Goa University

GU-PET Syllabus

Atmospheric Science

1. **Fundamentals:**Structure and Composition of the Atmosphere, Trace gases, greenhouse gases, aerosols, Electromagnetic spectrum relevant to atmospheric processes, Absorption, scattering, emission, Radiative transfer principles, Earth's radiation budget & climate feedbacks.
2. **Physical and Dynamical Meteorology:**Thermodynamics of the Atmosphere, Cloud Physics and Precipitation, Equations of Motion, Boundary Layer Meteorology, General Circulation and Monsoon Systems, Hadley, Ferrel, Polar cells, ENSO, IOD, Madden-Julian Oscillation, and Indian Summer Monsoon dynamics and variability.
3. **Synoptic and Mesoscale Meteorology:**Fronts, cyclones, anticyclones, Tropical cyclones and storm surge, Jet streams, and low-level jets. Land-sea breeze, mountain-valley winds, thunderstorms, and Squall lines, microbursts.
4. **Satellite and Remote Sensing Applications:**Principles of passive and active remote sensing in meteorology, Satellite sensors for atmospheric observations, and Retrieval of temperature, humidity, winds, clouds, and precipitation.
5. **Numerical Weather Prediction (NWP) & Climate Modelling:**Governing equations and parameterisations, Data assimilation techniques, Model resolution, ensemble forecasting, and regional climate models and downscaling.
6. **Atmospheric Chemistry and Air Quality:**Sources and sinks of atmospheric trace species, Photochemistry, ozone chemistry, smog formation, Aerosols: properties, sources, climate impacts, and Air quality indices and dispersion models.
7. **Data Analysis in Atmospheric Science:**Observational methods (ground-based, radiosonde, lidar, radar), Time series analysis, spectral analysis, and Uncertainty quantification.