



Department of Hydrology

A Unique School for Hydrological Education in India (Indian Institute of Technology Roorkee)



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Professor & Head

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www.doh.org.in; www.iitr.ac.in/departments/HY/pages/index.html

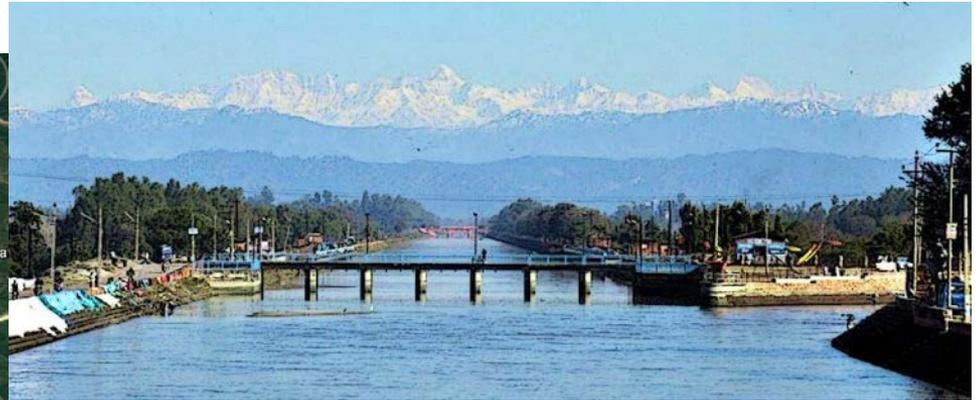
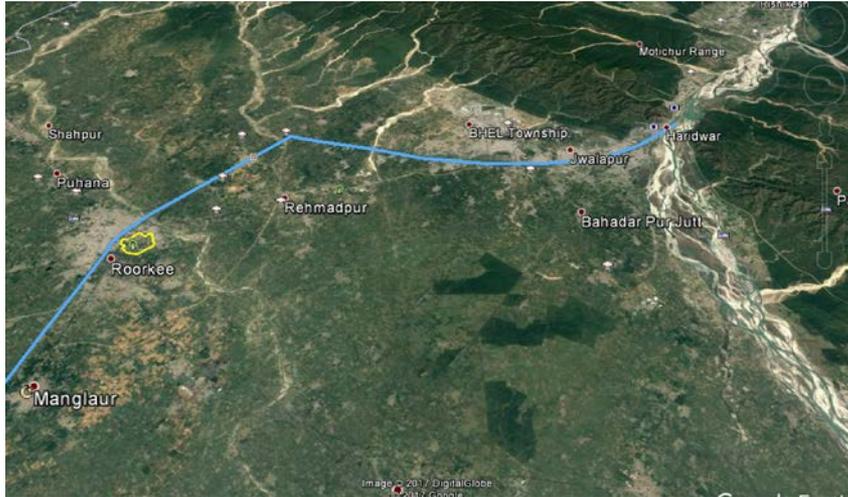
Location

- 180 km North of New Delhi
- Roorkee is the last City in plain before the Himalayas
- Three campuses
 - Roorkee campus (146 ha)
 - Saharanpur campus (10 ha)
 - Greater Noida extension center (4 ha)



...a journey to IIT Roorkee

...an institute that started its journey for the development of water resources

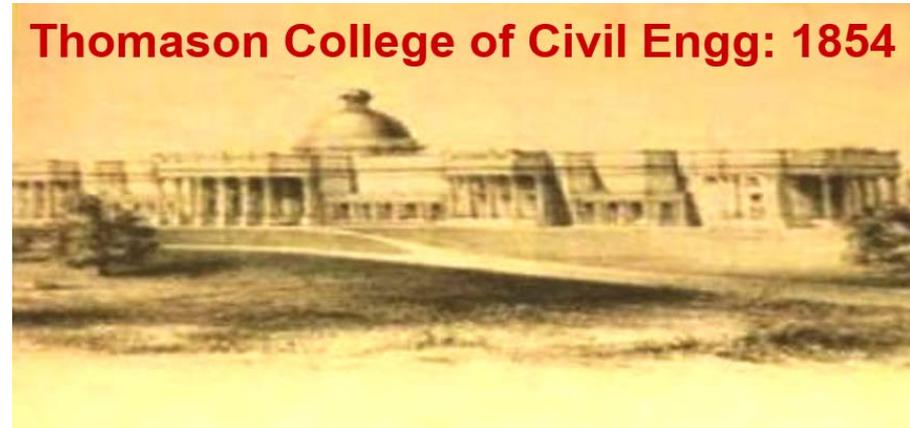
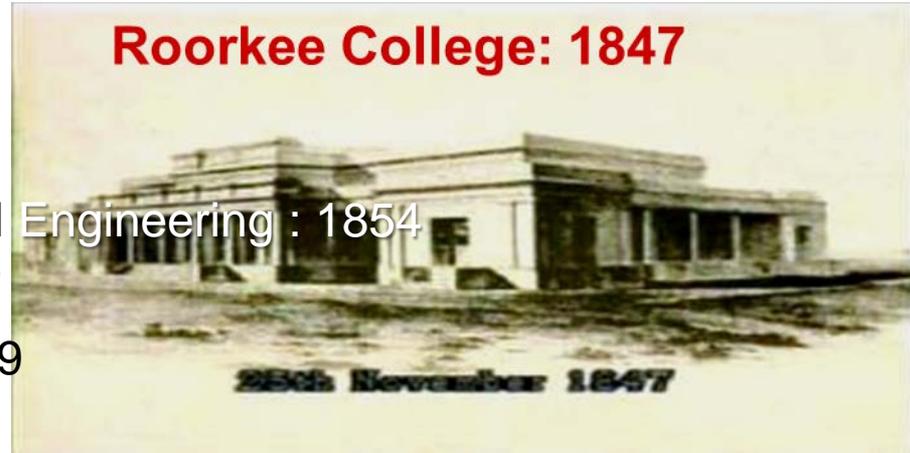


- 500 km long Canal
 - (The longest at that time)
- 10 years time
- First railway track in India was laid



...a journey to IIT Roorkee

- **First Technical Institution**
 - In India,
 - In Asia,
 - Among the Commonwealth Countries
 - Second Engineering Institute in world
- Established as Roorkee College : 1847
- Re-named as Thomason College of Civil Engineering : 1854
- Thomason College of Engineering: 1947
- Converted to University of Roorkee: 1949
 - Became first technical university of India
- Converted to IIT Roorkee : 2001



Academic Departments/Centres

- Architecture & Planning
- Bio-technology
- Chemical Engineering
- Chemistry
- Civil Engineering
- Earth Sciences
- Earthquake Engineering
- Electrical Engineering
- Electronics & Communication Engineering
- Computer Science and Engineering
- Humanities & Social Sciences
- Hydrology
- Management Studies
- Mathematics
- Mechanical & Industrial Engineering
- Metallurgical & Materials Engineering
- Pulp and Paper Technology
- Polymer and Process Engineering
- Applied Sciences and Engineering
- Physics
- Water Resources Development and Management
- Alternate Hydro Energy Centre
- Centre of Excellence for Disaster Mitigation & Management
- Centre of Excellence for Transportation Systems
- Centre of Excellence for Nano Technology
- Institute Instrumentation Centre
- Institute Computer Centre
- Information Superhighway Centre
- Continuing Education Centre
- Educational Technology Cell



...some facts

Only at IIT Roorkee

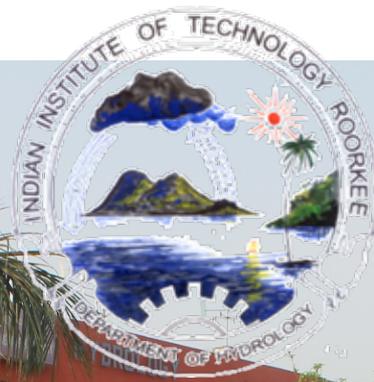
- Undergraduate program in
 - Pulp and Paper
- Postgraduate programs in
 - **Earthquake Engineering**
 - **Hydrology**
 - Welding Engineering
 - **Alternate Hydro Energy Centre**
 - **Water Resources Development & Management**
 - Pulp and Paper
 - Industrial Safety & Hazard Management
 - **Conservation of Rivers and Lakes**

Students Strength	Total
B.Tech / B. Arch./IDD	4295
Integrated M.Tech and M. Tech	1820
Ph.D	1646
TOTAL	7761

Faculty Strength 465

- Highest Density of Water Experts in India
- Largest strength of International students in the country
- So far 4000+ engineers have been trained from 50 countries in the field of Hydrology and Water Resources





~ VISION ~

To be the fountainhead of new ideas and innovations in hydrology

~ MISSION ~

Capacity building through education and training, and conducting pioneering research to seek scientific and engineering solutions in the field of hydrology

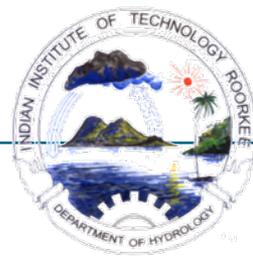


About the Department of Hydrology

- In 1972, the **Department of Hydrology** (formerly known as **School of Hydrology**) marked its beginning with the inception of the International Post-Graduate Course in Hydrology during **UNESCO's International Hydrology Decade**.
- The courses offered by the Department are presently sponsored by the **Government of India** and international agencies like **UNESCO, World Meteorological Organisation** etc.
- Till date, a total of **928 participants including 340 foreign participants from 41 countries** have participated in the Post-Graduate Programmes.
- This includes a **588 participants from 36 state and central government water resources departments**, river authorities and research organisations.
- PG and M.Tech (Hydrology) are **unique and only programmes of its kind** in the country.
- The Department is the **second degree awarding institution in the world**.
- The Department of Hydrology has been recognized as one of the **WMO Regional Training Centre (Flood Component)** in 2015



Long-term Academic Programs



- **M.Tech. (Hydrology)**

- 24 months academic programme

- Surface Water Hydrology

- Ground Water Hydrology

Qualifications

- **Bachelor's degree** in Civil/Mechanical/Agricultural Engineering/ Hydrology or its equivalent qualification

OR

- **M.Sc. (Master's) degree** in Chemistry/Geology/Geophysics/Applied Geology/Applied Geophysics/Physics/Meteorology/Geography/Atmospheric Physics/Environmental Science/Mathematics/Statistics, with Mathematics in B.Sc. (Bachelor's) course as one of the subjects

- **Ph.D. (Hydrology)**

- The Department is actively engaged in various research areas of Hydrology.



Core Competences (20-24 Credits)

Surface Water Hydrology

- Channel and fluvial hydraulics
- Deterministic hydrology
- Stochastic hydrology
- Surface water modeling and simulation
- Environmental planning and assessment of projects
- Hydrological data collection, processing and analysis

Groundwater Hydrology

- Groundwater hydrology
- Geophysical investigations
- Environmental quality
- Groundwater systems analysis
- Soil and groundwater contamination modelling

Watershed Management

- Hydrologic elements and analysis
- Watershed behavior and conservation practices
- Remote sensing and GIS applications
- Watershed modeling and simulation
- Irrigation and drainage engineering



Supplementary/Optional Competences (20-22 Credits)

- Environmental quality lab
- Experimental hydrology
- Flood forecasting
- Groundwater protection and regulation
- Hydrogeology
- Hydrogeology of hard rocks
- Hydroinformatics
- Hydrological data collection, processing and analysis
- Hydrometeorology and climate change
- Isotope hydrology
- Multi-phase flow through porous media
- Numerical methods in hydrology
- Numerical methods in hydrology
- Soft-computing techniques in hydrology
- Urban hydrology
- Vadose zone hydrology
- Water resources economics
- Water resources planning and Management



Admission Process

WWW.DOH.ORG.IN/ADMISSIONS

Fresh Graduate (15 Seats)

- through GATE Exam
- With fellowship

Indian Sponsored Candidate (15 Seats)

- From various state organization and water authorities

International Candidate (20 Seats)

- Fellowship by Govt. of India (Indian Technical and Economic Cooperation Programme) {all expenses covered}
- WMO
- UNESCO

ADMISSION BROCHURE 2017-18
(46th International Course)
P.G. Diploma / M. Tech. (Hydrology)

Indian Institute of Technology Roorkee

UNESCO WMO WMO - REGIONAL TRAINING CENTRE (Region Association - II)

DEPARTMENT OF HYDROLOGY
Indian Institute of Technology Roorkee
Roorkee-247667, India
www.iitr.ac.in/departments/hy
www.doh.org.in

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MINISTRY OF FINANCE (TCS OF COLOMBO PLAN)
GOVERNMENT OF INDIA

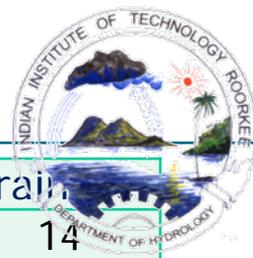
Last date for receipt of completed application form July 10, 2017

Admission Information is Circulated through

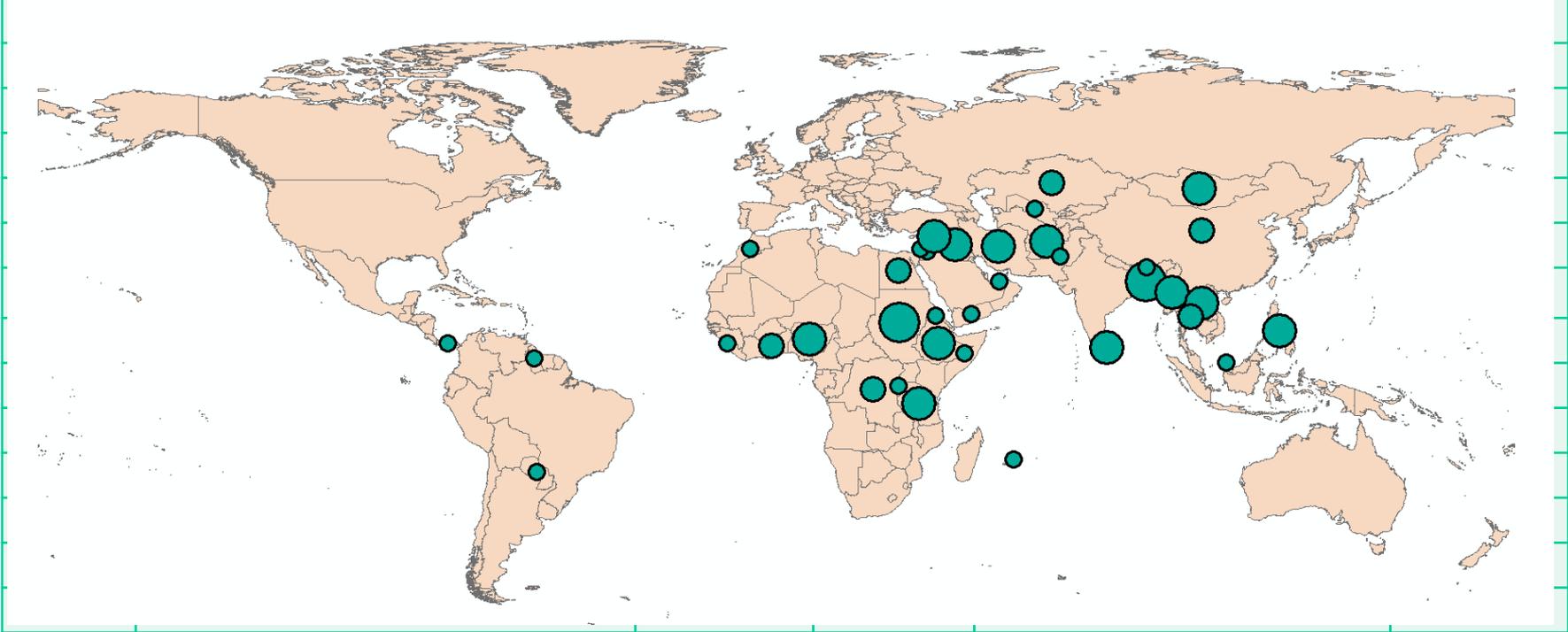
- Email
- Posters
- Facebook
- Twitter
- LinkedIn



Participation During 1972-2017: Total 928



S. No.	Country	Trainees	S. No.	Country	Trainees
1.	Afghanistan	18	22.	Myanmar	14
2.	Bangladesh	29	23.	Nepal	54
3.	Bhutan	2	24.	Nigeria	6



18.	Malaysia	2	39.	Uganda	2
19.	Mauritius	1	40.	Uzbekistan	1
20.	Mongolia	7	41.	Vietnam	18
21.	Morocco	1			



National Participation (1972-2017): Total 588



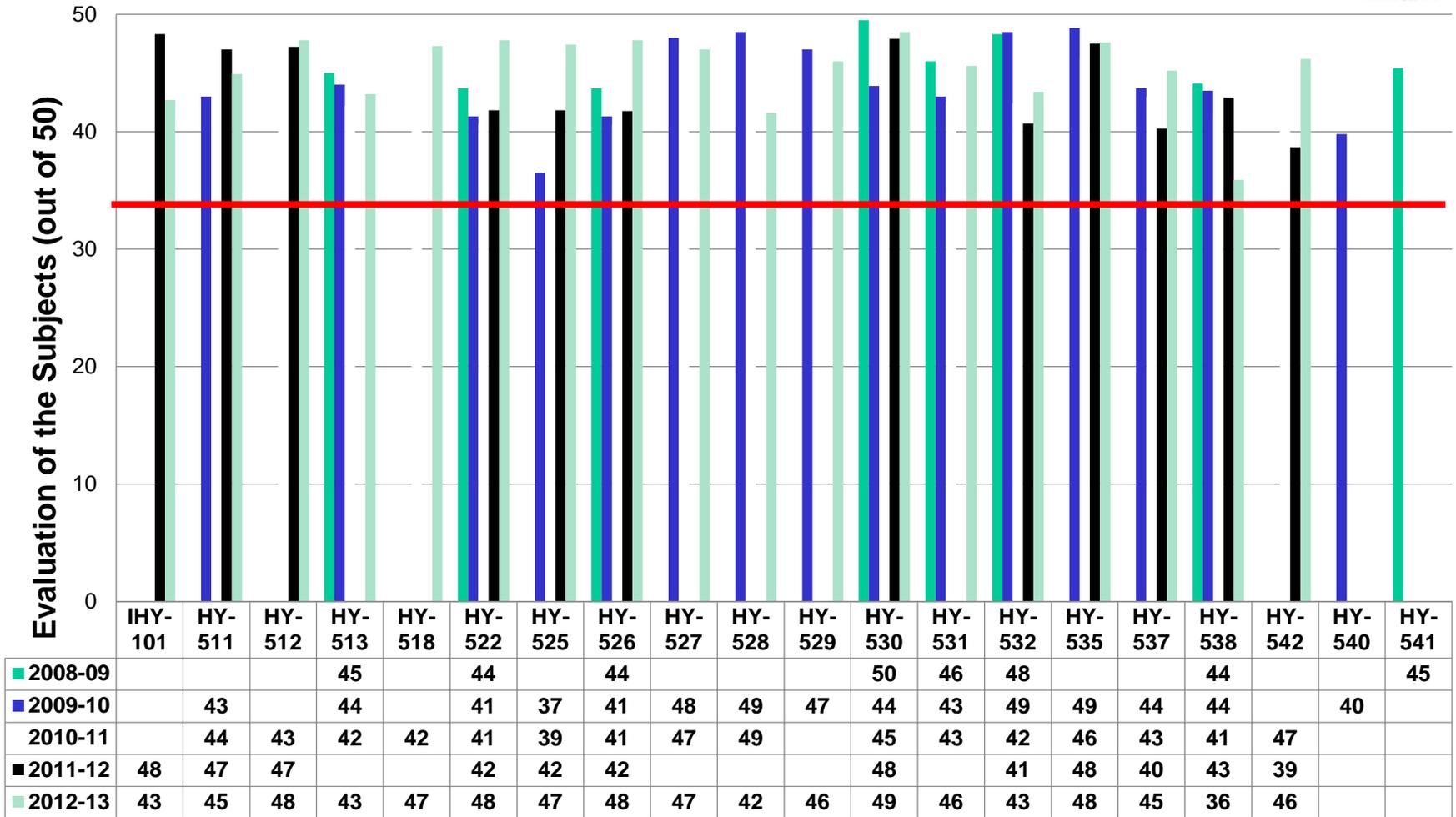
S. No.	Indian State / Organization	Trainees	S. No.	Indian State / Organization	Trainees
1.	Assam	53	19.	Maharashtra	20
2.	Andhra Pradesh	15	20.	Manipur	1
3.	Arunachal Pradesh	6	21.	Meghalaya	1
4.	Bihar	22	22.	Ministry of Agriculture	1
5.	CSWCRTI	2	23.	Mizoram	3
6.	Central Water Commission	25	24.	Municipal Corp. of Delhi	1
7.	Central Ground Water Board	12	25.	National Institute of Hydrology	9
8.	CWPRS	11	26.	NWDA	3
9.	Damodar Valley Corporation	6	27.	Odisha	77
10.	Fresh graduates (GATE)	149	28.	Punjab	1
11.	Goa	4	29.	QIP	1
12.	Gujarat	20	30.	Rajasthan	1
13.	Haryana	4	31.	Tamil Nadu	2
14.	Himachal Pradesh	4	32.	THDC	3
15.	Jammu & Kashmir	11	33.	Tripura	2
16.	Karnataka	24	34.	Uttar Pradesh	23
17.	Kerala	6	35.	Uttarakhand	1
18.	Madhya Pradesh	27	36.	West Bengal	37



Student Feedback System



Histogram of Subjects Evaluations Year Wise (2008-2013)



Competency-oriented Short-term Programs



- Conducted 60+ programs
- It includes more than 10+ international programs
 - Refresher Course for Asia region jointly with UNESCO-IHE
 - For RA-II with WMO Support
 - Bangladesh
 - Sri Lanka
 - Nepal
 - For African Countries supported by Govt. of India
(upcoming on Water Resources Management; Jan 7-27, 2018)



Flood Forecasting and Warning

(26 October to 1 November 2015)



- To refresh and enhance the skills in the area of Flood Forecasting and Warning within the framework of WMO Manual on Flood Forecasting and Warning (WMO-N° 1072)
- 21 participants from 8 countries
- Major Components
 - Classroom lectures
 - Demonstration
 - Field visit



Flood Forecasting and Warning

(26 October to 1 November 2015)



ICID-CIID

			1	2	3	4	5	6	
1	How well were the programme objectives explained at the onset of the programme?	Poorly							Clearly
2	How far were those achieved?	Poorly							Fully
3	To what extent will the programme contents help you do a better job?	Little Extent							Great

			1	2	3	4	5	
4	How was your learning experience?							
	A. From the point of view of your work situation	1	Extent to which course was able to meet objectives	Not at All				Fully
	B. From the point of view of your personal growth	2	Faculty able to present the course contents	Not Well				Excellently
5	Program Design?	3	Faculty encouraged participation	Not at All				Fully
6	How well was it organized?	4	Extent to which you can relate the lectures to your work needs	Not at All				Fully
7	Rapport established with Programme Director/ Coordinator/Assistant	5	Summarising Comments:	In general, the course was found relevant and the arrangements, contents and lecturers were appreciated. Participants also thanked WMO, ICID and IIT Roorkee				
8	In your opinion the orientation the total programme content was							
9	By and large, how would you rate the faculty selected for various subjects.	Average rating was 'very Good'						
10	Having gone through this programme, mention the two most important things you have learnt.	Mixed opinion but most of the participants learned the basics of Flood Forecasting						
11	Any Specific suggestions:	Desired a longer duration course with hands-on practice session						



New Competencies vis-a-vis Skill requirement

- Study of urban heat island (urban hydrological process)
 - A Indo-UK programme is approved involving 2 IITs, 1 CSIR lab & NCMRWF, and University of Bath and UKMO
- Urban Floods under the climate change scenario
 - A national network programme is formulated
 - Rainfall intensity actuated system is envisaged for extreme events
- Spatio-temporal Analysis of hydrometeorological data
 - Focuses on Open data sources
 - Use of reanalysis data and projected data in flood and drought prediction
- Dam Rehabilitation
 - Revisiting the hydrological design of Dams
 - Govt. of India has provided USD 1.5 million funds for capacity building
- Isotope Hydrology
 - With special reference to groundwater recharge
- Groundwater contamination and transportation



Feedback from Participants for new Competences

- Modular structure
- Flexible structure
- Credit-based earning of competencies
- Longer duration
- Newer technologies and tools
- Online and offline availability
- Leading to award of academic degree based on the credits earned



...way ahead

Looking for strategic international partners in the area of hydrology for

- Collaborative research
- Capacity building through
 - short-term competency-oriented programmes
 - long-term credit-based training programmes
- Joint research projects
- Student-faculty exchange
- Regular faculty (short by 100+)
- International visiting faculty (to a maximum of 5 years)
- **Partners for organizing activities for 50th year celebration in 2022 at Roorkee**



International Collaborations



United Nations
Educational, Scientific and
Cultural Organization

IHE
DELFT

Institute for
Water Education
in partnership with UNESCO



UNIVERSITY OF
WATERLOO



اَبُو سَيِّدِي تَيْكُو لُو كِي مَبَارَا
UNIVERSITI
TEKNOLOGI
MARA

PURDUE
UNIVERSITY

100%
BLACK

100%
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GOLD



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Centre for
Ecology & Hydrology

NATURAL ENVIRONMENT RESEARCH COUNCIL



UNIVERSITY OF
BATH



Australian Government
Bureau of Meteorology



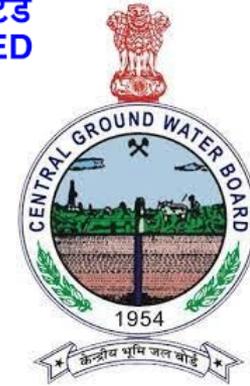
The Department is also the coordinator
(IITs) for African Centers of Excellences
(ACEs) for Water and Infrastructure



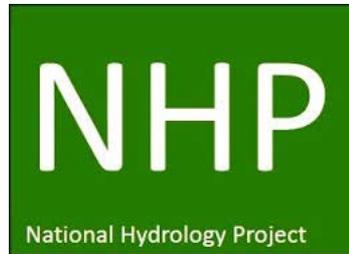
DEPARTMENT OF HYDROLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

National Collaborations

All State and Union Water Resources and Hydrology Departments



वाष्कोस



WAPCOS



Department of Hydrology ...providing solutions to Water Sector



COURSES AVAILABLE

LONG-TERM PROGRAMMES

- Master of Technology in Hydrology
24 Months Programme
- PG Diploma in Hydrology
12 Months Programme
- Ph.D. in Hydrology

SPECIALTIES

- Surface Water Hydrology
- Groundwater Hydrology
- Watershed Management

SHORT-TERM PROGRAMMES

- Department organizes various short-term courses of one to two weeks duration.

DEPARTMENT OF HYDROLOGY Indian Institute of Technology Roorkee

Department of Hydrology marked its beginning with the inception of the International Post-Graduate Course in 1972. The courses offered by the Department are presently sponsored by the Government of India and international agencies like UNESCO, World Meteorological Organization etc. Till date, a total of 905 participants including 379 international participants from 45 countries have participated in the Post-Graduate Programme.

The Department organizes National/International Conferences and symposia/Workshops. It also provides visiting services in the area of hydrology and water resources.

Indian Institute of Technology Roorkee has its roots in the Roorkee College established in 1847 as the first engineering college in India, which was renamed as Thomson College of Civil Engineering in 1954. After about 100 years of distinguished services, the college was elevated to University of Roorkee in 1949 as the first Engineering University of the independent India. In 1972, the faculty was created as the Department of Hydrology.

The Department has various ongoing research programmes in the areas of hydrology, water resources, environmental hydrology, computer hydrology and business administration besides research programmes at doctoral level.



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WWW.IITR.AC.IN/DEPARTMENTS/HY

Department of Hydrology has excellent facilities for carrying out teaching, research and consultancy activities in various aspects of hydrology and water resources.

Broad areas of interest are listed below:

- Agricultural and urban drainage studies
- Climate change studies
- Design flood studies
- Discharge measurement of rivers and canals
- Eco-friendly technologies for wastewater treatment
- Environmental assessment of agro-urban watersheds
- Geophysical investigation for identification of tube well sites
- Ground water modelling and recharge estimation
- Integrated water resources management
- Hydrological data collection, processing and analysis
- Hydrological investigations and planning
- Remote sensing and GIS applications
- Reservoir operation studies
- Soil erosion assessment and management
- Spatial decision support and information systems
- Vulnerability assessment of groundwater systems
- Waste water treatment and water remediation
- Water availability and design flood studies
- Water remediation
- Water resources planning and system studies
- Watershed modelling & management

AVAILABLE FACILITIES

LABORATORIES

Department has following state-of-the-art laboratories:

- Hydro-meteorological Data Laboratory
- Research, Simulation and Computer Laboratory
- Hydrological Information Systems Laboratory
- Environmental Hydrology Laboratory
- Groundwater Laboratory
- Geophysical Investigations Laboratory
- Watershed Laboratory

LIBRARY

The Departmental library has a collection of over 7000 books, publications, and reports etc. on different facets of hydrology.



FACULTY

- Dr. G.S. Arora, Professor & Head
- Dr. N.K. Goel, Professor
- Dr. Ramprakash Joshi, Professor
- Dr. M. Pujariyal, Professor
- Dr. M.K. Jaisi, Associate Professor
- Dr. R.K. Yadav, Associate Professor
- Dr. Suresh Singh, Assistant Professor

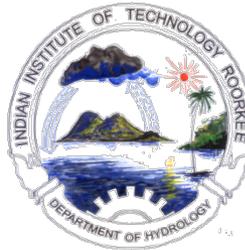
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THANK YOU!



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