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PRESS-RELEASE

IIT (ISM) Dhanbad to Host GIAN Course on Inverse Methods and Machine Learning in Geosciences

IIT (ISM) Dhanbad is set to organize a specialized Global Initiative of Academic Networks (GIAN) course on *Inverse Methods and Machine Learning: Applications in Geosciences* from June 23 to 27, 2025. The course will be held at the Executive Development Centre of the institute under the joint academic leadership of Dr. Saumen Maiti, Associate Professor in the Department of Applied Geophysics, as the National Faculty and Course Coordinator, and Professor Mrinal K. Sen, a globally renowned geophysicist from the University of Texas at Austin, as the Foreign Faculty.

The upcoming course aims to provide an in-depth understanding of how inverse methods and machine learning (ML) are revolutionizing data interpretation and decision-making in the geosciences. These approaches, increasingly adopted across scientific disciplines, have become essential for analyzing spatial and temporal data—particularly for characterizing subsurface structures and earth materials. The application of these methods enables geoscientists to decode complex underground processes using data acquired from surface, borehole, and remote sensing technologies.

Participants will gain insights into both deterministic and stochastic frameworks for solving inverse problems, including advanced regularization strategies, Bayesian inference, and the use of Markov Chain Monte Carlo (MCMC) methods. In light of growing data volumes and complex relationships within geophysical datasets, the course will also explore the power of machine learning algorithms—such as supervised and unsupervised learning, deep neural networks, and clustering techniques—to approximate nonlinear models and enhance predictive accuracy in resource exploration and environmental management.

The program promises to balance theoretical grounding with practical application. In addition to lectures, participants will benefit from hands-on training designed to equip them with real-world skills in formulating and solving inverse problems, handling noisy datasets, and quantifying uncertainties in predictions. Case studies and live project assignments in domains such as seismic exploration and natural resource evaluation will further enrich the learning experience.

This intensive week-long academic engagement is tailored for a broad audience, including professionals, researchers, engineers, scientists, and students from geosciences, applied sciences, computer science, R&D institutions, government agencies, and academic organizations. By enhancing participants' capabilities to apply data-driven and algorithmic techniques in geoscientific contexts, the course aligns with the broader goals of sustainable resource utilization and technological innovation.

The number of seats is limited to 50, and interested candidates are encouraged to register by the deadline of June 16, 2025. All registered participants must fill up the google form-
https://docs.google.com/forms/d/1pUoQfj_cZOi53e5jfQp-846_ScrYh3iKBrViyPL6W3Y/edit

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