A Short Course on

Statistical and Machine Learning Techniques in Climate Change and Hydrological Studies

Department of Civil Engineering, Indian Institute of Technology, Kharagpur, India

3rd to 5th March, 2025

About the Course

Climate change is one of the most critical and pressing concerns in the contemporary global landscape, posing a serious challenge to the conventional hydroclimatic/hydrologic modelling. To this end, this short course aims to provide an in-depth understanding of changing climate and equip participants with statistical and machine learning techniques to analyze its impacts and address associated hydrological challenges. This course balances foundational knowledge for beginners with advanced concepts for researchers and practitioners, fostering a deeper understanding of both theory and application. Overall, the aim of this course is to integrate theoretical foundations with hands-on practical sessions, focusing on real-world case studies and emerging trends in climate and data science. Key topics include fundamentals of climate change, climate modelling, basic to advanced statistical modeling, machine learning algorithms, and their integration into climate and hydrology research, with a special focus on hydroclimatic extremes, uncertainty quantification, and predictive modeling.

Objectives of the Course

- To introduce participants to statistical and machine learning techniques relevant to climate and hydrological studies.
- To discuss recent advancements in the science of climate change and predictive modeling.
- To enable participants to design data-driven solutions for climate and water resource management challenges.
- To provide hands-on experience/case studies in analyzing climate data.

Course Highlights

- Expert lectures by renowned professors and researchers in climate science and hydrology
- Hands-on sessions with Python, R or MATLAB for practical data analysis
- Real-world case studies focusing on climate change impacts on hydroclimatic extremes
- Interactive discussions and networking opportunities

Who should attend?

- Graduate and postgraduate students
- Researchers in climate science, hydrology, and data science
- Professionals and engineers from water resource management, environmental sciences, and related industries
- Policymakers and practitioners involved in climate adaptation and mitigation strategies

Teaching Faculty

Prof. Rajib Maity
Professor, Department of Civil Engineering, Indian Institute of Technology Kharagpur, India

Dr. Rajib Maity is a professor in the Department of Civil Engineering, IIT Kharagpur, India. His research areas include hydroclimatology, stochastic hydrology, climate impacts on water resources, hydrologic time series analyses and forecasting. He has published a book on 'Statistical Methods in Hydrology and Hydroclimatology,' several chapters, and over 100 research articles in various peer-reviewed journals and conferences. Some of his professional awards/honors include Humboldt Fellowship (experienced category) from Alexander von Humboldt Foundation (Germany), Fellow, Royal Meteorological Society, UK, BOYSCAST Fellowship (India/USA), DAAD Fellowship for IIT faculty (Germany), International ICE WaRM Fellowship (Australia).

Prof. Changhyun Jun
Associate Professor,
School of Civil, Environmental and Architectural Engineering
Korea University, Republic of Korea

Dr. Jun is an Associate Professor at the School of Civil, Environmental, and Architectural Engineering, Korea University. His research spans a wide range of topics, including watershed modeling, climate change impacts on the hydrologic cycle, and sustainable urban design for climate adaptation. With expertise in applied mathematics, physics, and statistics, he has led studies on urban water disaster mitigation, focusing on rainstorm characteristics, dam operations, and flood routing. His work contributes directly to the measurement and analysis of hydrological processes across spatial and temporal scales, advancing the development of water-sensitive cities for a more sustainable future.

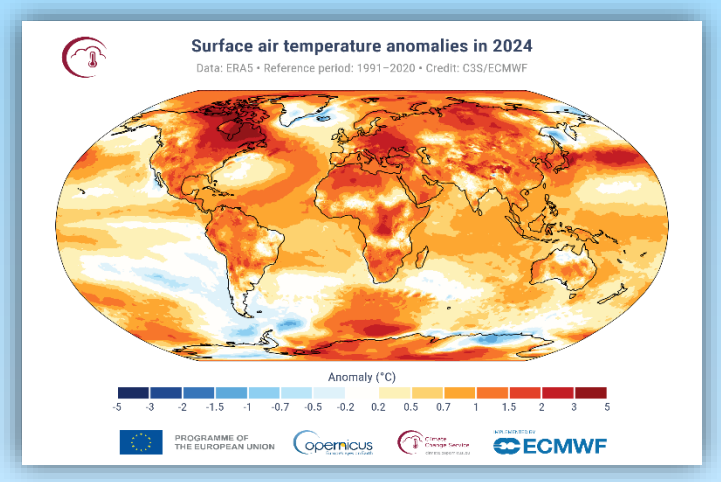
Important Details

- Course Schedule: Mar 03-05, 2025
- Last date for course registration: Feb 21, 2025
- Last date for fee submission (Only for selected participants): Feb 25, 2025
- Venue: Seminar Room, Department of Civil Engineering, IIT Kharagpur
- Certificates will be provided to the participants

Course Registration fee

❖ For everyone: Rs 15,000.00/- (including accommodation in the institute guest house inside the campus)

*Payment should be made only after receiving the registration confirmation mail



How to apply:

https://erp.iitkgp.ac.in/CEP/courses.htm (use the link to apply online)

Sign up → Verify your email-id → Login → Fill up profile details → Choose your program from the dashboard → Click on 'APPLY NOW'

- This is a one-time sign up process for applying through IIT Kharagpur online program registration portal. You can apply for any other programme any number of times using the same Login-id and Password.
- An e-mail will be communicated from Principal Coordinator/Convenor/Organiser, IIT Kharagpur to the shortlisted applicants stating the payment procedure once shortlisting is confirmed.

Topics to be Covered

- ✓ Role of Statistical and Machine Learning in Hydroclimatic Data Analysis
- ✓ Introduction to Machine Learning: Algorithms and Their Applications
- ✓ Climate Change Impact assessments: Recent Developments and Challenges
- ✓ Hydroclimatic Extremes: Individual and Compound Extremes
- ✓ Climate Change, Population exposure and socio-economic vulnerability
- ✓ Theory of Copula in Hydrology and Hydroclimatology
- ✓ Problems solving sessions with case studies/software demo.

Contact us

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