# Flow and contaminant transport through subsurface

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## Overview

Groundwater is an important natural resource that is extensively used for various industrial, agricultural and domestic purposes. In large part of the country, groundwater is the only source of water for human consumption. Groundwater can become contaminated from point source pollution that comes from a single source, such as wastewater treatment plant. Also, our country mostly depends on agricultural and industrial sectors to serve the population and to enhance the overall quality of life. High yields from agricultural sectors are often accompanied by a host of environmental problems in the form of increased use of fertilizers and pesticides in agriculture, or generation of harmful byproducts in industrial operations. Sometimes, leaching of wastes from landfills or discharge of industrial wastes to the soil without treatment also affects groundwater quality. The wastewater infiltrates through the vadose zone and upon reaching the water table, continues to travel for large distances through the subsurface environment. Hence, understanding and analyzing the subsurface flow and contaminants as they move from source to receptor locations is needed to design effective abatement strategies, remediation plans and use of modeling techniques for groundwater resources protection. Our understanding is derived from various mathematical models to describe the flow and contaminant transport processes that influence contaminant behavior through subsurface media.

Apart from the motivation for applications in the subsurface, it is useful for providing groundwater flow and contaminant transport processes that exert control on contaminant movement and sea water intrusion. It is well-suited as a topic for a workshop or short term course. This course aims to introduce the principles of groundwater flow, modeling flow and contaminant transport, seawater intrusion, aquifer parameter estimation and root water uptake models through vadose zone for the benefit of scientific and societal community of the country.

Course participants will learn these topics through lectures and tutorials/experiments. Also, case studies and assignments will be shared to stimulate research motivation of participants.

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| Modules | **(A)** Groundwater, surface and subsurface water interaction, Darcy's law and Governing flow equation, Vadose zone, hydraulic conductivity, contaminant transport, Leaky and multi-layer aquifer, pumping test analysis, Saline water intrusion and modeling flow through the root zone. **: February 20-24, 2023**<br>Number of participants for the course will be limited to fifty. |
| You Should Attend If… | ▪ you are a civil engineer or research scientist interested in groundwater flow and contaminant transport through subsurface porous media.<br>▪ you are a student of B.Tech. or M.Tech. or Ph.D. pursuing from academic institutions interested in higher studies in the field of groundwater hydrology and want to learn flow and contaminant transport through subsurface media.<br>▪ you are a faculty from an academic institution interested in learning how to do research on flow and contaminant transport through subsurface porous media. |
| Fees | The participation fees for taking the course is as follows:<br>Participants from abroad: US $100<br>Industry/ Research Organizations: Rupees 10000<br>Academic Institutions: Rupees 3500 for students and Rupees 6500 for faculty.<br>The above fee includes all instructional materials, computer use for tutorials, assignments, and laboratory equipment usage charges. The participants will be provided with accommodation on a payment basis. |

# The Faculty

**Dr. Rao S. Govindaraju** is the **Professor of Purdue University West Lafayette USA**. His research interests include watershed hydrology, stochastic and statistical hydrology, spatial variability, modeling surface and subsurface water movement and fate and transport of contaminants.

**Dr. Pramod Kumar Sharma** is an Associate Professor of Indian Institute of Technology, Roorkee. His research interest is Groundwater hydrology and hydraulics, mathematical and numerical modeling, flow and contaminant transport.

**Dr. K. S. Hari Prasad** is the Professor of Indian Institute of Technology, Roorkee. His research interest is Parameter estimation, stochastic hydrology, Irrigation Engineering, groundwater modeling and hydraulics modeling studies.

# Course Co-ordinator

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