

***Catalogue of post-graduate  
hydrology courses in India***

Issue # 3, April 1999

## *Introduction*

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Training helps to develop the knowledge and skills of staff involved in the Hydrology Project (HP). Training opportunities are made available in a variety of ways and include short, job-related training courses at central training institutes, in-house training provisions, workshops and seminars, study tours and postgraduate courses in India and overseas. To assist the HP's beneficiary hydrology organisations take a decision on the type of postgraduate training for their staff and set logistical preparations in motion, the Consultant approached several Institutions and Universities to gather information on ongoing and forthcoming postgraduate programmes in the field of hydrology. The results are compiled in this catalogue. Significant feature of this updated issue of the catalogue is that many new institutes have joined the HP family offering several courses on a variety of new topics including GIS, remote sensing, DGPS and Total Stations.

The courses listed, fall in two categories: a) long term courses leading to a postgraduate degree in hydrology and geo-hydrology, b) short term courses based on the Hydrological Information System (HIS) as developed under the HP. The short courses have an attractive short duration ranging from 2 to 8 weeks. These shorter courses are specially prepared and delivered for the Hydrology Project, and interested agencies are advised to timely depute participants and make reservations in direct consultation with the selected institutes.

The calendar of postgraduate training changes every year, and individual courses might be canceled if there is no interest. Since the short courses will be conducted by the institutes/universities only when a minimum course strength is nominated, it is essential that the training coordinators work together to sponsor sufficient number of staff for training at a particular institute.

In 1999, most of the hydrology related equipment, hard and software will be available in the organizations and the HIS becomes operational. The need for knowledgeable HIS resource persons in the organizations will rapidly increase. Therefore, 1999 is a crucial year in completing postgraduate training requirements. This is also in line with the recommendations of the Mid-term Review Mission of the World Bank and the Government of the Netherlands.

We do trust that the HP agencies will find this catalogue useful.

Hydrology Project  
Technical Assistance Team  
New Delhi, April 1999

# *28<sup>th</sup> International post graduate diploma and masters courses in hydrology*

<b>Topics</b>	<p><i>Core courses:</i> Hydrologic elements and analyses; computer methods; probability and statistics; mathematics; channel and fluvial hydraulics; water quality and environment; stochastic hydrology; agricultural hydrology; remote sensing applications in hydrology.</p> <p><i>Specialized courses:</i></p> <ul style="list-style-type: none"> <li>▪ SW: geo-hydrology, hydro-meteorology, systems analysis and surface water planning; parametric hydrology;</li> <li>▪ GW: ground water hydrology, systems analysis and ground water system hydrology, hydro-geology, geo- physical investigations</li> <li>▪ Watershed Management: planning and management of watershed, watershed behavior and conservation practices, hydro-meteorology, system ecology and environmental planning</li> </ul>
<b>Methodology and training methods</b>	<p><i>PG. Diploma:</i> Duration: one year, including core courses and specialized courses in SW, GW or watershed management streams, field trips, seminars and project work.</p> <p><i>Masters programme:</i> Duration: 4.5 months, either by dissertation or course work. For dissertation, the prescribed duration of 4.5 months may exceed.</p> <p><i>Research programme:</i> Leads to Ph.D. degree</p>
<b>Delivery dates</b>	16 July 1999 - 15 July 2000 (postgraduate diploma), or till 30 November 2000 (Masters)
<b>Last admission date</b>	15 May 1999
<b>Admission qualifications</b>	<p>Open for surface and ground water disciplines</p> <p>BE (Civil, Mech., Hydrology, Agricultural Engg.) or MSc. / Mtech. (Chem., Geol., Geophy., Appl. Geol., Appl. Geoph., Phys., Meteo., Geogr., Atmospheric Phys., Env. Science with Maths at BSc level; Statistics. or Maths at BSc level. Or AMIE (Sec A and B). At least 3 years professional experience required.</p>
<b>Basic course fee</b>	<p>No course fee for government/semi-government organisation nominees.</p> <p>Other costs: Rs 28,000 (per person) for books, field trips, examination fees, computer dues, outfit and medical expenses. Rs. 46,000 pp for Masters program.</p>
<b>Estimated board &amp; lodging cost</b>	<p>Rs 30,000 (per person) for PG Diploma</p> <p>Rs. 45000 per person for Masters programme</p> <p>Limited family accommodation available but trainees are advised not to bring families in the beginning of course.</p>
<b>Name of institute</b>	Department of Hydrology, University of Roorkee
<b>Contact person</b>	Dr. D. K. Srivastava, Professor and Head
<b>Address</b>	Department of Hydrology, University of Roorkee, Roorkee, Uttar Pradesh-247667, India.
<b>Telephone</b>	01332 - 723 49 extn: 5236 & 4336 <b>Telex</b> 0597-201 UOR IN
<b>Fax</b>	01332 - 735 60 <b>E-mail</b> hydro@rurkiu.ernet.in

# *Flood hydrology and real-time flood forecasting*

<b>Topics</b>	Introduction, importance of flood estimation and forecasting; data handling and analysis, screening, aggregation, storage, processing, etc.; flood frequency analysis, extreme flows, Gumbels distribution; hydrograph analysis, systems approach, unit hydrograph; mathematical modeling, linear and non-linear models; physically based models; flood routing and flood control; flood forecasting.
<b>Methodology and training methods</b>	Lectures, group exercises, practical demonstrations and field visits
<b>Delivery dates</b>	September 1999 - October 1999 Duration: 2 weeks
<b>Last admission date</b>	July 1999
<b>Admission qualifications</b>	BE/B.Tech. (Civil/Agriculture), MSc. with working experience in relevant areas
<b>Basic course fee</b>	Rs 10,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 7,500 per person for 15 days

<b>Name of institute</b>	Department of Civil Engineering, University of Roorkee		
<b>Contact person</b>	Prof. K. G. Ranga Raju		
<b>Address</b>	Department of Civil Engineering University of Roorkee Roorkee - 247667, Uttar Pradesh		
<b>Telephone</b>	01332 – 85219, 85408	<b>Telex</b>	
<b>Fax</b>	01332 – 75568, 73560	<b>E-mail</b>	civil@rurkiu.ernet.in

# *Mathematical modeling*

<b>Topics</b>	Introduction, governing equations of flow in rigid and alluvial bed, open channels, solution methods, finite difference techniques, description of mathematical models on flood flows, pollutant dispersion and reservoir sedimentation
<b>Methodology and training methods</b>	Lectures, group exercise, practicals, demonstration and field visits
<b>Delivery dates</b>	September 1999 - October 1999 Duration: one week
<b>Last admission date</b>	July 1999
<b>Admission qualifications</b>	BE/ B.Tech.(Civil/Chemical), M.Sc with working experience in relevant areas
<b>Basic course fee</b>	Rs 10,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 7,500 per person for 15 days

<b>Name of institute</b>	Department of Civil Engineering, University of Roorkee		
<b>Contact person</b>	Prof. K. G. Ranga Raju		
<b>Address</b>	Department of Civil Engineering University of Roorkee Roorkee - 247667, Uttar Pradesh		
<b>Telephone</b>	01332 – 85219, 85408	<b>Telex</b>	
<b>Fax</b>	01332 - 755 68, 73560	<b>E-mail</b>	civil@rurkiu.ernet.in

# *Hydrological analysis and modeling*

<b>Topics</b>	Observation, collection, processing, storage, retrieval and analysis of hydrological and hydro-meteorological data; design of the network, data base management, hydrological elements and their deterministic, probabilistic and stochastic analysis and modeling; design flood estimation, flood forecasting; water resources systems analysis, GW recharge and water balance studies, surface and ground water contamination modeling; water quality data collection, sampling, analysis and modeling. Project preparation.
<b>Methodology and training methods</b>	Lectures, practice sessions, assignments, panel discussions, study tour,
<b>Delivery dates</b>	6 December 1999-1 January 2000 Duration: 4 weeks
<b>Last admission date</b>	6 weeks prior to commencement of course
<b>Admission qualifications</b>	Open for surface and ground water quantity and quality.  BE(Civil, Mech, Hydrology) or equivalent. MSc/MTech (Chem, Geol, Geophys, Appl. Geol., Appl. Geoph., Phys, Meteorology, Geography, Environ. Science Statistics, Maths
<b>Basic course fee</b>	Rs30,000 per person Group size: 10-15 participants
<b>Estimated board &amp; lodging cost</b>	Rs 5,500 per person

<b>Name of institute</b>	Department of Hydrology, University of Roorkee		
<b>Contact person</b>	Dr. D. K. Srivastava, Professor and Head		
<b>Address</b>	Department of Hydrology, University of Roorkee, Roorkee, Uttar Pradesh-247667, India.		
<b>Telephone</b>	Off: 01332-85236(Direct) 01332 - 723 49 Extn: 5236 & 4336 Res: 01332-85156	<b>Telex</b>	0597-201UOR IN
<b>Fax</b>	01332 - 735 60	<b>E-mail</b>	hydro@rurkiu.ernet.in

# *Computer-aided hydrological investigations, analysis and design for surface water projects*

<b>Topics</b>	Hydrological, geological, topographical and environmental investigations; precipitation analysis; rainfall-runoff relations; estimation of design flood, flow duration curve and energy estimations; stochastic modeling of hydrological processes; reservoir capacity and yield; reservoir sediment distribution; flood frequency analysis; reservoir flood routing; planning for irrigation, hydropower, flood control and multipurpose projects; linear and dynamic programming techniques; simulation techniques; reservoir regulation and operation; case histories.		
<b>Methodology and training methods</b>	Lectures, practice sessions, panel discussions, study tours and special problem assignment.		
<b>Delivery dates</b>	31 Jan - 19 Feb 2000 <i>OR</i> 12 June - 1 July 2000 Duration: 3 weeks		
<b>Last admission date</b>	6 weeks before commencement of course		
<b>Admission qualifications</b>	BE(Civil, Mech, Hydrology, Agricultural Engg.) or equivalent. MSc/MTech (Chem, Geol, Geophys, Appl. Geol., Appl. Geoph., Phys, Meteo, Geography, Environ. Science, Statistics, Maths)		
<b>Basic course fee</b>	Rs 22,500 per person Group size: 10-15 participants		
<b>Estimated board &amp; lodging cost</b>	Rs 4,000 per person		
<b>Name of institute</b>	Department of Hydrology, University of Roorkee		
<b>Contact person</b>	Dr. D. K. Srivastava, Professor and Head		
<b>Address</b>	Department of Hydrology, University of Roorkee, Roorkee, Uttar Pradesh-247667, India.		
<b>Telephone</b>	Off: 01332-85236(Direct) 01332 - 723 49 Extn: 5236 & 4336 Res: 01332-85156	<b>Telex</b>	0597-201 UOR IN
<b>Fax</b>	01332 - 735 60	<b>E-mail</b>	hydro@ rurkiu.ernet.in

# *Application of groundwater modeling: development of flow and mass transport models*

<b>Topics</b>	<p>Ground water models: importance, data requirements; constructing a numerical model; analysis of field data; pumping tests; water quality data;</p> <p>Darcy's law; GW continuity equation for flow; transport equation; dispersion; Numerical methods for GW models; finite difference method; approximation of derivation of flow in 1-2 dimensions; alternating direction technique; successive over relaxation; pre-conjugate gradient method. Finite element method; basic principals, Galerkin method, solution of flow equation comparison with finite difference method.</p> <p>Solution of transport equation; numerical dispersion and grid constraints, particle tracking methods, method of characteristics, capture zones</p> <p>Software: introduction capabilities of FLOWPATH; Visual MODFLOW</p> <p>GW flow and Mass Transport Model case studies; hands-on-experience, preparation of a model of water shed/ sub-basin pollutant migration; documentation.</p>	
<b>Methodology and training methods</b>	Lectures; computer practice sessions; presentation and discussion of case studies, field visit; developing models; report writing	
<b>Delivery dates</b>	<p>Duration: 4 weeks</p> <p>Starting : July 1999, November 1999, February 2000, July 2000</p> <p>Exact date of commencement will be set after nominations are received by the Institute</p>	
<b>Last admission date</b>	One month before commencement of the course	
<b>Admission qualifications</b>	BE; MSc (Geology, Geo-hydrology, Geophysics, Earth Sciences or equivalent) Minimum number of participants: 10	
<b>Basic course fee</b>	Rs 30,000 per person	
<b>Estimated board &amp; lodging cost</b>	Rs 6,000 per person	
<b>Name of institute</b>	National Geophysical Research Institute	
<b>Contact person</b>	Dr. R. L. Dhar Head, Ground Water Exploration and Management Group	
<b>Address</b>	National Geophysical Research Institute Hyderabad-500 007 Post Bag No: 724 Andhra Pradesh	
<b>Telephone</b>	040-7171564 040-7170491	<b>Telex</b>
<b>Fax</b>	040-7171564 040-7170491	<b>E-mail:</b> postmast@csngri.ren.in

# *Isotope techniques for water resources management*

<b>Topics</b>	Basic concepts of isotopes. Environmental and artificial isotopes, stable and radioactive isotopes and application to hydrology. Isotopes as tracers. Application of isotope techniques to surface and groundwater hydrology e.g. recharge, groundwater flow, flow direction, seepage loss from irrigation canals, aquifer-aquifer interaction. Isotope techniques for pollution studies-salinity intrusion and similar problems. Laboratory practice on measurement and analytical techniques. Field demonstration on flow measurement, canal seepage estimation, recharge estimation
<b>Methodology and training methods</b>	Lectures, discussion, laboratory practice, field demonstration
<b>Delivery dates</b>	1-20 September 1999 Duration: 3 weeks
<b>Last admission date</b>	1 August 1999
<b>Admission qualifications</b>	BE, MSc(Geo-hydrology, Geology, or equivalent)
<b>Basic course fee</b>	Rs 40,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 12,000 per person

<b>Name of institute</b>	Centre for Water Resources Development and Management	
<b>Contact person</b>	Dr. K. Vasu Head-in-Charge Nuclear Hydrology Division	
<b>Address</b>	Centre for Water Resources Development and Management Kozhikode-673 571 Kerala	
<b>Telephone</b>	0495-35727	<b>Telex:</b> 0804-294
<b>Fax</b>	0495-357827	<b>E-mail:</b> <a href="mailto:cwrmd@ker.nic.in">cwrmd@ker.nic.in</a>

## *Groundwater assessment techniques*

<b>Topics</b>	Integrated use of geological mapping, remote sensing techniques and hydrologic information for identification of GW potential zones on a regional scale as well as for the evaluation of suitability of different well structures in those zones. Use of geophysical techniques for understanding the subsurface geology, and the utilisation of those results for fixing location of wells as well as depth of drilling. Designing and conducting pump test in different types of wells and the analysis of the pump test data for obtaining information on aquifer parameters and well yield. Familiarisation of the 'GW Estimation Methodology-1997' as approved by the MOWR, Government of India
<b>Methodology and training methods</b>	Lectures, presentation of case studies, field demonstration and practice, tutorial assignments and group discussion
<b>Delivery dates</b>	6- 25 September 1999 Duration: 3 weeks
<b>Last admission date</b>	16 August 1999
<b>Admission qualifications</b>	BE/ MSc( Geology, Geo- hydro-geology or equivalent One years professional experience in hydrological data collection
<b>Basic course fee</b>	Rs 40,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 12000 per person

<b>Name of institute</b>	Centre for Water Resources Development and Management	
<b>Contact person</b>	Dr. S. P. Rajagopalan Head Computer Application Division	
<b>Address</b>	Centre for Water Resources Development and Management Kozhikode-673 571 Kerala	
<b>Telephone</b>	0495-355864	<b>Telex:</b> 0804-294
<b>Fax</b>	0495-357827	<b>E-mail:</b> cwrmd@ker.nic.in

# *GIS applications in water resources management*

<b>Topics</b>	Fundamentals of photogrammetry and remote sensing; Digital image processing techniques and principals of GIS; principles of watershed management, watershed database creation, GIS applications in water balance, runoff modeling; sediment yield modeling, watershed prioritisation
<b>Methodology and training methods</b>	Lectures, practical sessions, tutorials, study tours and hands-on-experience using computers for image processing and GIS exercises for water resources- related studies; pilot project
<b>Delivery dates</b>	2 August -26 November 1999 Duration: 4 months. <i>Open for SW only</i>
<b>Last admission date</b>	15 July 1999
<b>Admission qualifications</b>	BE(Civil Engineering)/ ME( Water resources/Hydrology ) SW discipline only
<b>Basic course fee</b>	<i>For government sponsored staff: No course fee</i> Others: Rs. 24,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 8,000 per person

<b>Name of institute</b>	Indian Institute of Remote Sensing	
<b>Contact person</b>	Dr. P. S. Roy, Dean Mr. V. Hari Prasad In-charge Water Resources	
<b>Address</b>	No: 4, Kalidas Road P. B. No: 135 Dehradun-248001 Uttar Pradesh	
<b>Telephone</b>	0135-744583, 748041	<b>Telex</b>
<b>Fax</b>	0135-741987, 758041	<b>E-mail:</b> dean@del2.vsnl.net.in V h p@hotmail.com

## *Postgraduate diploma in remote sensing*

<b>Topics</b>	Fundamentals of photogrammetry and remote sensing; digital image processing and fundamentals of GIS; multidisciplinary sciences; water resources assessment: surface water inventory, snow melt runoff forecasting, hydro-meteorology, rainfall-runoff modeling and ground water targeting watershed management: water shed characterisation, sediment yield modeling, reservoir sedimentation, watershed prioritisation and conservation, water resources management: flood, drought, water quality, irrigation water management and water logging and salinity
<b>Methodology and training methods</b>	Lectures, practical sessions, tutorials, study tours and hands-on- experience using computers for image processing and GIS exercises for water resources related studies, pilot project
<b>Delivery dates</b>	2 August 1999-2 June 2000 Duration: 10 months <i>Open for SW only</i>
<b>Last admission date</b>	15 July 1999
<b>Admission qualifications</b>	BE(Civil Engineering)/ ME( Water resources/Hydrology ) SW discipline only
<b>Basic course fee</b>	<i>For government sponsored staff: No course fee</i> Others: Rs. 60,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 20,000 per person

<b>Name of institute</b>	Indian Institute of Remote Sensing	
<b>Contact person</b>	Dr. P. S. Roy, Dean Mr. V. Hari Prasad, In-charge Water Resources	
<b>Address</b>	No: 4, Kalidas Road P. B. No: 135 Dehradun-248001 Uttar Pradesh	
<b>Telephone</b>	0135-744583, 748041	<b>Telex</b>
<b>Fax</b>	0135-741987, 758041	<b>E-mail:</b> dean@del2.vsnl.net.in V h p@hotmail.com

## *Remote sensing applications in water resources*

<b>Topics</b>	Basic concepts of remote sensing, digital image processing and GIS, hydrologic elements quantification using remote sensing techniques, concepts of watershed management using GIS, hydrologic modeling using GIS
<b>Methodology and training methods</b>	Lectures, practical sessions, tutorials, study tours and hands-on-experience using computers for image processing and GIS exercises for water resources- related studies; pilot project
<b>Delivery dates</b>	Open: to be mutually decided; agencies may address the institute Duration: 2-8 weeks as per requirement of the agencies <i>Open for SW only</i>
<b>Last admission date</b>	Institute may be contacted 2 months in advance
<b>Admission qualifications</b>	BE(Civil Engineering)/ ME( Water resources/Hydrology ) SW discipline only
<b>Basic course fee</b>	Rs 2000 per person per week
<b>Estimated board &amp; lodging cost</b>	Rs 500 per person per week

<b>Name of institute</b>	Indian Institute of Remote Sensing	
<b>Contact person</b>	Dr. P. S. Roy, Dean Mr. V. Hari Prasad, In-charge Water Resources	
<b>Address</b>	No: 4, Kalidas Road P. B. No: 135 Dehradun-248001 Uttar Pradesh	
<b>Telephone</b>	0135-744583, 748041	<b>Telex</b>
<b>Fax</b>	0135-741987, 758041	<b>E-mail:</b> dean@del2.vsnl.net.in V_h_p@hotmail.com

# *Remote sensing and geographical information system in Groundwater exploration and targeting*

<b>Topics</b>	Details not available	
<b>Methodology and training methods</b>	Lectures, practical demonstration using manual and machine-aided(computer) techniques	
<b>Delivery dates</b>	April – February (following year)	
<b>Last admission date</b>	31 January	
<b>Admission qualifications</b>	MSc/Mtech in geosciences 2 years field experience	
<b>Basic course fee</b>	Rs 60,000 per person Dessertation fee: Rs. 3,000; Books: Rs. 1,500	
<b>Estimated board &amp; lodging cost</b>	Rs 1,500 per person	
<b>Name of institute</b>	Indian Institute Of Remote Sensing	
<b>Contact person</b>	Professor V. K. Jha, Head Geosciences	
<b>Address</b>	No: 4, Kalidas Road P. B. No: 135 Dehradun-248001 Uttar Pradesh	
<b>Telephone</b>	0135-745516	<b>Telex</b>
<b>Fax</b>	0135-741987, 748041	<b>E-mail:</b> dean@del2.vsnl.net.in

# *Remote sensing technology and its applications*

<b>Topics</b>	<p>Remote sensing: introduction, physical basis, satellite orbits, platforms and sensors</p> <p>Image processing, pattern recognition and geographic information system(GIS): conceptual aspects, enhancements, quantitative and qualitative analysis and recent developments in image processing, statistical, artificial neural network and texture based thematic classification of images and GIS technology</p> <p>Applications: geology, hydrology and water resources, land use, oceanography and marine resources, soils, forestry, agriculture, agro-meteorology and integrated studies</p> <p>Remote sensing programmes in future: remote sensing in 1998-2015 and role of remote sensing in global change studies</p>
<b>Methodology and training methods</b>	Lecture, practice sessions, demonstrations
<b>Delivery dates</b>	<p>Short term : 2 weeks for senior officials( topics same as for regular course), dates: open</p> <p>Regular: 11 weeks for implementation level officers: 21 June - 3 September 1999</p> <p>User request: special courses conducted on request/ requirements of agencies</p>
<b>Last admission date</b>	21 May 1999 for regular 11 weeks course
<b>Admission qualifications</b>	BE/ME; MSc
<b>Basic course fee</b>	<p>Sponsorship from central/state government departments or autonomous organisations</p> <p>11 weeks course: Rs 6,000 per person</p> <p>2 weeks course: Rs. 1,600 per participant</p> <p><i>(payable by demand draft in favour of National remote Sensing Agency and payable at Hyderabad)</i></p>
<b>Estimated board &amp; lodging cost</b>	<p>Not available</p> <p>Hostel (limited)facility available; participants need to apply at least 20 days in advance</p>
<b>Name of institute</b>	National Remote Sensing Agency
<b>Contact person</b>	Dr. Rajendra Kumar Gupta, Group Head, Training and Educational Activities
<b>Address</b>	<p>Training and Educational Activities Group</p> <p>National remote Sensing Agency</p> <p>Balanagar, Hyderabad-500037, Andhra Pradesh</p>
<b>Telephone</b>	<p>Off: 040 – 3078870</p> <p>Res: 040 - 7756904</p> <p style="text-align: right;"><b>Telex:</b> 0425-8039</p>
<b>Fax</b>	<p>040 – 3078648</p> <p style="text-align: right;"><b>E-mail:</b> <a href="mailto:rkg@nrса-dir.globemail1.com">rkg@nrса-dir.globemail1.com</a> <a href="mailto:training@nrса.gov.in">training@nrса.gov.in</a></p>

# *Groundwater exploration, modeling and assessment in hard rock areas*

<b>Topics</b>	<p><i>Hydro-geology:</i> Introduction, landforms, and ground water occurrence; structural and stratigraphic controls in occurrence of ground water; aquifer types and their hydraulic properties; occurrence and movement of groundwater in crystalline rocks</p> <p><i>Methods of ground water exploration:</i> Applications of remote sensing, geophysical methods, seismic, electrical and electromagnetic methods, automatic interpretation of electrical resistivity data</p> <p><i>Hydraulics and design of wells:</i> Equations of ground water flow, graphical and computer-assisted analysis of pumping test data; evaluation of hydraulic parameters for fractured aquifers; parameter estimation for large diameter wells; drilling techniques and well design</p> <p><i>Ground water modeling and assessment:</i> ground water balance studies, estimation of ground water recharge aquifer simulation and groundwater flow modeling; ground water quality criteria, sea water intrusion in coastal aquifers; planning for regional ground water development; case studies involving ground water modeling and assessment</p>	
<b>Methodology and training methods</b>	Lectures, practice sessions, panel discussion, study tour, problem assignment	
<b>Delivery dates</b>	15 November – 4 December 1999 3-22 January 2000 Duration: 3 weeks	
<b>Last admission date</b>	6 weeks before commencement of course	
<b>Admission qualifications</b>	BE(Civil, Mech., Hydrology, agricultural Engg.); MSc./MTech( Chem.,Geol.,Geophy.,Appl.Geol.,Appl. Geoph.,Phys., Geogr., Env. Science; Statistics and Maths.	
<b>Basic course fee</b>	Rs 22,500 per person Group size: 10-15 participants	
<b>Estimated board &amp; lodging cost</b>	Rs 4,000 per person	
<b>Name of institute</b>	Department of Hydrology, University of Roorkee	
<b>Contact person</b>	Dr. D. K. Srivastava, Professor and Head	
<b>Address</b>	Department of Hydrology, University of Roorkee, Roorkee, Uttar Pradesh-247667	
<b>Telephone</b>	Off: 01332-85236(Direct) 01332 - 723 49 Extn: 5236 & 4336	<b>Telex</b> 0597-201UOR IN
<b>Fax</b>	01332 - 735 60	<b>E-mail</b> hydro@rurkiu.ernet.in

# *Geodesy and global positioning system(GPS)*

<b>Topics</b>	<p>Fundamentals of geodesy and surveying: earth , geoid, ellipsoid, reference surface, datums, coordinate systems, everest spheroid(Indian Geodetic System), WG S84</p> <p>Control survey(horizontal and Vertical control): conventional methods, modern methods(EDM, TOTAL STATION, GPS)</p> <p>Global Positioning System (GPS): fundamentals, point positioning system, relative positioning, Differential global positioning system(DGPS). Accuracy, Biases, GPS observables, ambiguity resolution, GPS data collection, down loading and processing, GPS survey techniques, GPS applications</p> <p>Grid: rectangular coordinates on maps, introduction to digital mapping, LIS/GIS</p>	
<b>Methodology and training methods</b>	Lectures practice sessions, problem assignment and outdoor field work	
<b>Delivery dates</b>	1 –28 September 1999 Duration: 4 weeks	
<b>Last admission date</b>	30 June 1999	
<b>Admission qualifications</b>	BE or MSc with Mathematics up to degree level	
<b>Basic course fee</b>	Rs 400,000 for 10 persons; additional at Rs 40,000 per person	
<b>Estimated board &amp; lodging cost</b>	Rs 2,000 per person ( approx)	
<b>Name of institute</b>	Survey Training Institute, Survey of India	
<b>Contact person</b>	Mr. N. K. Agarwal, Director and Head, Faculty of Geodesy and Computer Sciences	
<b>Address</b>	Uppal Hyderabad-500039 Andhra Pradesh	
<b>Telephone</b>	Off: 040-7171979 Res: 040-7152421	<b>Telex:</b> 0425-7020 DSTI IN
<b>Fax</b>	040-7170286	<b>E-mail:</b> ssecsoi@ap.nic.in

## *Water quality*

<b>Topics</b>	Health aspects of water supply and sanitation, water- borne diseases-microbiology and epidemiological aspects, water quality standards, water quality monitoring, sanitary survey, KAP( knowledge-attitude- practice) survey, water pollution and classification of pollutants, evaluation of the system, data interpretation and analysis, laboratory establishment, community based approach for management, institutional set up, water quality mapping, documentation
<b>Methodology and training methods</b>	Lectures, laboratory practice, field visits, data collection, demonstration sessions
<b>Delivery dates</b>	7-26 June, 1999 Duration: 3 weeks
<b>Last admission date</b>	30 April, 1999
<b>Admission qualifications</b>	BE(Civil), AMIE(Civil), MSc/M.Tech(Chem) Minimum trainees per class: 10 Maximum trainees per class: 20
<b>Basic course fee</b>	Rs 15,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 5,000 approximately per person in the institution's hostel

<b>Name of institute</b>	AI India Institute of Hygiene and Public Health	
<b>Contact person</b>	Prof. K. J. Nath Director-Professor & Head Prof. A. Majumder	
	Department of Sanitary Engineering	
<b>Address</b>	110, Chittaranjan Avenue Calcutta-700 073	
<b>Telephone</b>	033-241 5572(Direct) 033-241 2860(PBX)	<b>Telex</b>
<b>Fax</b>	033-241 8508	<b>E-mail</b> sanengg.cal@gems.vsnl.net.in

## *Environmental pollution studies of surface and groundwater*

<b>Topics</b>	Ground and surface water sources, ground water hydrology, ground water pollution travel, soil type, soil compaction, permeability, grain size distribution-gradient, surface water pollution, inorganic pollution, Leachate????, surface water pollution, stream sanitation, Streeter -Phelps equation, water quality monitoring, conservation practice and impacts, sampling, testing procedures, water quality control, management and remedial measures
<b>Methodology and training methods</b>	Lectures, laboratory practice, field visits, data collection, demonstration sessions
<b>Delivery dates</b>	9-20 August 1999 Duration: 2 weeks
<b>Last admission date</b>	31 May 1999
<b>Admission qualifications</b>	BE(Civil), AMIE(Civil), MSc/M.Tech(Chem) Minimum trainees per class: 10 Maximum trainees per class: 20
<b>Basic course fee</b>	Rs 10,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 3,500 approximately per person in the Institute's hostel

<b>Name of institute</b>	AI India institute of Hygiene and Public Health		
<b>Contact person</b>	Prof. K. J. Nath Director-Professor & Head Prof. A. Majumder Department of Sanitary Engineering		
<b>Address</b>	110, Chittaranjan Avenue Calcutta-700 073		
<b>Telephone</b>	033-241 5572(Direct) 033-241 2860(PBX)	<b>Telex</b>	
<b>Fax</b>	033-241 8508	<b>E-mail</b>	sanengg.cal@gems.vsnl.net.in

# *Water quality management*

<b>Topics</b>	Physical, chemical and biological characteristics of water; water quality standards for drinking, irrigation, industrial and other uses, effect of domestic, agricultural and industrial pollution on water quality, methods of water quality surveys and monitoring, field and laboratory techniques of water analyses, bacteriological methods of analyses, analytical methods and instrumentation techniques in water pollution studies, water pollution indices, statistical methods and data presentation, activities to improve water quality (conventional and modern techniques) conservation of water sources, migration of pollutants, water quality modeling
<b>Methodology and training methods</b>	Lectures, field visits, demonstrations, laboratory practice, small project assignments, class room exercises
<b>Delivery dates</b>	Duration: Three weeks 2 <sup>nd</sup> to 4 <sup>th</sup> week of October 1999 and 2000 2 <sup>nd</sup> to 4 <sup>th</sup> week of January 2000 (Exact date will be set on receipt of nominations)
<b>Last admission date</b>	One month before the commencement of course
<b>Admission qualifications</b>	MSc.(Chemistry/ Biological Sciences/ Life Sciences ) or BE( Civil Engineering), Diploma in Civil Engineering
<b>Basic course fee</b>	Rs 40,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 12,000 per person)

<b>Name of institute</b>	Centre for Water Resources Development and Management	
<b>Contact person</b>	Dr. P. S. Harikumar Scientist Central Water Analysis Laboratory	
<b>Address</b>	Centre for Water Resources Development and Management Kozhikode-673 571 Kerala	
<b>Telephone</b>	0495-355864	<b>Telex:</b> 0804-294
<b>Fax</b>	0495-357827	<b>E-mail:</b> cwrmd@ker.nic.in

## *Water quality monitoring and modeling*

<b>Topics</b>	Basic and environment chemistry; ecology and environment microbiology; waste generation and its impacts on environment; instrumental analysis; water quality network design and modeling; statistics and interpretation of data
<b>Methodology and training methods</b>	Lectures, handouts and hands-on practice, field visits, working on and use of Personal computers, Use of GIS, DIP, LSI
<b>Delivery dates</b>	15 November – 31 December 31, 1999 Duration: 8 weeks.
<b>Last admission date</b>	As mutually convenient to client and NEERI
<b>Admission qualifications</b>	Not indicated. Open for water quality chemists. Minimum number of trainees: 15, maximum: 25
<b>Basic course fee</b>	Rs 10,000 per person per week
<b>Estimated board &amp; lodging cost</b>	Rs 3,000 per person per week

<b>Name of institute</b>	National Environmental Engineering Research Institute		
<b>Contact person</b>	Dr. R. Sarin/Dr. (Mrs.) N. P. Thacker		
<b>Address</b>	Nehru Marg Nagpur - 440020		
<b>Telephone</b>	0712 - 22 56 40 0712 - 22 60 71 (ext: 416)	<b>Telex</b>	+715-7233 NEERI IN
<b>Fax</b>	0712 - 22 27 25 0712 - 22 56 40	<b>E-mail</b>	drsarin@nagpur.dot.net.in

# *Water quality: analysis, monitoring, network design and data processing*

<b>Topics</b>	Surface and ground water pollution; water quality parameters; physico-chemical and microbiological analysis of water samples. Mandates and networks of organisations involved in water quality monitoring; concepts of probability and statistics for water quality; design of monitoring networks; location of stations; sampling frequency evaluation, selection of parameters; rationalisation of networks. Data availability; data validation; parametric and non-parametric techniques of data analysis; testing for distributions and data transformation; interparametric and inter-location co-relations; assessment of variability; trend analysis; flux estimation; violation of standards; graphical presentation.	
<b>Methodology and training methods</b>	Lectures, laboratory and tutorials sessions; panel discussion, study tour, special problem assignment. Participants advised to bring data/information for analysis/presentation for the assignment	
<b>Delivery dates</b>	Duration: 3 weeks 13 March – 1 April 2000 15 May-3 June 2000	
<b>Last admission date</b>	6 weeks before the commencement of course	
<b>Admission qualifications</b>	BE(Civil, Mech., Hydrology, Agricultural Engg.); MSc./MTech( Chem.,Geol.,Geophy.,Appl.Geol.,Appl. Geoph.,Phys.,Meteo., Geogr., Environmental Science; Statistics and Maths.	
<b>Basic course fee</b>	Rs. 22,500 per person Group size: 10-15 participants	
<b>Estimated board &amp; lodging cost</b>	Rs 4, 000 per person	
<b>Name of institute</b>	Department of Hydrology, University of Roorkee	
<b>Contact person</b>	Dr. D. K. Srivastava, Professor and Head	
<b>Address</b>	Department of Hydrology, University of Roorkee, Roorkee, Uttar Pradesh-247667	
<b>Telephone</b>	Off: 01332-85236(Direct) 01332 - 723 49 Extn: 5236 & 4336 Res: 01332-85156	<b>Telex</b> 0597-201UOR IN
<b>Fax</b>	01332 - 735 60	<b>E-mail</b> hydro@rurkiu.ernet.in

## *Water quality analysis*

<b>Topics</b>	Not available, will be developed by ITRC as per requirement.
<b>Methodology and training methods</b>	Lectures, Laboratory work practice, Field visits, surveys, data collection and on- the-job training, Computer exercises
<b>Delivery dates</b>	As mutually convenient to the HP agencies and ITRC Duration: 1 to 10 weeks
<b>Last admission date</b>	One month in advance of the commencement of the course
<b>Admission qualifications</b>	B.E (Civil)/MSc in relevant subject and work experience
<b>Basic course fee</b>	Rs 1000 per person per day
<b>Estimated board &amp; lodging cost</b>	Accommodation not available at the ITRC

<b>Name of institute</b>	Industrial Toxicology Research Centre		
<b>Contact person</b>	Mr. K. K. Gupta Head, Industrial Liaison		
<b>Address</b>	PO Box No. 80 Lucknow-226001 Uttar Pradesh		
<b>Telephone</b>	0522 – 21 15 47 0522 – 22 82 27	<b>Telex</b>	05 35 24 56
<b>Fax</b>	0522 - 22 82 27	<b>E-mail</b>	kkg@itrc.sirnetd.ernet.in

# *Postgraduate diploma in watershed management*

<b>Topics</b>	Fundamentals of photogrammetry and remote sensing; digital image processing and fundamentals of GIS; multidisciplinary sciences; water resources assessment: surface water inventory, snow melt runoff forecasting, hydro-meteorology, rainfall-runoff modeling and ground water targeting; watershed management: water shed characterisation and management, sediment yield modeling, conservation measures for integrated watershed management and planning, watershed development projects monitoring and economic evaluation..
<b>Methodology and training methods</b>	Lectures, practical sessions, tutorials, study tours and hands-on-experience using computers for image processing and GIS exercises for water resources- related studies; pilot project
<b>Delivery dates</b>	2 August 1999-2 July 2000 Duration: 10 months
<b>Last admission date</b>	15 July 1999
<b>Admission qualifications</b>	BE(Civil Engineering)/ ME( Water resources/Hydrology ) SW discipline only
<b>Basic course fee</b>	<i>For government sponsored staff: No course fee</i> Others: Rs. 60,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 20,000 per person

<b>Name of institute</b>	Indian Institute of Remote Sensing	
<b>Contact person</b>	Dr. P. S. Roy, Dean Mr. V. Prasad Head, Water Resources	
<b>Address</b>	No: 4, Kalidas Road P. B. No: 135 Dehradun-248001 Uttar Pradesh	
<b>Telephone</b>	0135-744583, 748041	<b>Telex</b>
<b>Fax</b>	0135-741987, 758041	<b>E-mail:</b> dean@del2.vsnl.net.in V_h_p@hotmail.com

## *Management information systems in hydrology and hydro-geology*

<b>Topics</b>	Data and information, need for management information systems in hydrology and hydro-geology, windows operating system, relational database management systems and data base design with special reference to rainfall, stream flow and water table data, understanding SQL, visual front end tools for developing management information systems
<b>Methodology and training methods</b>	Guided practical sessions with PC's on Windows operating systems supplemented by class room lectures, demonstration of selected MIS in-house, Group project work, study tour to Technopark in Trivandrum
<b>Delivery dates</b>	29 November-18 December 1999 Duration: 20 days
<b>Last admission date</b>	1 November 1999
<b>Admission qualifications</b>	BE or MSc. One years professional experience in hydrology, hydro-geology, hydrological or hydro-geological data collection
<b>Basic course fee</b>	Rs 40,000 per person
<b>Estimated board &amp; lodging cost</b>	Rs 12,000 per person

<b>Name of institute</b>	Centre for Water Resources Development and Management	
<b>Contact person</b>	Dr. S. P. Rajagopalan Head Computer Application Division	
<b>Address</b>	Centre for Water Resources Development and Management Kozhikode-673 571 Kerala	
<b>Telephone</b>	0495-355864	<b>Telex:</b> 0804-294
<b>Fax</b>	0495-357827	<b>E-mail:</b> cwrmdm@ker.nic.in