

A short-term course on

# Soil Moisture and Soil Hydraulic Properties at Micro- and Macro-Scales for Water Resources Management

under the aegis of MHRD—Global Initiative of Academic Networks (GIAN)

## Overview

The course is designed to provide a theoretical basis for understanding the significance of soil moisture and soil hydraulic properties and different ways to estimate these earth system state and properties at micro- and macro-scales. The emphasis is on effective utilization of the knowledge of soil moisture status and soil hydraulic properties and their spatial variability in various aspects of water resources management.

At field scales, soil moisture studies are conducted using insitu observations or downscaled remote sensing data, and such analyses are useful in agricultural water management and non-point source pollution control. The soil hydraulic properties are valuable inputs to watershed/basin hydrological models that help address: improvement of their prediction capabilities, risk preparedness, etc.; climate change and climate variability; and flood and drought management at basin/regional scales. The soil hydraulic property estimation techniques using field measurement and remote sensing techniques are reviewed, and popular up- and down-scaling methodologies will be covered in the lectures. The significance of surface water-groundwater interaction in hydrological models and recharge estimation studies, as well as the various aspects of non-point source contamination and its management will be discussed. Additionally, case studies, instrumented field site visit, and assignments will cover ongoing research in soil hydrology.

<b>Modules</b>	<p>The course covers the following topics over a span of 5 days, from <b>Dec. 26 - Dec. 30, 2016</b>:</p> <ul style="list-style-type: none"><li>▪ Soil moisture spatio-temporal variability using remote sensing and ground observations, physical controls, and scaling</li><li>▪ Measurement and estimation of soil hydraulic properties (SHPs),</li><li>▪ Scaling tools and techniques, Indirect estimation techniques, Transfer Functions</li><li>▪ Uncertainty in SHP estimation, Bayesian techniques</li><li>▪ Applications in watershed modeling and management</li><li>▪ Surface water-groundwater interactions, Non-point source pollution management</li></ul> <p><i>Number of participants for the course will be limited to 50.</i></p>
<b>Who can attend?</b>	<ul style="list-style-type: none"><li>▪ Engineers and researchers involved in civil, agricultural, hydrologic, water resources, and environmental engineering profession including R&amp;D laboratories</li><li>▪ Students at all levels and faculty members from reputed academic and technical institutions</li></ul>
<b>Fees</b>	<p>The participation fees for taking the course is as follows:</p> <ul style="list-style-type: none"><li>▪ Participants from abroad: US \$500</li><li>▪ Industry/ Research Organizations: Rs. 10000/- per participant</li><li>▪ Academic Institutions: Rs. 5000/- per participant</li><li>▪ M.Tech. and Ph.D. students: Rs. 1000/- per participant</li><li>▪ UG students: Rs. 500/- per participant</li></ul> <p>The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hrs. free internet facility. The participants will be provided with accommodation on payment basis.</p>

## The Faculty



**Prof. Binayak Mohanty** is a Regents Professor and Endowed Chair in Biological and Agricultural Engineering/Ecosystem Science and Management/ Water Management and Hydrologic Sciences at Texas A&M University, College Station, Texas (USA). Prof. Mohanty has a unique role in modern hydrology and flow through porous media. He is an international leader in using satellite remote sensing as a tool to study soil moisture, soil hydraulics, and evapotranspiration at different scales. Most impactful efforts of Prof. Mohanty's research includes the implementation of satellite platforms for Earth surface's hydrologic parameter exploration at multiple scales, and discovery of soil moisture scaling rules including the dominant geophysical controls under different hydrologic and climatic conditions. He received the prestigious Don and Betty Kirkham Soil Physics award from Soil Science Society of America for his seminal research contributions in 2014.



**Prof. R K Panda** is currently a Professor and the Head of the School of Infrastructure as well as the Dean (Research & Development) at IIT Bhubaneswar. He has 25 years of experience in the IIT system (22 years at IIT Kharagpur and 3 years at IIT Bhubaneswar). His major areas of research and teaching interest are: hydrology, watershed management, non-point source pollution of water resources, rainwater management and deficit irrigation management. He has guided 14 Ph.D and 68 M.Tech students and has more than 100 publications in high impact journals. He has executed several sponsored research and consultancy projects. He is currently the Lead Principal Investigator of a multi-institutional collaborative project in eastern India funded by the Ministry of Information Technology with the major objective to reverse the decline in groundwater level and quality through improved water management strategies under climate change scenario leading to induced recharge and enhanced water-use efficiency.



**Dr. Meenu Ramadas** is currently working as an Assistant Professor in School of Infrastructure at IIT Bhubaneswar. Dr. Ramadas's teaching and research interests include surface and ground water hydrology, water resources engineering, unsaturated flows, climate change impact assessment, and probabilistic and statistical modeling in hydrology. She has worked on funded projects for developing probabilistic drought models at Purdue University. During her Ph.D., she has also worked on unsaturated flows in vertically non-uniform soils.

## Venue

School of Infrastructure  
IIT Bhubaneswar, Argul Campus  
Jatni, Khurda Dist. -752050

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## Course Co-ordinators

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## Last Date of Registration:

November 30, 2016

## Visit GIAN registration portal:

<http://www.gian.iitkgp.ac.in/GREGN/index>

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## Online Payment of Course Fee Bank Details

A/c Name : CEP, IIT Bhubaneswar  
A/c No. : 24282010001960  
IFSC Code : SYNB0002428  
Bank Name : Syndicate Bank  
Address : Syndicate Bank Branch  
IIT Bhubaneswar