



**NITTR
BHOPAL**

MH-11/2026-2027

AI, Machine Learning and Data driven Materials Engineering

15-06-2026 to 19-06-2026

COEP Technological University, Pune

<https://erp.nittrbpl.ac.in/poc2026/?id=regMH-11>



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Rationale

With the rapid emergence of Industry 4.0 and data-centric scientific paradigms, materials engineering is undergoing a significant transformation. Traditional experimental and computational approaches are increasingly being complemented by artificial intelligence (AI), machine learning (ML), and data-driven methodologies. This shift necessitates the reskilling and upskilling of faculty members to remain relevant in both teaching and research domains.

The integration of AI/ML in materials science enables accelerated discovery, predictive modeling, and enhanced understanding of process–structure–property relationships. However, a significant gap exists in equipping faculty with the required interdisciplinary skills spanning materials science, data analytics, and computational tools.

This programme is designed to bridge this gap by providing a structured and progressive learning pathway—from foundational data handling to advanced AI-enabled materials design and simulation. The FDP emphasizes practical exposure, industry relevance, and hands-on learning to empower faculty members to transition into data-driven

Programme Outcomes

- i. Explain the fundamentals of materials informatics and data-driven research methodologies.
- ii. Apply machine learning techniques (regression, classification, clustering) to materials science problems.
- iii. Analyze raw materials data, including handling noisy and unstructured datasets.
- iv. Convert the raw data into readable data.
- v. Utilize computer vision and deep learning techniques for microstructure characterization.
- vi. Integrate AI with simulation tools such as DFT and molecular dynamics for accelerated materials discovery.
- vii. Explore advanced concepts such as generative design, digital twins, and smart manufacturing.
- viii. Develop a testable basic AI-driven materials prediction model using accessible tools.

Programme Content

Module 1: Foundations & Data Strategy (Materials informatics, Python for materials science, OQMD, Citrine, etc. Module 2: AI in Metallurgy (Feature engineering, supervised learning (regression and classification), alloy design optimization, process–structure–property relationships, & unsupervised learning,

Module 3: Computer Vision & Microstructure Analysis (Image processing fundamentals, deep learning (CNNs), automated microstructure analysis, defect detection)

Module 4: Advanced Applications & Future Trends (AI-assisted DFT/MD simulations, CALPHAD integration, generative

Target Group

Faculty of Engineering disciplines

Coordinator & Co-Faculty

Prof. Coordinator(EC)-PUNE
Professor

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Expert



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