



MANGALORE UNIVERSITY

Department of Marine Geology

MSc MARINE GEOLOGY

MGS 454: **METEOROLOGY AND CLIMATOLOGY**

Course Outcome:

CO1: Able to understand the elements of meteorology and their significance.

CO2: Understand precipitation and its types, temperature, atmospheric pressure, winds and humidity. Earth's radiation balance and human interference: relationships between the Earth and the Sun.

CO3: Able to learn weather monitoring, meteorological hazards and weather modification: Thunder storms, dust storms, cloud burst, cyclones and related processes, floods, drought and famine.

CO4: Understand the general weather systems of India.

Meteorology

Unit 1	Elements of meteorology and their significance. Precipitation and its types, temperature, atmospheric pressure, winds and humidity. Earth's radiation balance and human interference: relationships between the Earth and the Sun. Latitudinal, altitudinal and seasonal variations in the temperature including lapse rate. Atmospheric boundary layer and turbulence. Coupled ocean-atmosphere system, El Nino Southern Oscillation (ENSO).	6 hrs
Unit 2	Descriptive meteorology: Winds- geostrophic, and distribution of global winds, regional and local winds, land-sea breezes. Atmospheric pressure and air masses of the globe. Introduction to the global monsoons, jet streams, tropical cyclones and other related phenomena. Monsoon meteorology. Rainfall, measurements and its distribution over the globe with special emphasis on India. Onset and withdrawal of monsoons. General weather systems of India.	6 hrs
Unit 3	Weather monitoring, meteorological hazards and weather modification: Thunder storms, dust storms, cloud burst, cyclones and related processes, floods, drought and famine, and pollution/hazards from aircrafts and space crafts. General weather systems of India, - cyclone and jet stream, Western disturbances and severe local convective systems, distribution of precipitation over India. Western disturbances and severe local convective systems. Utilities of satellites in meteorology.	8 hrs

Climatology

Unit 4	Principles of climatology: Differences between meteorology and climatology. Intergovernmental Panel on Climate Change. Causes of climate variation: tectonic (changes in the redistributions of continents and oceans), orbital (changes in the solar output) and sub-orbital parameters, including human factors (Changes in the concentration of Greenhouse Gases in the atmosphere).	6 hrs
Unit 5	Climate system and feedbacks. Classification of continental and oceanic climates: Greeks, Koppen's and Thornthwaite's schemes of classification. Climate and climatic zones of India. Principles of General Circulation and Climate Modelling.	6 hrs
Unit 6	Paleoclimatology: Principles of paleoclimate. Sources, records and proxies for paleoclimate. Records for paleoclimate – instrumental / meteorological data and archives: continental and oceanic sediments, speleothems, loess, ice cores, corals, tree rings, desert varnish. Proxies for paleoclimate - stable and radiogenic isotopes, trace elements, pollen, clay minerals, and microfossils. Short-term and long terms variations in the climate. Climate change and, short-term and long-term climate cycles.	8 hrs

List of References:

1. Physical Geology - C. W. Montgomery-Wm. C. Brown Publishing Co. Ltd.
2. Physical Geology – Judson Sheldon (1987).
3. Ecology, Environment & Pollution - A. Balasubramaian (1995) M/s. Indira Publishers, Mysore.
4. A Course in Elementary Meteorology – Meteorological Office Publications.
5. Atmosphere, Weather and Climate: An introduction to Meteorology-Narora - B. Saunders Co., Philadelphia.
6. Meteorology - William L. Donn (1975) - McGraw-Hill Book Co., New York.
7. An introduction to Dynamic Meteorology - J. R. Holton (1992) - III Ed, Academic Press.
8. Climate Processes and Change Cambridge Univ. Press – E. Bryant (1997).
9. Intergovernmental Panel for Climate Change reports 2007, 2013 (available in the internet).