

AS-210: NUMERICAL METHODS IN ATMOSPHERIC MODELLING

CREDITS: 3:0

INSTRUCTORS: Dr. Ashwin Seshadri and Prof. Ravi Nanjundiah

PREREQUISITE: AS-207: Introduction to Atmospheric Dynamics

SYLLABUS:

Equations used in atmosphere and climate modelling and their scale analysis; numerical discretization (horizontal, vertical, time-discretization) of governing equations (e.g., mass, momentum, energy conservation); solution of discretized equations; finite difference and finite volume schemes; overview of Semi-Lagrangian techniques; various spectral techniques and Galerkin projection; numerical solutions of example problems; modelling of sub-grid scale processes (e.g., cumulus parameterization); special topics (e.g., emerging techniques/architectures, analysis of data driven/hybrid approaches).

REFERENCES:

P H Lauritzen et al., Numerical Techniques for Global Atmospheric Models, Springer, 2011

A Chandrasekar, Numerical Methods for Atmospheric and Oceanic Sciences, Cambridge University Press, 2022

E Kalnay, Atmospheric Modeling, Data Assimilation and Predictability, Cambridge University Press, 2003

T T Warner, Numerical Weather and Climate Prediction, Cambridge University Press, 2011