



**ONE WEEK SHORT TERM COURSE ON  
COMPUTATIONAL METHODS FOR HYDROLOGIC SYSTEMS**  
(Sponsored by Ministry of Human Resource Development (MHRD), under Scheme of 'GIAN')  
(2<sup>nd</sup> -6<sup>th</sup> January 2018)

.....

**OVERVIEW**

Hydrologic system modelling relies heavily on system-based approach to generalize hydrologic processes to make spatial and temporal predictions about the quantity and quality of water. Despite advances in computer modelling tools, inverse techniques, complete understanding of hydrological processes remains elusive, and fundamental flow and transport problems remain extremely difficult due to spatial heterogeneity, temporal variability and nonlinearity of fluid dynamics, and coupling between chemical, physical, and biological processes as well as data limitations and uncertainties.

This course aims on developing the fundamental understanding of hydrologic processes. Course will also demonstrate the effectiveness of mathematical modelling approach through model development, simulation and validation.

**OBJECTIVES**

The primary objectives of the course are as follows:

- i) Introduce various types of system behaviours and development of simple models
- ii) Introduce HEC-HMS, HYDRUS, AQTESOLVE, and MODFLOW software's to simulate various hydrologic system behaviour
- iii) Adopt hands-on modelling approach in which participants conceptualize and formulate variety of hydrologic mathematical models

## Course

## Content

<b>Lecture 1</b>	General Introduction of course, Introduction to hydrologic systems and processes
<b>Tutorial 1</b>	Hands-on modelling exercises to develop basic understanding of computer modelling
<b>Tutorial 2</b>	Hands-on modelling exercises to develop basic understanding of computer modelling
<b>Lecture 2</b>	Understand various elements of models, introduction to system modelling approach, and discussion of types of models and data trend analysis
<b>Lecture 3</b>	Elements of urban water systems, understanding flooding problems in developed watersheds, computer modelling approaches for urban watersheds
<b>Tutorial 3</b>	Hands-on model development using HEC-HMS for urban flood management and flood frequency analysis. Case studies based on real data sets.
<b>Tutorial 4</b>	Hands-on model development using HEC-HMS for urban flood management and flood frequency analysis. Case studies based on real data sets.
<b>Lecture 4</b>	Flood control methods, sizing and design of water-control measures, flood plain management
<b>Lecture 5</b>	Infiltration and role of unsaturated zone, transport of solutes through infiltration process
<b>Tutorial 5</b>	Hands-on model development using HYDRUS for water flow and solute transport. Case studies based on real data sets.
<b>Tutorial 6</b>	Hands-on model development using HYDRUS for water flow and solute transport. Case studies based on real data sets.
<b>Lecture 6</b>	Non-equilibrium water flow and solute transport, Coupled water, vapour and heat transport
<b>Lecture 7</b>	Develop perspective on well hydraulics, pumping tests and its importance, advances in methods for analysing pumping test data
<b>Tutorial 7</b>	Hands-on model development using AQTESOLVE for analysing pumping test and slug test data. Case studies based on real data sets.
<b>Tutorial 8</b>	Hands-on model development using AQTESOLVE for analysing pumping test and slug test data. Case studies based on real data sets.
<b>Lecture 8</b>	Slug tests and constant head tests, recent advances in methods for analysing slug test data
<b>Lecture 9</b>	Mathematical models for groundwater systems, numerical methods for groundwater flow and transport modelling
<b>Tutorial 9</b>	Hands-on model development using MODFLOW for water flow and solute transport in groundwater. Case studies based on real data sets.

## Who can

## attend

- Senior Undergraduate students, Graduate students (pursuing Master's and PhD degrees), Postdoctoral Fellows of Engineering.
- Practicing Engineers and Scientists working in Industries, as well as, government research organizations.
- Faculty from reputed academic institutions and technical institutions

## Fees

**Participants from Abroad:** US \$ 150

**Professionals From Industries/Research Organizations:** 4000 INR

**Professionals from academic institutions:** 3000 INR

**Students from Research/Academic Institutions:** 1500 INR

- Registration Fee only includes attendance to sessions, course materials and lecture notes
- The participants will be provided single bedded accommodations and food on payment basis in the institute guest house based on availability.

To register or for any questions please send an email to [giancedpantnagar@gmail.com](mailto:giancedpantnagar@gmail.com)

## REGISTRATION PROCESS

Registration for GIAN courses is not automatic because of the constraints on maximum number of participants allowed to register for a course. In order to register for one or multiple non-overlapping courses, you have to apply online using the following steps:

### Stage1:

**Web (Portal) Registration:** Visit GIAN Website at the link: <http://www.gian.iitkgp.ac.in/GREGN/index> and create login user ID and Password. Fill up blank registration form and do web registration by paying Rs. 500/- on line through Net Banking/ Debit/ Credit Card. This provides the user with life time registration to enroll in any no. of GIAN courses offered.

### Stage2:

**Course Registration (Through GIAN Portal):** Log in to the GIAN portal with the user ID and Password created. Click on “Course Registration” option given at the top of the registration form. Select the Course titled “**Computational Methods for Hydrologic Systems**” from the list and click on “Save” option. Confirm your registration by Clicking on “Confirm Course”.

Fill the form under “Application” tab either on-line or offline. The signed offline application should be sent to the course- coordinator via email at [giancedpantnagar@gmail.com](mailto:giancedpantnagar@gmail.com). Only Selected Candidates will be intimated through E-mail by Course Coordinator.

**The fees should be paid in the form of Draft/NEFT/RTGS Payable in favour of GIAN CIVIL (Punjab National Bank (PNB) Pantnagar, Uttarakhand), Account no: 4446000400010504 Branch Code: 444600, MICR Code: 263024252, IFSC Code: PUNB0444600.**

## Course Faculty



**Dr. Phoolendra Mishra** is currently working with **California State University Fullerton CA USA**. He received his PhD from the University of Arizona. Prior to joining California State University, he worked at **Los Alamos National Laboratory**, an esteemed research organization.

Dr. Mishra has over 10 years of experience in hydrologic modelling. He has taught wide range of graduate and undergraduate courses and is recipient of exceptional teaching effectiveness award from California State University. Dr. Mishra actively engages undergraduate and graduate students in his research and promotes engineering education through hands-on activities. His research interests include modelling flow and transport in hydrologic systems, coupled processes modelling, parameter estimation, and uncertainty quantification. He has published numerous research articles in these areas.

## Course Coordinator



**Dr Sanjeev Suman** is presently working with **Department of Civil Engineering of College of Technology, G. B. Pant University of Agriculture & Technology, Pantnagar (U. S. Nagar), Uttarakhand, India**.

His area of interest include Optimization of Water Distribution Network, Ant System Optimization, Intelligent Transport System (ITS), Advanced Public Transport System, Advanced Traveler Information System, GIS and Web GIS applications in Transportation and Advanced Surveying. He has more than 13 years of teaching and research experience at this university. His teaching involves both Undergraduate and Post Graduate level at the University in Highway Engineering, Mechanics and Advanced Surveying related subjects. He has several publications in peer-reviewed journals/conferences of national and international repute.

## Course Co- Coordinator



**Dr. Sandeep Gupta** is presently with the **Department of Civil Engineering, College of Technology, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India**. He has a wide teaching and research experience. The areas of his research interests include GIS, Water and Waste Water Treatment and Solid Waste Management. He has several publications in peer-reviewed journals/conferences of national and international repute. He has also attended several national and international conferences in India.

**Contact  
Information**

**Course Coordinator**  
Dr. Sanjeev Suman  
Department of Civil Engineering  
College of Technology  
G.B. Pant University of Agriculture  
&Technology  
Pantnagar, Uttarakhand, India  
Email:  
[giancedpantnagar@gmail.com](mailto:giancedpantnagar@gmail.com)  
[sanjeevsumanemail@gmail.com](mailto:sanjeevsumanemail@gmail.com)  
Mobile No. +91-7417236206

**Course Co-Coordinator**  
Dr. Sandeep Gupta  
Department of Civil Engineering  
College of Technology  
G.B. Pant University of Agriculture  
&Technology  
Pantnagar, Uttarakhand, India  
Email:  
[giancedpantnagar@gmail.com](mailto:giancedpantnagar@gmail.com)  
[gupt\\_sand@rediffmail.com](mailto:gupt_sand@rediffmail.com)  
Mobile No. +91-9411027629

**GIAN Short Term Course on  
COMPUTATIONAL METHODS FOR HYDROLOGIC SYSTEMS  
(2<sup>nd</sup>-6<sup>th</sup> January 2018)**

**REGISTRATION FORM**

GIAN Registration No \_\_\_\_\_  
Name: \_\_\_\_\_  
Designation: \_\_\_\_\_  
Department: \_\_\_\_\_  
Academic Degree: \_\_\_\_\_  
Address for correspondence: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phone: \_\_\_\_\_  
E-mail: \_\_\_\_\_

Category of participant:

- Foreign Participant
- Participant from Industries/Research Organizations
- Faculty participant from academic institutions
- Students Participant from Research/Academic Institutions

Accommodation required: Yes/No

**Payment Details:** \_\_\_\_\_

Amount \_\_\_\_\_

DD No. and Date \_\_\_\_\_

**Payment Mode:** Draft/NEFT/RTGS Payable in favour of GIAN CIVIL (Punjab National Bank (PNB) Pantnagar, Uttarakhand), Account no: 4446000400010504, Branch Code: 444600, MICR Code: 263024252, IFSC Code: PUNB0444600.

I agree to attend the course for the entire duration

Signature of Participant