Course Content

1 Introduction to Industry 5.0
- Evolution: Industry 4.0 → Industry 5.0
- Human-centric & resilient manufacturing
- Data-driven manufacturing systems
- Industrial IoT (IIoT) fundamentals

2 Fundamentals of AI/ML
- Introduction to AI/ML
- Data preprocessing & feature engineering
- Regression and classification techniques
- Clustering methods and model evaluation
- Basics of deep learning
- Applications of AI/ML

3 Additive Manufacturing
- Rapid prototyping
- Rapid tooling & 3D printing
- Polymer, metal and composite AM
- Microstructure & property characterization
- Aspects of postprocessing
- Applications of AI/ML in AM

4 Advanced Manufacturing
- Microwave material processing such as casting, drilling, curing, etc.
- Advanced manufacturing Processes such as ECDM, EDM, UAFM, LBM, squeeze casting, laser cladding, etc.
- AI use cases in advanced manufacturing

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or Registration Link

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Five-Days National Workshop

on

AI-Driven Advanced Manufacturing for Industry 5.0

during

13th April – 17th April 2026

(Virtual Mode)

Organized by

Department of Mechanical Engineering
National Institute of Technology, Rourkela
Odisha-769008

About NIT Rourkela

The National Institute of Technology Rourkela (NIT Rourkela), formerly known as Regional Engineering College until its renaming on 26th June 2002, is a premier government-funded institution committed to excellence in engineering, science, and technology. Situated in the steel city of Rourkela, Odisha, India, it is one of the 31 NIT and is recognized as an Institute of National Importance under the National Institutes of Technology Act, 2007. NIT Rourkela has achieved notable recognition in national and global rankings, securing the 13th position in the NIRF Rankings 2025 for engineering institutions in India, 396th in the QS Asia University Rankings 2025, and 167th in the QS World University Sustainability Rankings 2025 (Asia region). It is also placed within the 401–600 band in the Times Higher Education World University Rankings (Engineering) for 2025–26. The institute aims to emerge as a globally recognized center of excellence in education and research, contributing to society through knowledge and innovation, while establishing itself as a preferred destination for undergraduate and postgraduate studies.

About ME Department

The Mechanical Engineering Department of NIT, Rourkela is known for research in diverse fields. The main foci of research are mechanical vibration, robotics, CAD/CAM, precision engineering, metal forming, Machining, CFD, Industrial refrigeration and Cryogenics. The academic programme of the department reflects not only the core areas of Mechanical Engineering but also the research specialization of the faculty. The department at present has over one hundred research scholars pursuing projects in diverse fields. The faculty is organized into three divisions i.e., thermal, design and production engineering and six groups. All the groups are working in close co-operation while retaining individual identities. Many Research and Development projects being pursued by the faculty are sponsored by Government agencies and private industries. Some of the major sponsors are BRNS, DST, DAE, CSIR, DRDO, BARC, ISRO and private industries.

About the Workshop

This 5-day workshop on AI-Driven Advanced Manufacturing for Industry 5.0 is designed to provide participants with a comprehensive understanding of next-generation manufacturing systems that integrate artificial intelligence with human-centric design principles. The program combines data-driven decision-making, intelligent automation, and advanced manufacturing technologies to enable efficient, adaptive, and sustainable engineering solutions.

The workshop begins with the fundamentals of Industry 5.0, including its evolution from Industry 4.0, human-machine collaboration, and the role of AI and machine learning in modern manufacturing. Participants will explore industrial IoT (IIoT), smart factories, and data-driven systems, followed by core AI/ML techniques such as supervised and unsupervised learning, time-series analysis, and computer vision for predictive maintenance, quality inspection, and process optimization.

The program further introduces advanced manufacturing technologies, including microwave material processing for casting, drilling, and curing, along with non-conventional machining methods such as Electrochemical Discharge Machining (ECDM), Ultrasonic Assisted Finishing Machining (UAFM), and Laser Beam Machining (LBM). Emphasis will be placed on integrating AI for intelligent monitoring and optimization of these processes.

The workshop highlights human-AI collaboration to enhance productivity, flexibility, and safety, along with applications in autonomous production, sustainable manufacturing, and energy-efficient systems. Through hands-on sessions and case studies, participants will gain practical skills to design and implement AI-driven manufacturing solutions. Key challenges such as cybersecurity and industrial deployment will also be addressed, preparing participants for emerging opportunities in Industry 5.0.

Academicians from premier institutions such as IITs and NITs, along with experts from industries and R&D organizations, will be invited as resource persons for this workshop.

Eligibility

The workshop is open for faculty members, research scholars, UG/ PG students, technical staff members of educational institutions, personnel from R&D sectors/ research laboratories & Industry.

Important details

Course Fee (Including GST)

Faculties/ Research Scholars/ Students/ Technical Staff Members from academic institute: **Rs. 354/-** (Including 18% GST)

Personnel from Industry and R&D units: **Rs. 590/-**(Including 18% GST)

Online Payment Details

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Certificate

E-Certificate will be issued upon participation in all the sessions.

Last date of registration: 12/04/2026