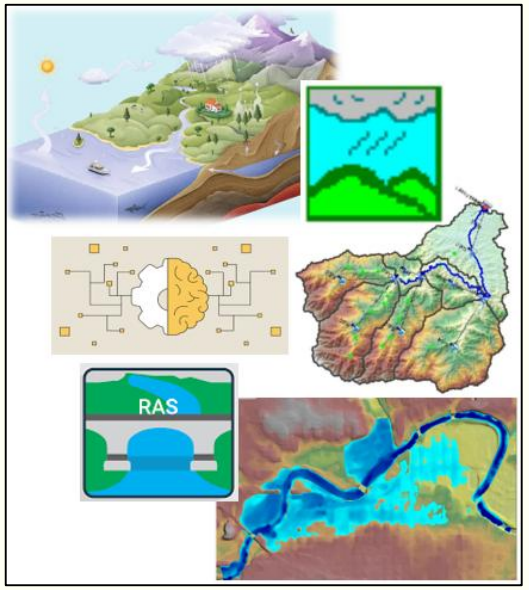
TRAINING COURSE
ON

HYDROLOGICAL MODELING: HEC-HMS, HEC-RAS AND MACHINE LEARNING
(HyMHECMaL 2026)

February 16 - 20, 2026



Organized by

NATIONAL INSTITUTE OF HYDROLOGY

ROORKEE - 247667

BACKGROUND

Water is a vital natural resource for sustaining life and is expected to become an increasingly scarce asset in the coming decades due to population growth and the combined impacts of anthropogenic drivers and climate change. Consequently, the judicious and sustainable management of water resources is essential.

Hydrological modelling is required for accurate assessment of catchment response, which is fundamental for the planning, development, operation, and management of water resources. Modelling approaches have been widely applied for more than five decades to represent a wide range of hydrological processes. The evolution of hydrological models has paralleled advancements in computational capability. While event based hydrological models originated in the 1930s and could be executed only through manual calculations, continuous rainfall - runoff simulation models emerged in the 1960s when computational resources became adequate to represent land-phase processes using simplified conceptual formulations. Subsequent advancements in computational power during the 1970s and 1980s facilitated the development of physically based hydrological models that solve coupled partial differential equations to represent overland, channel, subsurface flow and transport processes, along with evaporation from land and water surfaces. At present, process based data driven models form integrated modelling framework that supports advanced water resources assessments across diverse scales.

Hydrological modelling tools such as HEC-HMS, HEC-RAS, and contemporary machine-learning techniques play a pivotal role in quantifying and managing complex hydrological systems. HEC-HMS (Hydrologic Engineering Center - Hydrologic Modeling System) is extensively used for simulating rainfall - runoff processes in dendritic catchments, making it indispensable in flood forecasting, water availability assessment, and climate change impact studies. HEC-RAS (Hydrologic Engineering Center - River Analysis System) provides computational capabilities for one and two dimensional hydraulic simulations through natural and constructed channels, floodplain mapping, dam break analysis, and sediment transport studies. Complementing hydrological and hydraulic modelling, machine learning techniques offer data driven capabilities for analysing and modelling hydrological datasets.

Extensive hands-on tutorials will guide participants through the complete workflow of data preprocessing, preparation, and visualization, enabling them to handle and analyse real hydrological datasets with confidence. Participants will further engage in model development using supervised machine-learning techniques, supported by rigorous evaluation and assessment methods to interpret, compare, and optimize model performance. Overall, the module emphasizes comprehensive application oriented learning for hydrological assessments and decision supports, ensured through structured tutorials, guided hands on exercises, and applied case studies.

COURSE CONTENT

The specialized training course on “Hydrological Modeling: HEC-HMS, HEC-RAS and Machine Learning” will comprise lectures delivered by scientists and professors with extensive experience in hydrology, hydraulics, and data driven modelling. Lectures will be supplemented with comprehensive hands-on sessions, constituting nearly fifty percent of the total training duration. The course material will be useful not only for participants, but will also serve as a reference for practicing hydrologists, engineers, and researchers. A strong two-way interactive framework is proposed throughout the course to ensure effective exchange of field experiences, technical challenges, and modelling approaches. The following topics will be covered:

- Water Resources Management Challenges
- Basics of Hydrological Modeling
- Hydro-meteorological Data: Requirements, Sources, and Downloading Techniques
- HEC-HMS: Overview and Applications, Data Preparation, Model Setup and Configuration
- Hands-on Exercises: Simulation, Optimization, and Result Analysis
- HEC-RAS: Overview and Applications, Data Preparation, Boundary Condition Setup, Model Setup for 1D and 2D Simulations
- Hands-on Exercises: 1D and 2D Analysis
- Machine Learning Concepts, Applications, and Tutorials

DURATION AND VENUE

The training course will be conducted in physical mode at National Institute of Hydrology, Roorkee, during February 16 - 20, 2026.

PARTICIPATION

The course is intended for engineers, scientists, and officers working in water resources, irrigation, and other related departments of Central/State Government, as well as those engaged in academic institutions. Postgraduate students and research scholars are encouraged to attend the course. Representatives of NGOs and other civil society organizations may also participate. Participants are expected to have a keen interest in the hydro-meteorological data analysis and its application in the hydrological processes modelling.

ABOUT NATIONAL INSTITUTE OF HYDROLOGY (NIH)



NIH is a premier Research and Development organization under the Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti, Government of India. It was established in the year 1978 with its headquarter at Roorkee, Uttarakhand. The main objectives of NIH are to undertake, aid, promote and coordinate systematic and scientific work in all aspects of hydrology and water resources management. NIH is an ISO 9001:2008 certified organization. It has 7 Regional centers across India located at Bhopal, Belagavi, Guwahati, Jammu, Jodhpur, Kakinada and Patna. The institute has well equipped laboratories like Remote Sensing Lab, Nuclear Hydrology Lab, and Water Quality Laboratories with state of the art equipment. For more details, kindly visit www.nihroorkee.gov.in

REGISTRATION

The registration fee per participant is as follows:

NGOs and PSUs = ₹12,000/-
Government Employee = ₹11,000/-
PG Students/Research Scholar = ₹9,000/-

The fee includes a registration kit, working lunch, session teas, field visit, and certificate.

It is intended to register only a limited number of participants (25) for this training program on a first come, first served basis after the registration fees have been paid. The participants will have to arrange TA/DA or any other expenditure from their parent organization/institute. The participants must carry laptops for hands-on sessions. The Guest House facility of NIH Roorkee can be availed on a payment basis at nominal charges. The interested participants are required to fill in the registration form online latest by 15th January 2026 (along with registration fee). An Institute/University identity card should be uploaded while submitting the application. If needed, the intending participants may contact the course coordinators for further information.

FEE PAYMENT DETAILS

Account Name: NIH PROJECT
Account No: 4044 0001 0017 4852
Bank: PUNJAB NATIONAL BANK (PNB)
Branch: IIT ROORKEE
IFSC code: PUNB0404400
MICR Code: 247024103

Register Here

Registration Link and QR
https://forms.gle/JvuhFnwNFme7Jhem9

PATRON

Dr. Y.R.S. Rao
Director
National Institute of Hydrology
Roorkee - 247 667 (Uttarakhand)
Phone: (+91 1332) 272106
Fax: (+91 1332) 272123
Email: director.nihr@gov.in

CONVENER

Dr. A.R. Senthil Kumar
Scientist G & Head
Water Resources Systems Division
National Institute of Hydrology
Roorkee - 247667 (Uttarakhand)
Ph.: (+91 1332) 249223
Email: arsk.nihr@gov.in

COURSE COORDINATOR(S)

Dr. Ajay Ahirwar
Scientist C
Water Resources Systems Division
National Institute of Hydrology
Roorkee - 247667 (Uttarakhand)
Ph.: (+91 1332) 249404, +91 9300549512
Email: ajayahirwar.nihr@gov.in
ajayahirwar2006@gmail.com

Dr. Richa Pandey
Scientist B
Water Resources Systems Division
National Institute of Hydrology
Roorkee - 247667 (Uttarakhand)
Ph.: (+91 1332) 249247
Email: richapandey.nihr@gov.in
richapandey018@gmail.com

All correspondence related to the course should be made with the course coordinator(s).