

**ACADEMIC AFFAIRS OFFICE
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

No. Acd./1572 /IAPC-111

Dated: September 29 , 2021

Head, Department of Hydrology

The IAPC in its 111th meeting held on 22.09.2021 vide Item No. 111.2.3 considered and approved the proposal of Department of Hydrology regarding revision in course i.e., HYN-538: Hydrological Data Collection, Processing and Analysis with minor modifications.

The modified syllabus is attached as **Appendix-A**.


Assistant Registrar (Curriculum)

Encl: as above

Copy to (through e mail):-

1. All faculty
2. Head of all Departments / Centres
3. Dean, Academic Affairs
4. Associate Dean of Academic Affairs (Curriculum)
5. Channel i/ Acad portal/ Academic webpage of iitr.ac.in

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT/CENTRE: Department of Hydrology

1. **Subject Code:** HYN-538 **Course Title:** Hydrological Data Collection, Processing and Analysis
2. **Contact Hours:** **L:** 3 **T:** 1 **P:** 2/2
3. **Examination Duration (Hrs.):** **Theory:** 3 **Practical:** 0
4. **Relative Weightage:** **CWS:** 15-30 **PRS:** 20 **MTE:** 15-25 **ETE:** 30-40 **PRE:** 0
5. **Credits:** 4 **6. Semester:** Autumn **7. Subject Area:** PEC
8. **Pre-requisite:** Nil
9. **Objective:** The objective is to present the details of various methods for hydro-meteorological data collection, processing and analysis.

10. Details of the Course

S.No.	Contents	Contact hours
1.	Introduction: Types of hydro-meteorological data and their importance, time oriented, space oriented and relational data.	3
2.	Precipitation and Meteorological Parameters: Ground-based observations of rain and snow; Measurement of rainfall interception, throughfall, and stemflow; Radar measurements of rainfall; Measurements of temperature, solar radiation, humidity, evaporation, and evapotranspiration; Satellite-derived products of rainfall, evapotranspiration and other meteorological parameters.	8
3.	Soil moisture: Soil moisture measurements; Soil moisture sensors, capacitance probe, time domain reflectometry, heat pulse sensors, etc.; Satellite-derived soil moisture products; Validation of satellite products.	5
4.	Streamflow and sediment: Overview of traditional methods of streamflow measurements; Non-contact streamflow measurement; Satellite-based estimation of water level; Sediment transport measurement: suspended sediment and bed load; Sediment transport measurements in rivers and lakes; Tracer techniques.	8
5.	Groundwater: Groundwater monitoring systems; Water level measurements; Tracer methods; Application of GRACE satellite data for groundwater studies.	4
6.	Design of hydrometeorological network: Design and optimization of monitoring systems for rainfall, evaporation, groundwater monitoring station, gauge and discharge gauge networks.	3
7.	Data processing and analysis: Hydrological Information System; Data storage and retrieval; Completeness, consistency and homogeneity of data; Estimation of missing data in rainfall, runoff and other parameters; Record extension for rainfall and runoff data; Extracting data from netCDF and HDF file formats.	8
8.	Indian and international practices: Storage, transmission and retrieval of data; different formats adopted by IMD, CWC and WMO; India WRIS; Bhuvan.	3
Total		42

List of Practicals:

- i. Observation of rainfall, temperature, and evaporation.
- ii. Observation of groundwater levels in observatory.
- iii. Observation of gauge and discharge in lab/field.
- iv. Demonstration of hydrological processes using Total Hydrologic Station/Rainfall Simulator.
- v. Measurement of infiltration rates.
- vi. Processing of satellite-derived datasets (TIFF and netCDF formats).

11. Suggested Books:

S.No.	Name of Authors/Book/Publisher	Year of Publication/ Reprint
1.	Schultz G.A. and Engman E.T., “Remote Sensing in Hydrology and Water Management”, 1 st Edition, Springer.	2000
2.	WMO, “Guide to Hydrological Practices, Volume I: Hydrology – From Measurement to Hydrological Information”, World Meteorological Organization (WMO).	2008
3.	WMO, “Guide to Hydrological Practices, Volume II: Management of Water Resources and Applications of Hydrological Practices”, World Meteorological Organization (WMO)	2008
4.	Chow V. T., Maidment D. R. and Mays L. W., “Applied Hydrology”, reprint, McGraw Hill Ltd.	2010
5.	Viessman W. and Lewis G. L., “Introduction to Hydrology”, 5 th Edition, Pearson Education.	2015
6.	CWC, “Handbook for Hydrometeorological Observations”, Central Water Commission, New Delhi	2017
7.	Subramanya K., “Engineering Hydrology”, 5 th Edition, McGraw Hill Ltd.	2020