IIT Madras Zanzibar

MTECH IN INDUSTRIAL ARTIFICIAL INTELLIGENCE (WEB-ENABLED)

February 2025

TAKE YOUR NEXT STEP WITH IIT MADRAS

Important Dates

- **Application Start Date:** 15/11/2024
- **Application End Date:** 8/1/2025
- **Online Test:** 12/1/2025
- **Course Starts:** Feb 2025

- **Degree:** MTech in Industrial Artificial Intelligence
- **Duration:** 18 months
- **Mode:** Virtual Classroom
- **Academic Cycle:** Starts from Feb 2025
- **Total Program Fee:** 12000 USD
- **Eligibility:** Bachelors/Masters in any branch with mathematics as compulsory subject
- **Selection Criteria:** Online Test

Why Choose Our Program?

- Cutting-edge curriculum with industry-aligned AI skills
- Equip individuals to be in-demand across top tech global companies
- Learn from Experienced Faculty from IITs and Industry
- Live Classes and Hands-on Sessions
- Practical Applications

REGISTER TODAY!

FOR MORE INFORMATION

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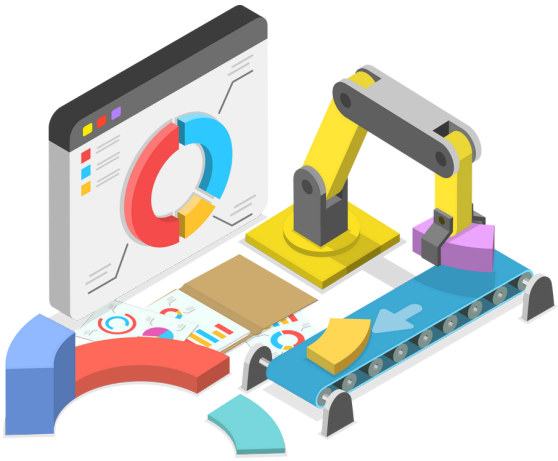
PROJECT



- The project starts in Term 4 and Ends in Term 6
- A single MTech project will be carried out in three stages (Projects I, II, and III)
- The minimum duration of the project is 10 months
- Project work done by the candidate will be defined by them with the consultation of coordinators that includes scope, objective, and data.
- IITM will review the proposed project work and approve the projects for feasibility, timeline, and deliverables as a part of the MTech project
- IITM will do intermediate reviews of the project work on agreed milestones and provide feedback to do course correction
- Once project work is completed by the candidate within stipulated agreed timelines, IITM shall evaluate and provide an appropriate grade for project work
- In case guidance/facilities are required from IITM for the project, it will be covered under a separate agreement on a case-by-case basis with the concerned faculty

SYLLABUS FOR QUALIFYING TEST

- **Probability and Statistics:** Introduction to probability including conditional and joint probability, Random variables and distributions, Descriptive statistics, and Inferential statistics
- **Linear Algebra:** Foundations of linear algebra including eigenvalue decomposition, singular value decomposition
- **Calculus:** Calculus including maxima and minima
- **Basic Machine Learning:** Introduction to simple and multiple linear regression and kNN, logistic regression, k-means clustering, cross validation

CURRICULUM OVERVIEW

Course Types	Course Description
Core Courses	Mathematical Foundations for Data Science, Applied Time Series Analysis, Multivariate Data Analysis, Machine Learning and its Applications, Applied Deep Learning, Online and Reinforcement Learning
Labs	Industrial AI Laboratory, Industrial AI at Scale Laboratory
Electives	AI in Predictive Maintenance, Reliability and warranty, AI in process and logistic optimization, Industrial Vision AI
Projects	Research and Development work

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COURSE DETAILS

Course Name	Course Content
Core 1: Mathematical Foundations for Data Science	Basics of Data Science, Linear Algebra for Data Science, Probability, Statistics and Random Processes for Data Science, Optimization for Data Science
Core 2: Applied Time Series Analysis	Introduction to Time Series – Analysis, Partial Auto-Correlation Function, Power Spectrum, Basics and Design of filters for data cleaning and preprocessingÍ¾ Kalman filterÍ¾ Applications to process data
Core 3: Multivariate Data Analysis	Introduction to multivariate data analytics and machine learning. Function approximation and classification problems Multivariate Data Analytics: Principal Component Analysis, Kernel Principal Components, Generalized Principal Component Analysis
Core 4: Machine Learning and its applications	Several clustering techniques, Lasso and elastic net SVM, SVR, Decision trees, Random forests
Core 5: Applied Deep Learning	Deep Learning: Neural networks basics, Autoencoders, layer-wise learning, deep networks, convolution neural networks, recurrent neural networks, advanced learning algorithms
Core 6: Online and Reinforcement Learning	Introduction to reinforcement learning, value functions and Q-learning, SARSA, RL with function approximation, exploration/exploitation, batch reinforcement learning, online learning, multi-arm bandits
Lab 1: Industrial AI Laboratory	Hands-on training in data analysis algorithms using Python
Lab 2: Industrial AI at Scale Laboratory	Hands-on training in Big Data - Practical aspects of analytics at large scale, i.e., big data with concepts spanning hardware, systems and software using cloud
Elective 1: AI in predictive Maintenance, Reliability and warranty	Predictive Maintenance, Failure detection and diagnosis, Benchmarking, Forecasting and recommendations
Elective 2: AI in process and logistic optimization	Process Improvement, Multivariable Optimizing Control, Systems Engineering 1D/ FEM models/ Digital Twins, Supply Chain Management, Computer vision for Retail Stores related (Slip and trip of people, Self-checkout loss in retail stores, Smart docks etc), Smart City
Elective 3: Industrial Vision A	Introduction of various machine learning models that are needed for solving computer vision problems – Probability, Machine Learning models and inference, Graphical models, Image pre-processing, Multi-view geometry and Models for vision