Weather Radar and Hydrology

Overview

Rainfall is among the most uncertain of weather variables to measure, primarily due to its spatial and temporal variability. Raingages at best represent only point measurement of rainfall and the density of raingage network needed to capture the spatial variability of rainfall accurately over a large area is often not enough for hydrologic modelling and flood forecasting. In the past two decades, weather radar technology has advanced considerably for accurately characterizing the spatial variability of rainfall. Today, radar has an important role in flood forecasting, flood mitigation & management and water resources management in various regions.

This course intends to provide graduate students, operational forecasters, and researchers with a theoretical framework and practical knowledge of radar precipitation estimation. Further, this course will also provide an overview of distributed hydrologic modelling using HEC-HMS and integration of radar data for flood modelling and forecasting.

The objectives of the course are:

- Provide theoretical framework and practical knowledge of radar precipitation estimation
- Processing of radar data to arrive at accurate estimates of rainfall
- Advanced radar sensing principles and applications
- Hands-on application of hydrologic models, Radar rainfall inputs, parameters, state variables, calibration procedures, and outputs

Dates for the Course	**5th March 2018 to 17th March 2018**
Host Institute	**IIT Madras**
No. of Credits	**2**
Maximum No. of Participants	**30**
You Should Attend If…	▪ You work in the areas of hydrology, water resources and flood forecasting. ▪ you are a student or faculty from academic institution interested in learning the concepts of hydrologic models such as HEC-HMS
Course Registration Fees	The participation fees for taking the course is as follows: **Student Participants:** Rs.2,000 **Faculty Participants:** Rs.5,000 **Government Research Organization Participants**: Rs.5,000 **Industry Participants:** Rs.10,000 The above fee is towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges. Accommodation is not a part of registration fee. **Mode of payment:** **Online transfer: (Preferred)** Account Name: CCE IIT Madras Acc. No.: 36401111110 Branch: SBI, IIT Madras Branch, Chennai , IFSC Code: SBIN0001055 **OR** Demand draft in favour of "Registrar, IIT Madras" payable at Chennai. **The demand draft is to be sent to the Course Coordinator at the address given below.**
Accommodation	The participants may be provided with hostel accommodation, depending on the availability, on payment basis. Accommodation is not a part of registration fee. Request for hostel accommodation may be submitted through the link: http://hosteldine.iitm.ac.in/iitmhostel

Course Faculty

Dr. Chandrasekar(Chandra),is currently a University Distinguished Professor at Colorado State University. He has made pioneering contributions in the area of "Polarimetric Radar Observations of the Atmosphere". Dr. Chandra has extensive experience in Radar System Design, Radar Network Development, DSP Design as well as RF Communication Systems. He has contributed significantly to the areas weather radar and applications to Atmospheric Sciences. Dr Chandra is co-author of two textbooks, Polarimetric and Doppler Weather Radar (by Cambridge University Press) and Probability and Random Processes (by McGraw Hill) and five general-purpose books. He has been a PI or Co-PI on several national level programs such as the Advanced Communication Technology Satellite (ACTS) program at CSU, DARPA NGI program, the NASA TRMM and GPM missions. He is currently a CO-PI of the CSU-CHILL radar facility and plays an important role in maintaining it as one of the most advanced meteorological radar systems in the world available for research, and continues to work actively with the CSU-CHILL radar supporting its research and education mission. He is a Fellow of IEEE, The American Meteorological Society and CIRA (NOAA), and Knighted by the Government of Finland. He was a member of the National Academy of Sciences panel on "Future Radar Systems beyond NEXRAD ".He has served as a visiting professor at the National research Council of Italy, as well as Distinguished Visiting Scientist at the NASA Goddard Space Flight Center. He has won numerous awards including the IEEE (Remote sensing) Education award and the Outstanding Researcher Award.

Dr. Balaji Narasimhan, is an Associate Professor in the Department of Civil Engineering, IIT Madras. He has over 12 years of experience in the use of GIS and remote sensing tools for hydrologic model development. He was also a Member of "Think Tank" for development of Water Resources Information System (WRIS), Ministry of Water Resources, Govt. of India. His fields of interests include, hydrologic modelling of floods, Irrigation water management, and Hydroinformatics.

Course Coordinator

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For detailed Syllabus:
URL: http://www.civil.iitm.ac.in/balaji_edu

Spatial Modelling and Analysis of Environmental Systems using open source tools

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Overview

Natural resources and Environmental Systems exhibit a high level of spatial and temporal variability depending on the scale at which a process or phenomenon is considered. Hence, we often collect Geo-spatial data using different methods of ground survey, ground based sensors and satellite based sensors at varying levels of spatial resolution. For understanding the process, we often have to integrate geo-spatial data from different platforms and resolutions, called geospatial modelling.

This course will provide Theory and practice of applying geo-spatial data for resource inventory and analysis, biophysical process modeling, and land surveys. Emphasizes use and evaluation of spatial analytical methods applied to agronomic and environmental systems and processes. Laboratory section is used to process, analyze, and visualize geo-spatial data of interest to the student, ending in a comprehensive student project.

This course is aimed at Graduate and senior undergraduate students who want to advance their understanding of geographic information science and technology, including introduction to the R environment for (spatial) statistical computing and visualization, and the QGIS open-source GIS. This will be especially useful for students starting a graduate research project that uses spatial information in natural resource management, hydrology, ecology, and soil science. The following are the expected learning outcome from the course:

- Student is able to analyze complex spatial problems with appropriate theory and tools
- Enhance student skills in processing, analyzing, and visualizing spatial data; with emphasis on open-source computer programs and publically-available data
- Provide opportunities to analyze students' own geospatial data under instructor supervision

Dates for the Course	**11th June 2018 to 23rd June 2018**
Host Institute	**IIT Madras**
No. of Credits	**2**
Maximum No. of Participants	**30**
You Should Attend If…	▪ You work in the areas of GIS, remote sensing and natural resources systems ▪ you are a student or faculty from academic institution interested in learning the concepts of geoinformatics
Course Registration Fees	The participation fees for taking the course is as follows: **Student Participants:** Rs.2,000 **Faculty Participants:** Rs.5,000 **Government Research Organization Participants**: Rs.5,000 **Industry Participants:** Rs.10,000 The above fee is towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges. Accommodation is not a part of registration fee. **Mode of payment:** **Online transfer: (Preferred)** Account Name: CCE IIT Madras Acc. No.: 36401111110 Branch: SBI, IIT Madras Branch, Chennai , IFSC Code: SBIN0001055 **OR** Demand draft in favour of "Registrar, IIT Madras" payable at Chennai. **The demand draft is to be sent to the Course Coordinator at the address given below.**
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Course Faculty

Dr D (David) G Rossiter is an Adjunct Associate Professor at Cornell, where he teaches a one-semester graduate course in spatial modelling for agronomic, natural resources and environmental issues. David is a well-regarded research leader in the field of Geo-spatial modelling analysis, specifically to soil and environmental systems, and has more than 60 peer-reviewed publications. David retired from University of Twente, Faculty ITC, Netherlands, in August 2014 after 17 years service and was invited to join ISRIC as an in-house strategic consultant. He also works at ISRIC-World Soil Information in Wageningen (NL) as guest researcher on digital soil mapping, and for the past six years he has done collaborative research and teaching during the fall months in Nanjing (China) either at the Soil Science Institute, Chinese Academy of Sciences, and/or at Nanjing Normal University's Graduate Faculty.

Dr. Balaji Narasimhan, is an Associate Professor in the Department of Civil Engineering, IIT Madras. He has over 12 years of experience in the use of GIS and remote sensing tools for hydrologic model development. He was also a Member of "Think Tank" for development of Water Resources Information System (WRIS), Ministry of Water Resources, Govt. of India. His fields of interests include, hydrologic modelling of floods, Irrigation water management, and Hydroinformatics.

Course Coordinator

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For detailed syllabus please look at:
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