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

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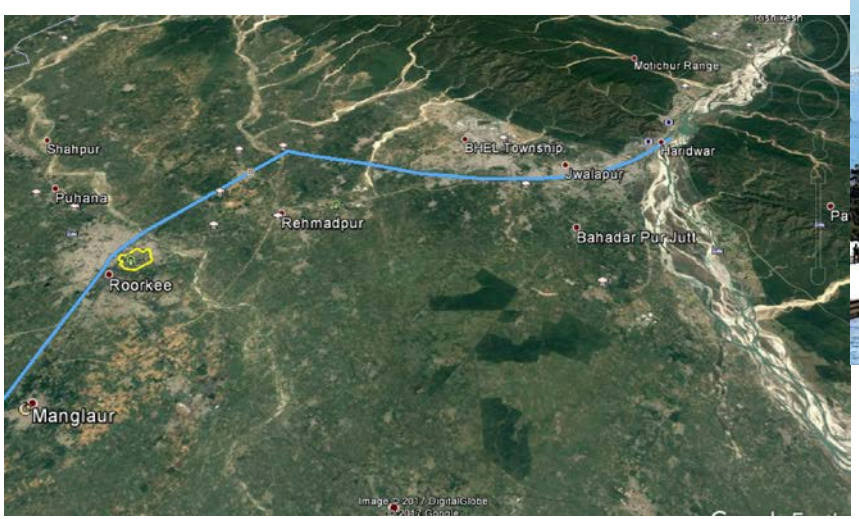
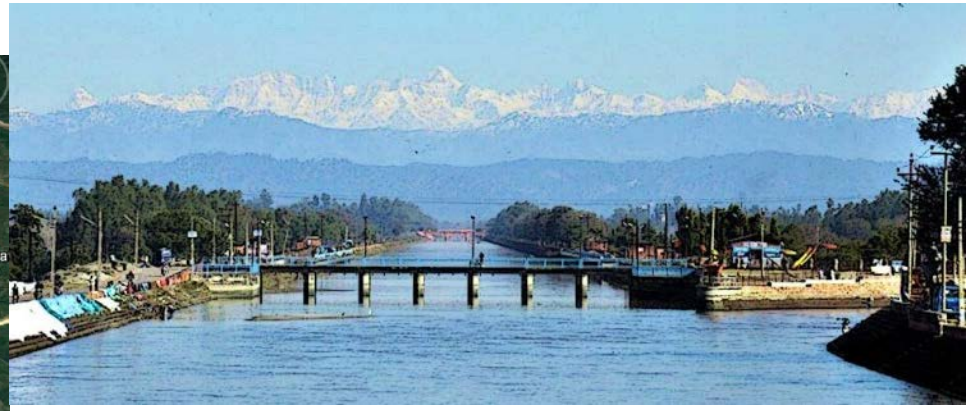
Location

- 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

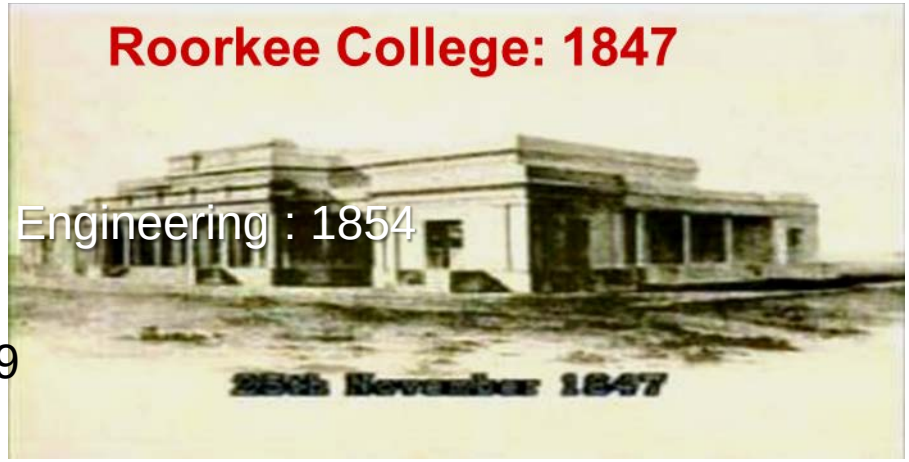


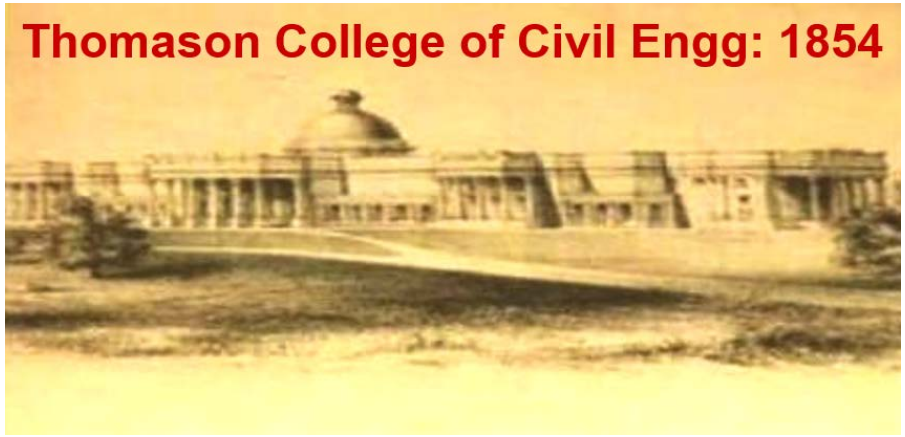


- 500 km long Canal
  - (The longest at that time)
- 10 years time
- First railway track in India was laid

…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
  - [illegible]
  - [illegible]
- **P.G**
  - [illegible]
- **Ph.D. (Hydrology)**
  - The Department is actively engaged in various research areas of 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

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)

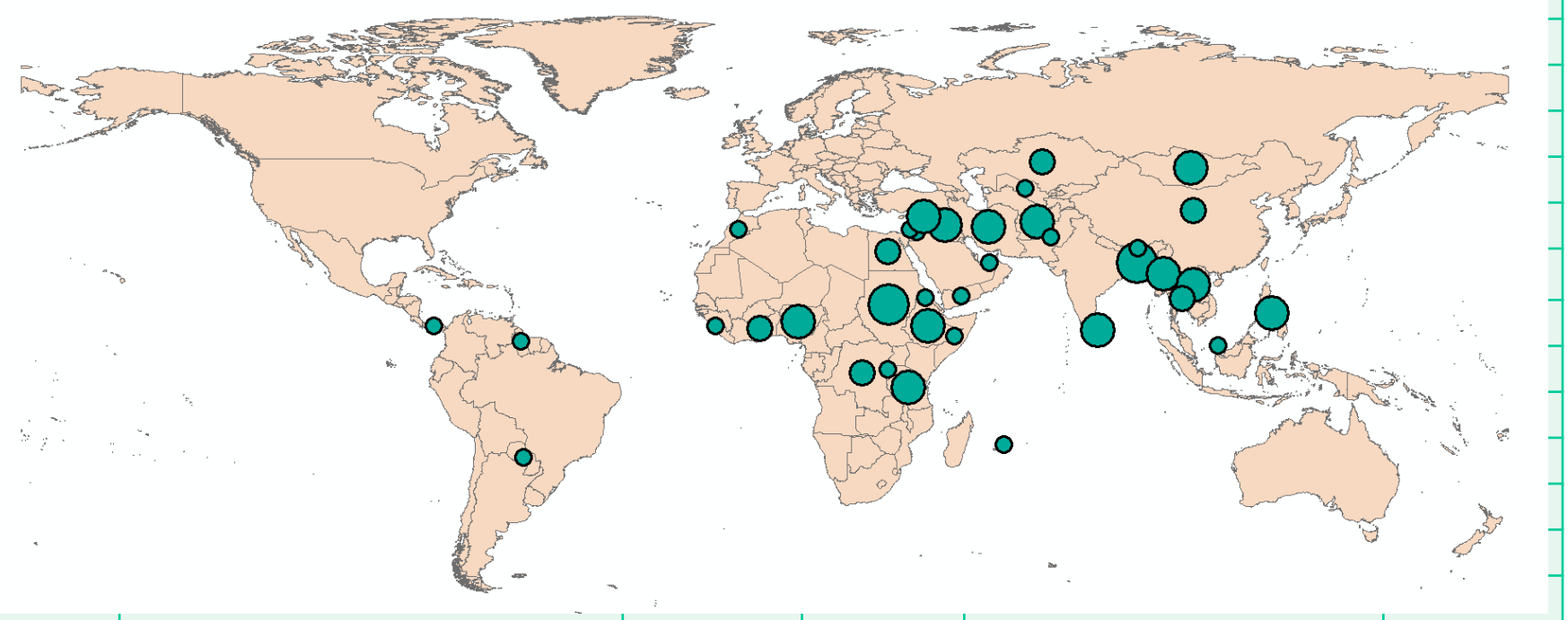
- Fellowship by Govt. of India (Indian Technical and Economic Cooperation Programme) {all expenses covered}
- WMO
- UNESCO

Admission 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

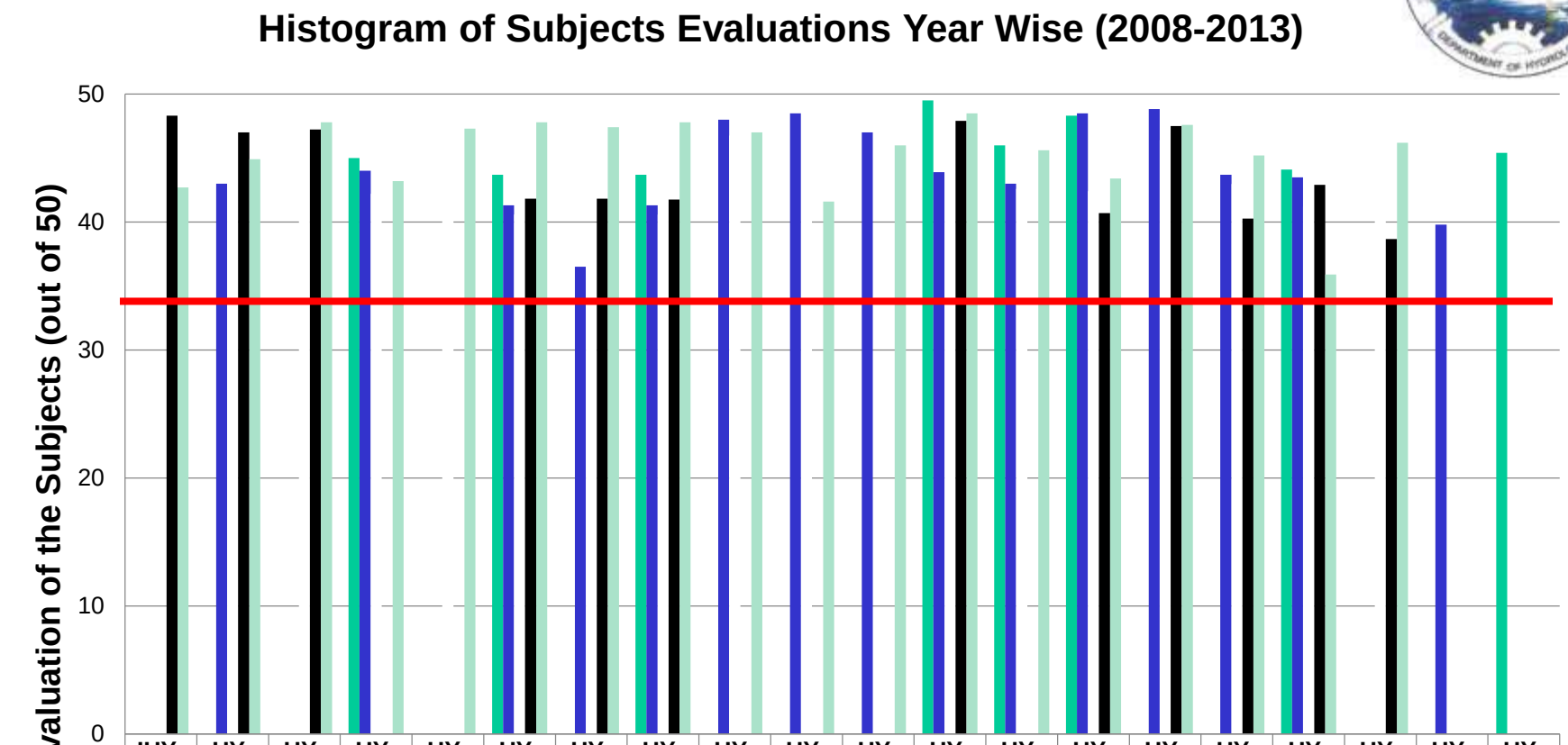


18.	Malaysia	2	39.	Uganda	2
19.	Mauritius	1	40.	Uzbekistan	1
20.	Mongolia	7	41.	Vietnam	18
21.	Morocco	1			

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



	IHY-101	HY-511	HY-512	HY-513	HY-518	HY-522	HY-525	HY-526	HY-527	HY-528	HY-529	HY-530	HY-531	HY-532	HY-535	HY-537	HY-538	HY-542	HY-540	HY-541
2008-09				45		44		44				50	46	48			44			45
2009-10		43		44		41	37	41	48	49	47	44	43	49	49	44	44		40	
2010-11		44	43	42	42	41	39	41	47	49		45	43	42	46	43	41	47		
2011-12	48	47	47			42	42	42				48		41	48	40	43	39		
2012-13	43	45	48	43	47	48	47	48	47	42	46	49	46	43	48	45	36	46		

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 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)

			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 jo	Little Extent							Great
4	How was your learning experien								
	A. From the point of view of you work situation								
	B. From the point of view of you personal growth								
5	Program Design?								
6	How well was it organized?								
7	Rapport established with Programme Director/ Coordinat /Assistant								
8	In your opinion the orientation the total programme content w								
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							

			1	2	3	4	5	
1	Extent to which course was able to meet objectives	Not at All						Fully
2	Faculty able to present the course contents	Not Well						Excellently
3	Faculty encouraged participation	Not at All						Fully
4	Extent to which you can relate the lectures to your work needs	Not at All						Fully
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						

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

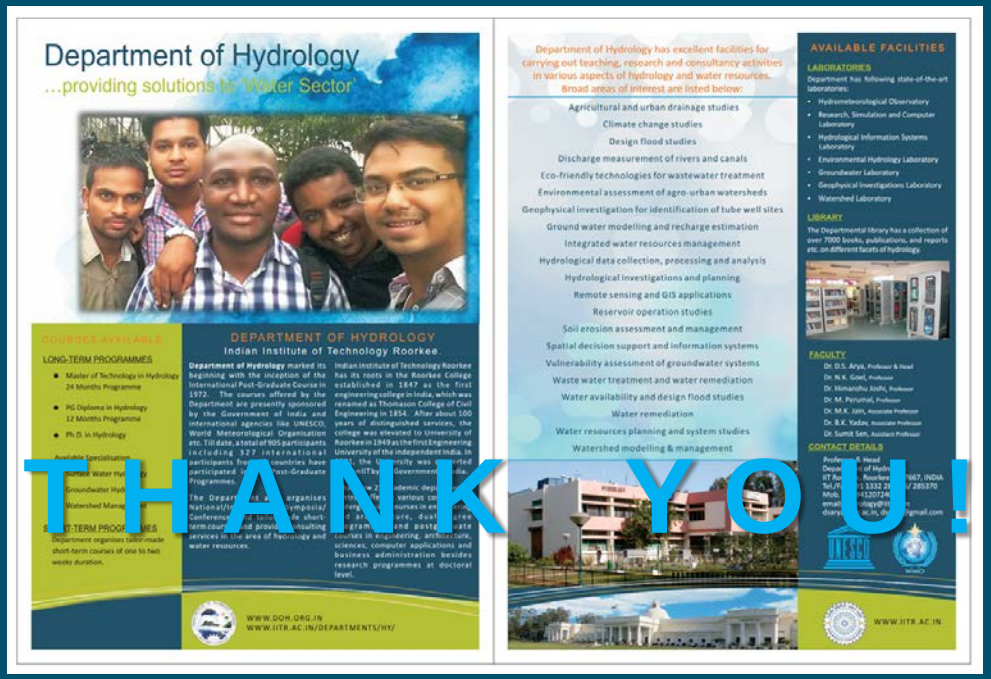
- Collaborative research
- Capacity building through
  - short-term competency-oriented programmes
  - long-term credit-based training programmes
- Joint research projects
- Student-faculty exchange
- Regular faculty (short by 100+)
- International visiting faculty (to a maximum of 5 years)
- Partners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

International Collaborations

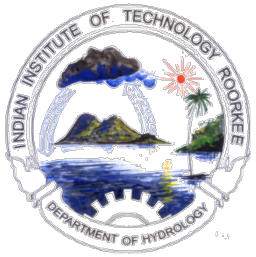
The Department is also the coordinator (IITs) for African Centers of Excellences (ACEs) for Water and Infrastructure

National Collaborations

All State and Union Water Resources and Hydrology Departments



THANK YOU!



जल विज्ञान विभाग

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