze?

Lecture 8 - Monsoons and the seasonal variation of tropical circulation and rainfall

Lecture 9 - Evolution of the ideas about the basic system responsible for the Indian monsoon - Part 1

Lecture 10 - Evolution of the ideas about the basic system responsible for the Indian monsoon - Part 2

Lecture 11 - Tropical Convergence Zones and the Indian monsoon - Part 1

Lecture 12 - Tropical Convergence Zones and the Indian monsoon - Part 2

Lecture 13 - Variability of organized convection over the tropical oceans

Lecture 14 - Heat lows and the TCZ

Lecture 15 - Monsoonal regions of the world

Lecture 16 - Seasonal transitions - Part 1 : spring to summer transition

Lecture 17 - Seasonal transitions - Part 2 : spring to summer transition

Lecture 18 - Seasonal transitions - Part 3 : Advance and retreat of the summer monsoon

Lecture 19 - Climatic clusters of the Indian region

Lecture 20 - Active-weak spells and breaks in the monsoon - Part 1

Lecture 21 - Active-weak spells and breaks in the monsoon - Part 2

Lecture 22 - Intraseasonal variation and intraseasonal oscillations

Lecture 23 - The tropical oceans

Lecture 24 - El Nino Southern Oscillation (ENSO) - Part 1

Lecture 25 - El Nino Southern Oscillation (ENSO) - Part 2

Lecture 26 - El Nino Southern Oscillation (ENSO) - Part 3

Lecture 27 - El Nino Southern Oscillation (ENSO) - Part 4

Lecture 28 - El Nino Southern Oscillation (ENSO) - Part 5

Lecture 29 - El Nino Southern Oscillation (ENSO) - Part 6

Lecture 30 - Indian Ocean and the monsoon - Part 1

Lecture 31 - Indian Ocean and the monsoon - Part 2

[Lecture 32 - Indian Ocean Dipole - Part 1](#)

[Lecture 33 - Indian Ocean Dipole - Part 2](#)

[Lecture 34 - Interannual variation of the Indian summer Monsoon rainfall: Links to events over the Pacific and Equatorial Indian Ocean](#)

[Lecture 35 - Monsoon Variability and Agriculture - Part 1](#)

[Lecture 36 - Monsoon Variability and Agriculture - Part 2](#)

[Lecture 37 - Monsoon Variability and Agriculture - Part 3](#)

[Lecture 38 - Monsoon Variability and Agriculture - Part 4](#)

[Lecture 39 - Indian Summer Monsoon, GDP and Agriculture](#)

[Lecture 40 - Monsoon Prediction - Part 1](#)

[Lecture 41 - Monsoon Prediction - Part 2](#)

[Lecture 42 - Concluding Remarks](#)