

VALUE ADDED COURSES BY Dr. Binita Pathak

COURSE NAME: Aerosol Physics

Course Objectives:

The objectives of the course are to make students understand

- (i) the basics of aerosols
- (ii) physics and dynamics of aerosols
- (iii) how aerosols perturb surface-reaching solar radiation
- (iv) the aerosol contribution in climate change and human wellbeing

Student outcome:

By opting this course, the students are expected to be able to

- Understand the existence and formation of aerosols in the atmosphere
- Know the measurement techniques of aerosols in the atmosphere
- Differentiate between molecular and particle scattering
- Understand the aerosol participation in different atmospheric processes
- Explain the role of aerosols on cloud formation

Unit I

Basics of aerosols: definition, production sources, formation mechanisms, optical properties: AOD, SSA, Phase function, physical properties: Refractive index, Stokes diameter, size distribution, aerosol types, chemical composition, Dynamical properties: Stokes law, Dry deposition velocities, aerosol impacts: health, economy, hydrology, aerosol instrumentation: ground and space-based

Unit II

Aerosol and Radiation: Scattering, absorption, emission, extinction by aerosols, Rayleigh and Mie scattering, Beer's law, Radiation dynamics, Radiation transfer in a planetary atmosphere, General equation of radiation transfer, Concept of radiative forcing, Radiative heating

Suggested Readings

1. The Atmosphere: An Introduction to Meteorology -Frederick K. Lutgens and Edward J. Tarbuck
2. Atmospheric Chemistry and Physics: From Air Pollution to Climate Change - John H. Seinfeld and Spyros N. Pandis
3. An Introduction to Atmospheric Physics by David G. Andrews
4. An Introduction to Atmospheric Radiation, K N Liou, Academic Press
5. Stratosphere-Troposphere Interaction - K Mohankumar, Springer
6. The Atmosphere: An Introduction to Meteorology, F K Lutgens and E J Tarbuck, Prentice

Hall

