Course Type	Course Code	Name of Course	L	T	P	Credit
ESO	ESE 201	Atmospheric Science and Climate Change	3	0	0	9

Course Objective
The objective of the course is to develop understanding of atmospheric science including quantifying climate sensitivity to changes in greenhouse gases and interrelation between the various components of the climate system.
Learning Outcomes
Upon successful completion of this course, students will be able to: • The students will be able to know the basics of atmospheric science and climate change. • They will develop a broader awareness of current methods and areas of research in climatology. • They will also assess current and future climatic risks.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Course overview; Structure and Composition of the Atmosphere, Components of the climate system.	3	To introduce components of climate system
2	Global energy balance and Radiative transfer in the atmosphere, global climate models, Climate sensitivity to changes in greenhouse gases and feedback mechanisms between the components.	10	To learn radiative budget applicable to Earths surface solar system
3	Global temperature distributions, greenhouse effect, influences on temperature, daily and seasonal variations, Heat index.	6	To understand the impact of GHG on temperature distribution
4	Concept of pressure, ideal gas law, pressure gradient, hydrostatic equilibrium, wind forces: Coriolis force, Cloud formation (lifting mechanism, stability, lapse rates), cloud types, growth of cloud droplets, forms of precipitation, measuring precipitation., environmental lapse rate, adiabatic processes and stability.	11	To understand atmospheric stability and cloud physics
5	Atmospheric circulation; single cell model, three-cell model, semi-permanent pressure cells, polar fronts & jet streams, troughs, ridges and wind systems, air-sea interactions.	6	To learn global circulation and wind pattern
6	Strategies for reducing emissions: The Kyoto Protocol, reports of IPCC, the Clean Air Act and the EPA.	6	Policies and acts to reduce GHG emission

Reference Books:

- Introduction to Atmospheric Chemistry, by Daniel J. Jacob, Princeton University Press, (2004)
- First principles of meteorology and air pollution by Mihalis Lazaridis (2010). Springer.
- Goosse H., P.Y. Barriat, W. Lefebvre, M.F. Loutre, and V. Zunz (2010). Introduction to climate dynamics and climate modelling.