

# **BACHELORS WITH ENVIRONMENTAL SCIENCE AS MAJOR (CT-2)**

## **6<sup>th</sup> SEMESTER**

**EVS622J2 ENVIRONMENTAL SCIENCE\_ ATMOSPHERIC SCIENCE**

**CREDITS: (THEORY-4, PRACTICAL -2)**

**COURSE LEARNING OUTCOMES:** *Atmospheric Science is the study of the Earth's atmosphere, its composition, structure, and dynamics. This course provides an introduction to the fundamental concepts and principles in atmospheric science, including meteorology and climatology.*

### **THEORY (4 CREDITS: 60 HOURS)**

#### **UNIT I: METEOROLOGY**

Meteorological parameters: Atmospheric pressure, temperature, precipitation, humidity; Wind, atmospheric stability; Radiation and heat budget:

#### **UNIT II: CLIMATOLOGY**

Fundamentals of climatology; Classification of climate: Koppen's; Monsoon and climatic zones of India  
Western disturbances and climate of J&K; Paleo-climatology and climate change

#### **UNIT III: ATMOSPHERE COMPOSITION AND CIRCULATION**

Composition and structure of atmosphere; Atmospheric aerosols: Types, sources and atmospheric effects; Atmospheric-sea interactions; Atmospheric general circulation; Climate variability and forcing: Madden Julian oscillations (MJO), El-nino and southern oscillations (ENSO), Indian Ocean dipole (IOD)

#### **UNIT IV: ATMOSPHERIC DATA ANALYSIS**

Weather analysis and forecasting techniques; Dry and wet atmospheric deposition; LIDARS, SODARS, weather RADARS; Remote-sensing techniques (WP-RASS); Self-recording instruments, radiosondes, radiometer sondes, ozone sonde; Satellite meteorology: visible and infrared radiometer and multi scanner radiometer

### **PRACTICALS: (2 CREDITS) (60 HOURS)**

1. Visit local weather stations for demonstration of meteorological parameters
2. Measure temperature, humidity, and pressure at different altitudes.
3. Understand cloud formation and classification by using cloud charts
4. Set up rain gauges to measure precipitation.
5. Survey of local area for collection of activity data for air pollution studies
6. Survey of local area for emission inventory for air pollution studies
7. Study of weather maps/satellite imagery for identification of different atmospheric features
8. Measurements of wet and dry depositions

### **SUGGESTED READINGS:**

1. The Asian Summer Monsoon: Characteristics, Variability, Teleconnections and Projection, Yunyun Liu, Ping Liang, Ying Sun .2019. Elsevier.
2. Mid latitude synoptic Meteorology: Dynamics, Analysis and forecasting. American Meteorology Society, Lackmann Gary .2011.
3. Tropical Meteorology: An Introduction, T. N. Krishnamurti, Lydia Stefanova, and Vasubandhu Misra .2013. Springer Science & Business Media.
4. Basic Physical Chemistry for the Atmospheric Sciences, Peter V. Hobbs .2000. Cambridge University Press.
5. Measurement Methods in Atmospheric Sciences: In Situ and Remote, S. Emeis .2010. Gebr. Borntraeger Science Publishers.
6. Monsoon Meteorology, C.P. Chang T.N Krishnamurti .1987. Oxford University Press Inc.
7. Atmospheric Science, An Introductory Survey, John M. Wallace, Peter V. Hobbs .2006. Second Edition. Elsevier/Academic Press.
8. Satellite Meteorology: An Introduction, Stanley Q. Kidder and Thomas H. Vonder Haar .1995. Elsevier.