

Semester	AUG 2023
Open to semester	3
Course code	EC2113
Course title	Introduction to Climate Science
Credits	3 /
Course Coordinator & participating faculty (if any)	Neena Joseph Mani
Nature of Course	Lectures and Tutorials
Pre-requisites	None
Objectives (goals, type of students for whom useful, outcome etc)	The course provides an overview of the Earth's Climate system and the various forcing and feedbacks controlling the climate variability in short and long timescales. It will also give a brief introduction to the atmosphere and ocean circulations.
Course contents (details of topics /sections with no. of lectures for each)	<p>Concept of earth system, Solar Flux at Earth's Orbit, Planetary Energy balance, daily and seasonal variability, Faint Young Sun Paradox, Daisy world model, climate forcing, responses, feedback loops, equilibrium states.</p> <p>Earth's Climate variability on short and long time scales, An overview of climate archives, Tectonic scale climate change.</p> <p>Formation and evolution of Earth's atmosphere, composition, CO₂ and long term climate variability, Role of Oceans, Orbital variations, Milankovitch cycles, Pleistocene glaciations.</p> <p>Thermal and dynamical structure of Earth's atmosphere, Interaction of radiation with atmospheric gases, Greenhouse effect, Energy budget, Role of clouds.</p> <p>Mean distribution of air temperature, pressure and wind patterns, Centrifugal and Coriolis force, Geostrophic wind, Three cell structure of atmospheric circulation, seasonal changes, monsoons.</p> <p>Temperature, salinity and density variation in the oceans, wind driven circulation, surface currents, Ekman transport, subtropical gyres, upwelling, downwelling, Coupled Ocean atmosphere processes, El Nino Southern Oscillation, Thermohaline circulation, deep water masses.</p> <p>Historical and Future climate change, Overview of weather prediction and climate modelling.</p>

Evaluation /assessment	<p>End-Sem Examination-40%</p> <p>Mid-Sem Examination-30%</p> <p>Others-30 - Quiz /Assignment%</p>
Suggested readings (with full list of authors, publisher, year, edn etc.)	<p>1. The Earth System, 3rd Edition (2009), by LR. Kump, JF. Kasting and RG. Crane, Pearson.</p> <p>2. Earth's Climate: Past and Future, 2nd Edition (2008) by William F. Ruddiman, W.H. Freeman.</p> <p>3. Atmospheric Science: An Introductory Survey, 2nd Edition (2006), by JM. Wallace and PV. Hobbs, Academic Press.</p>