

## Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

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### CE6034-GIAN 171003C06: Weather Radar and Hydrology

**Credit Distribution:** C:6 L:2 T:0 P:0 E:0 O:4 TH:0

**Course Type:** Theory

**Description:**

1. Provide theoretical framework and practical knowledge of radar precipitation estimation.
2. Processing of radar data to arrive at accurate estimates of rainfall.
3. Advanced radar sensing principles and applications.
4. Hands-on application of hydrologic models, Radar rainfall inputs, parameters, state variables, calibration procedures, and outputs.

**Course Content:** Lectures: Measurement of rainfall; Weather radar principles: Basics; Principles of Radar Quantitative Precipitation Estimation (QPE): Radar calibration and Precipitation rate estimation; Principles of Radar Quantitative Precipitation Estimation (QPE): Rain Gauge adjustment; Space-Time Aggregation; Hydrologic Modelling using HEC-HMS; Calibration and validation; Geographic Information System; Polarimetric Radar QPE; Quality metrics for radar precipitation estimation; Bias adjustment; Dual-Frequency / Dual-polarization Precipitation Radar Laboratory Projection, Datum and Coordinate system using Open source GIS(QGIS); Hydrologic Modelling using HEC-HMS; Radar QPE Quality metrics and adjustment; Radar QPE for modelling using HEC-HMS; In-class Project.

**Text Books:**-NIL

**Reference Books:**

1. Bringi, V., and Chandrasekar, V. 2001. Polarimetric Doppler Weather Radar: Principles and Applications. Cambridge: Cambridge University Press. doi:10.1017/CBO9780511541094
2. Yang Hong and Jonathan J. Gourley . 2014. Radar Hydrology: Principles, Models, and Applications. CRC Press Taylor & Francis Group.
3. Michaelides, S., 2008: Precipitation: Advances in Measurement, Estimation and Prediction. Springer-Verlag, 540 pp.
4. Testik, Y. F., Gebremichael, M. 2010. Rainfall: State of the Science, American Geophysical Union as part of the Geophysical Monograph Series, Volume 191.

**Prerequisites:**-Nil