IITM Pravartak's

Certificate Programme in

Deep Learning and AI

IITM PRAVARTAK
CATALYSING INNOVATION

Starts March 30, 2023 | 10 Months | Live Online & In-campus

The Must-have Skills of the **21st Century** ***Techie***

AI has the potential to boost India's annual growth rate by 1.3 percentage points, lifting the country's income by 15% by 2035.

- NITI Aayog

Only 2.5% of Indian engineers possess technical skills in AI that the industry requires.

- Analytics India Magazine

Programme **Overview**

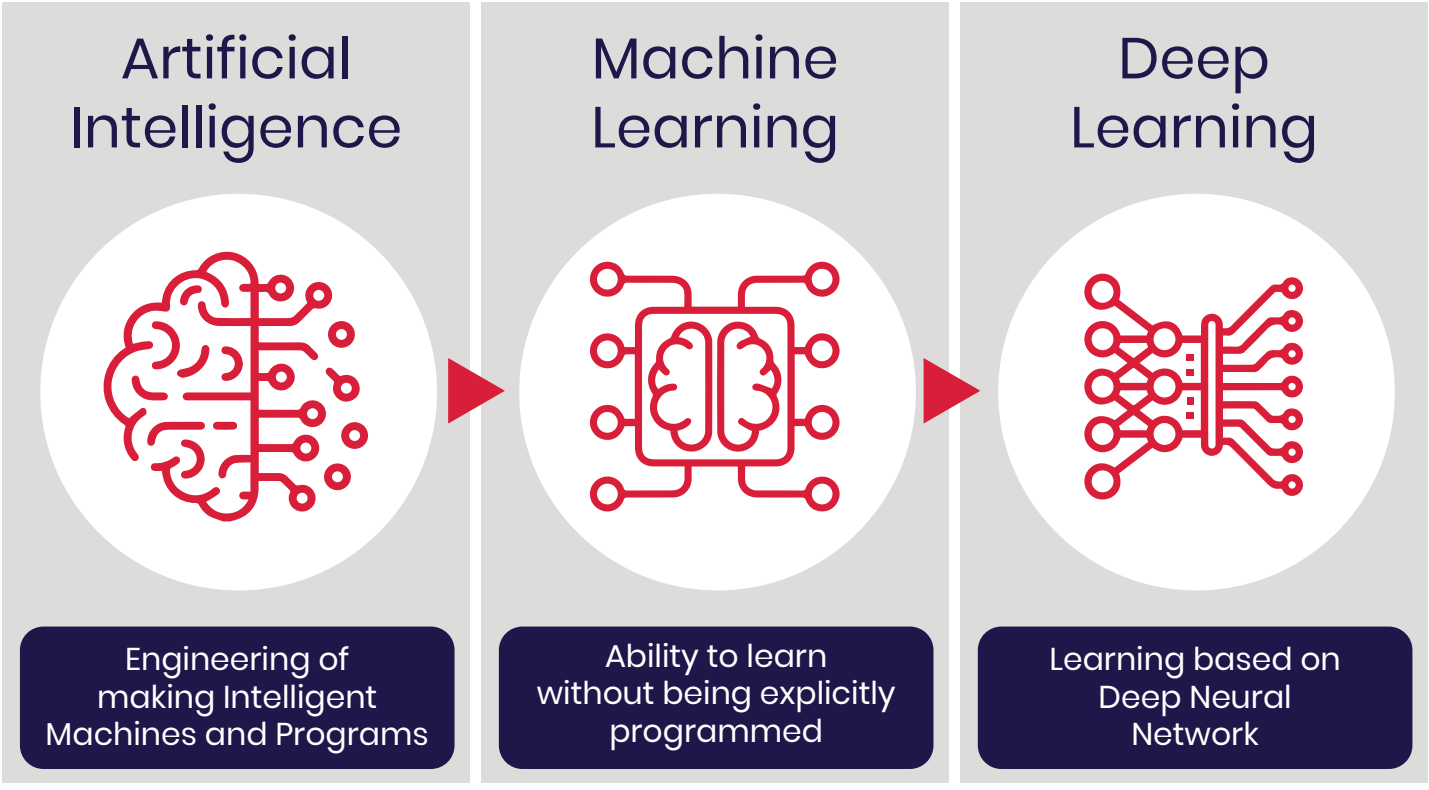
Modern Deep Learning (DL) and Artificial Intelligence (AI) are making the impossible a reality by applying complex neural networks to everyday problems and powering innovations like Alexa, Siri, humanoids and chatbots, to name a few. It's no wonder that business leaders see these data-driven technologies as critical for the future—and that practitioners fluent in both fields are in high demand.

75%

Growth rate for AI and machine learning jobs over the past four years and is poised to keep growing.

- Forbes

The **Certificate Programme in Deep Learning and AI** from IITM Pravartak and Centre of Outreach and Digital Education (CODE), IITM, enables those aspiring for a high-growth career in DL and AI a career-defining programme to acquire in-demand skills and be industry-ready with a competitive edge over their peers.



How is this programme **different?**

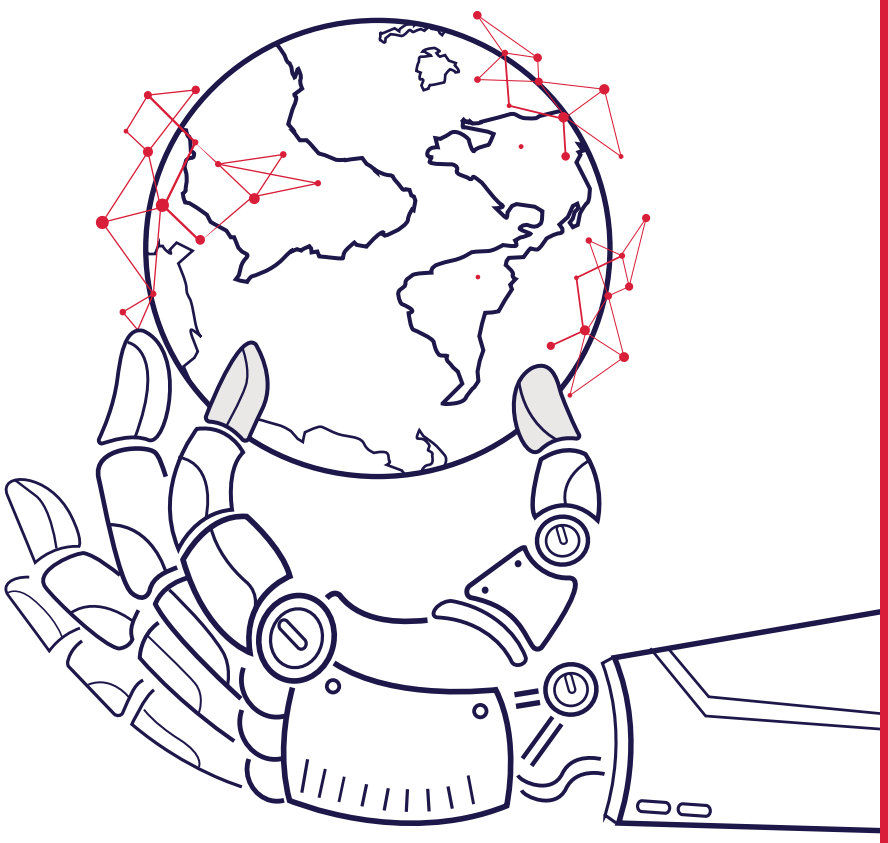
This high-rigor programme will equip learners with **working knowledge of Deep Learning and AI models** to consolidate, diagnose, test, and recommend data-backed solutions to real-world tasks that are of the greater:

Efficiency

Accuracy

Quality

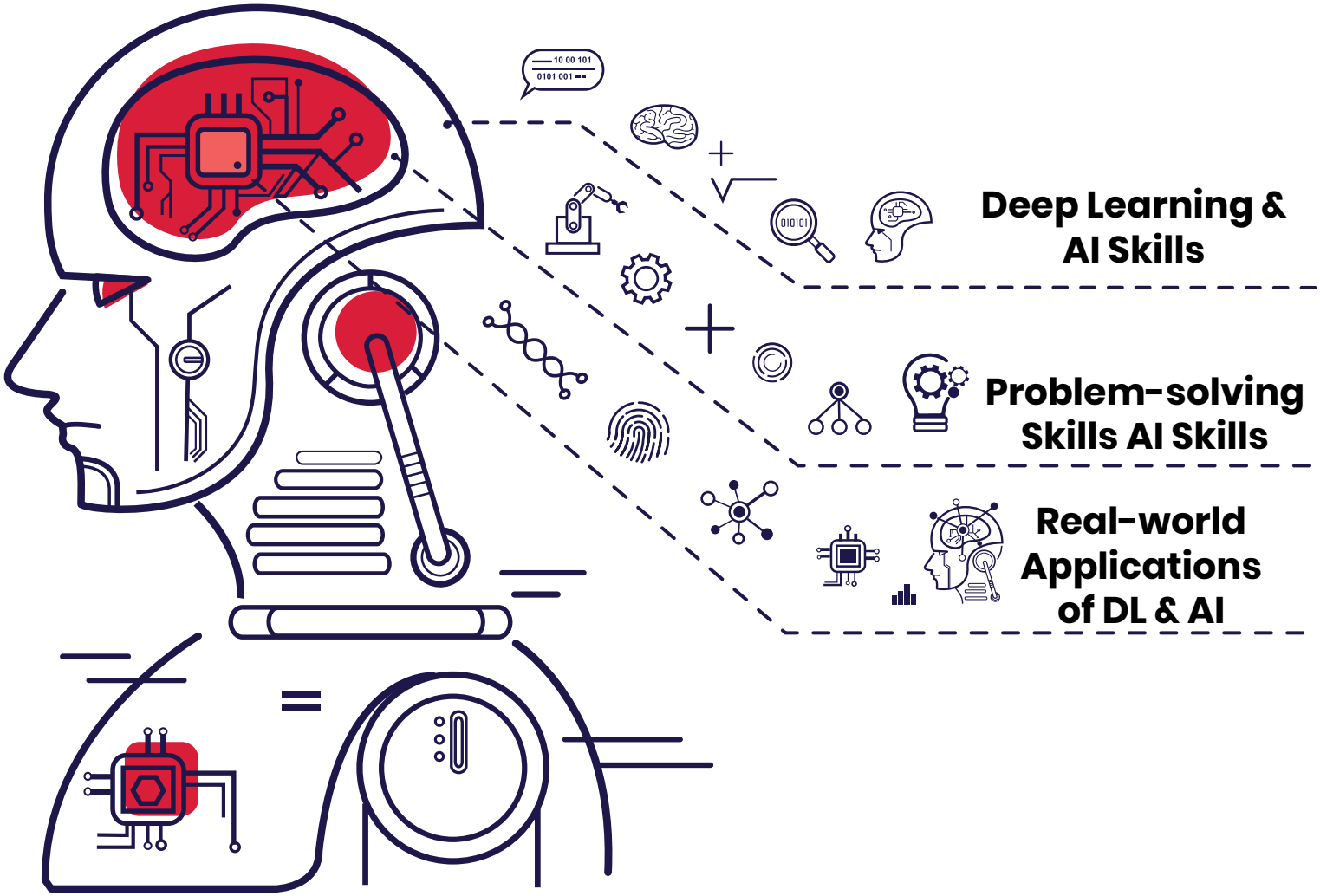
Timeliness



Participants will also gain exposure to developing deep-tech solutions through high-level programming, powerful tools and libraries, and designing, training, and validating deep neural networks.

Benefit from the right balance of frameworks and algorithm teaching with hands-on tools through assignments.

In 10 months of immersive experiential learning, **you will master –**



- ***Deep Learning & AI skills*** *from Modeling to Design & Deployment*
- *Develop* ***problem-solving skills*** *that convert complex business problems to innovative deep learning and AI solutions*
- *Learn* ***real-world applications of in-demand DL & AI techniques*** *using deep-tech expertise to deliver efficient solutions and insights for complex business problems*

Who is the **programme ideal for?**

- Early-career professionals looking to solve complex real-world problems by leveraging neural networks and deep learning skills powered by massive amount of data across disciplines
- Mid-career professionals keen on applying deep tech solutions to business problems by advancing their skillset in various neural network and deep learning algorithms and their applications.

> ***"The world's first trillionaires are going to come from somebody who masters AI and all its derivatives,*** *and applies it in ways we never thought of."*
>
> – Mark Cuban,
> Billionaire Entrepreneur

How does the **Action Learning methodology** work?

01 STEP — Work on assignments throughout the programme duration with insights from the curriculum in the respective business context

02 STEP — Challenge yourself with high-effort hours, immersive learning journey aimed at building real-world skills

03 STEP — Receive guidance and feedback on assignments from thought-leading faculty at IITM

04 STEP — Refine project solutions by testing hypothesis through access to Labs in the CSE Department of IITM

05 STEP — Participate in the hackathon to gain hands-on learning during the in-campus immersion

06 STEP — Quizzes and end-semester examination will be conducted online

Tools Covered

PyTorch

TensorFlow

MATLAB®

Keras

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Programme **Modules**

1 MODULE

Introduction to Programme

- Motivation for Programme
- Overview of Programme
- Expected Outcomes of Programme

2 MODULE

Machine learning tasks and applications

- Function approximation (Regression), Classification, Clustering, Ranking, Information retrieval
- Text processing applications
- Image and video processing applications
- Speech processing applications
- Data representation

3 MODULE

Paradigms of machine learning

- Supervised learning & Unsupervised learning
- Semi-supervised learning & Active learning
- Self-supervised learning & Transfer learning
- Domain adaptation
- Federated learning

4 MODULE

Review of basics of mathematical topics

- Linear Algebra
- Calculus
- Probability and Statistics

5 MODULE

Regression methods

- Linear model for regression
- Supervised learning
- Parameter estimation - Maximum likelihood method
- Overfitting & Regularisation
- Ridge regression
- Lasso

Programme **Modules**

6 MODULE

Probabilistic models for classification

- K-nearest neighbour classifier
- Bayes classifier
- Normal density function
- Maximum likelihood estimation
- Gaussian mixture model
- Naïve Bayes classifier
- Decision surfaces
- Dimension reduction methods

7 MODULE

Artificial neural networks for classification and regression

- McCulloch-Pitts neuron
- Perceptron learning rule
- Perceptron convergence theorem
- Sigmoidal neuron
- Softmax function
- Multilayer feedforward neural network
- Error backpropagation method
- Gradient descent method
- Stochastic gradient descent method
- Stopping criteria
- Logistic regression based classifier

8 MODULE

Optimization and regularization methods for DFNNs

- Deep feedforward neural networks (DFNNs)
- Optimization methods: Generalized delta rule
- AdaGrad, RMSProp, Adadelta & AdaM
- Second order methods
- Regularization methods: Dropout, Dropconnect
- Batch normalization

9 MODULE

Autoencoders

- AANN & Stacked Autoencoder
- Greedy layer-wise training
- Pre-training & Fine tuning a DFNN
- Regularization in autoencoders
- Denoising autoencoder
- Variational autoencoder

Programme
Modules

10 MODULE

Convolutional neural networks (CNNs)

- Basic CNN architecture
- Rectilinear Unit (ReLU)
- 2-D Deep CNNs: LeNet, AlexNet, VGGNet, GoogLeNet, ResNet
- Image classification using 2-D CNNs
- 3-D CNN for video classification
- 1-D CNN for text and audio processing
- VLAD method for aggregation - NetVLAD

11 MODULE

Recurrent neural networks (RNNs)

- Architecture of an RNN & its unfolding
- Backpropagation through time
- Vanishing and exploding gradient problems in RNNs
- Long short term memory (LSTM) units
- Gated recurrent units
- Bidirectional & Deep RNNs

12 MODULE

Encoder-decoder paradigm based deep learning models

- Encoder-decoder paradigm
- Image and video captioning models
- Machine translation
- Text processing models
- Representation of words: Word2Vec and GloVe

13 MODULE

Transformer models

- Attention-based models
- Scaled dot product attention, Multi-head attention (MHA), Self-attention MHA, Cross-attention MHA.
- Position encoding
- Encoder and Decoder modules in a transformer
- Sequence to sequence mapping using transformer
- Machine translation using transformer model
- Vision transformer
- Video captioning using transformer model
- BERT Model
- Text and Visual question answering and reasoning using transformer models

Programme **Modules**

14 MODULE

Generative adversarial networks (GANs)

- Image generation models
- Architecture and training of a GAN
- Deep convolutional GAN
- Cyclic GAN
- Conditional GAN
- Super-resolution GAN
- Applications of GANs for image processing

15 MODULE

Reinforcement Learning

- Introduction to reinforcement learning
- Markov decision processes
- Policy gradients
- Temporal difference learning
- Q-learning
- Deep Reinforcement Learning
- Text processing using deep reinforcement learning

Note:

- Modules/ topics are indicative only, and the suggested time and sequence may be dropped/ modified/adapted to fit the participant profile & programme hours.

-The programme curriculum includes individual assignments, simulations, group projects & presentations to apply and demonstrate classroom learnings.

Programme **Coordinator**

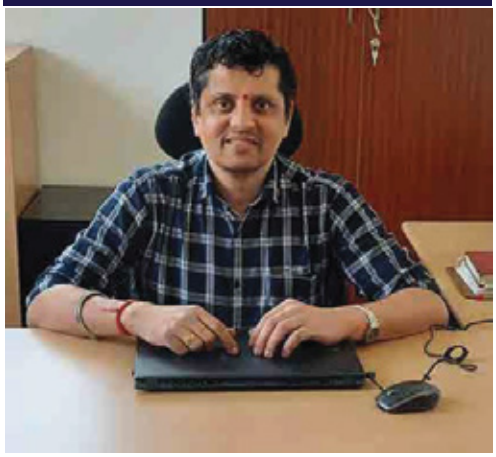
Prof. C. Chandra Sekhar
Professor, Department of
Computer Science & Engineering,
IITM

- Prof. Sekhar's expertise and research interests include speech recognition, neural networks, kernel methods, machine learning, deep learning and metric learning
- He is the author of many research papers that have been published in peerreviewed, national and international journals and conferences
- In 2016, he was the recipient of the coveted Srimathi Marti Annapurna Gurunath Award for Excellence in Teaching from IITM

Prof. C. Chandra Sekhar receiving the "Srimathi Marti Annapurna Gurunath Award for Excellence in Teaching" from IITM

Note: Programme Coordinator might change due to unavoidable circumstances, and revised details will be shared closer to the programme start date.

Programme **Faculty**



Dr. Dileep A. D.
Associate Professor, School of Computing and Electrical Engineering, IIT Mandi

- Received his M.Tech. and Ph.D. degrees in Computer Science and Engineering from IIT Madras
- His research interests include pattern recognition, Kernel Methods for Pattern Analysis, Machine Learning for Speech Technology, Computer Vision, Cloud and Telecom networks
- He is an author of many research papers published in peer reviewed, international and national journals and conferences
- In 2020, he was the recipient of the Teaching Honour Roll Award for Excellence in Teaching during the academic year 2019-20, at IIT Mandi

Dr. Dileep A. D. receiving the"Teaching Honour Roll Award for Excellence in Teaching" at IIT Mandi

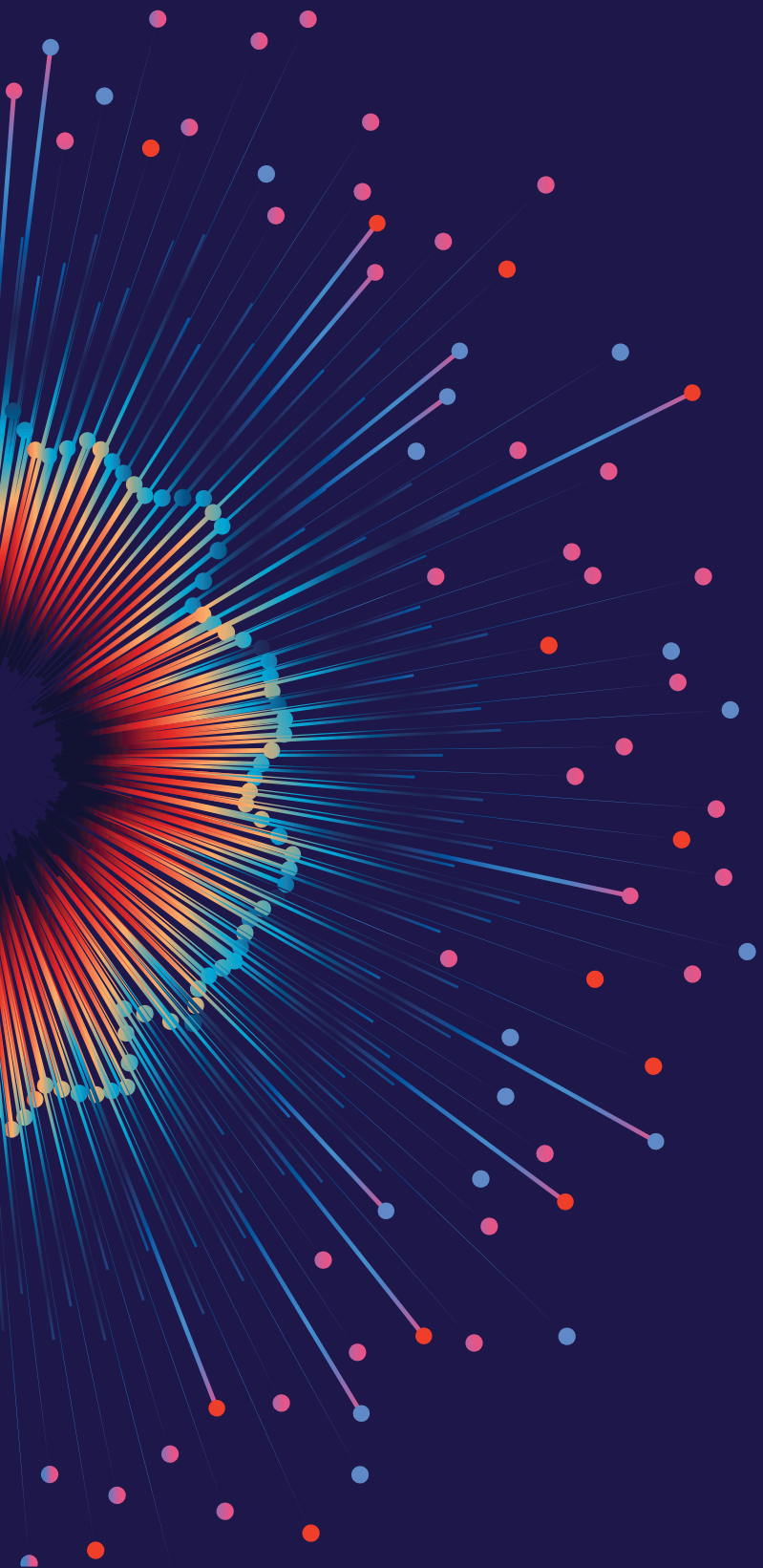
Top 3 Reasons
To Apply Now

- IITM is ranked as the **#1 Institute in India** (NIRF Rankings,2022)
- Taught by **top research Professors at IITM** via **100% live online lectures**
- Gain working knowledge to apply deep tech and develop in-demand skills for a **high-growth career**

"This programme in Deep Learning & Artificial Intelligence covers machine learning and deep learning techniques
for text, image and video processing tasks. You will learn how to use Deep Learning models for AI tasks in a pedagogy that is cutting-edge and powerfully hands-on to make you future-ready, today".

-Prof. C. Chandra Sekhar

What are the **Learning Outcomes**?



- **Understand** neural network architectures and models
- **Identify** appropriate deep learning algorithms
- **Perform** classification and regression using ANN
- **Implement** methods of optimization & regularization for DFNNs
- **Gain** working knowledge of transformer models and Autoencoders
- **Design** and evaluate CNN from texts, images, and videos
- **Create** and analyse RNN for natural sequential pattern analysis tasks
- **Evaluate** encoder-decoder based deep learning models
- **Design** transformer models for sequential pattern analysis tasks
- **Gain** exposure to GANs and deep reinforcement learning
- **Build** deep tech capabilities to solve real-world problems

Programme **Pedagogy**

100% Live Lectures by Top IITM Faculty

Hands-on Assignments, Case Studies & a **Hackathon**

Convenient, Weekend Live Online Classes

Campus Immersion at the IITM Campus

Peer-to-peer Learning & Networking

Certificate of Completion from IITM Pravartak

Programme **Highlights**

150+
Hours of Learning

6
Quizzes & Assignments

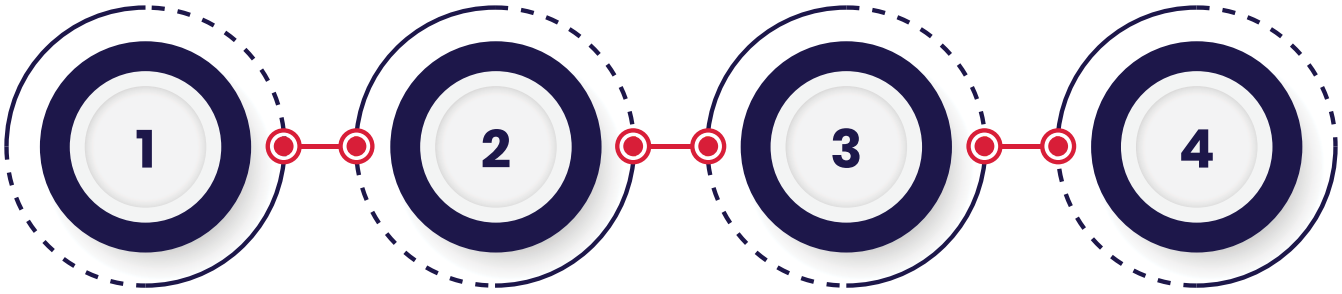
1
Hackathon

Programme **Eligibility**

- Graduates who have completed B.E./ B.Tech./ MCA/ or MSc (CS or IT) as on **March 30, 2023.**

- Candidates should have a basic understanding of mathematic topics such as Linear Algebra, Calculus, Probability and Statistics; Familiar with programming in either C or Python or MATLAB

Application **Process**



1:1 Counselling with our Programme Advisors

Submit application form and application fee

Application screening and selection

Paying booking amount in-time & enrolling

Programme **Certificate**

On successful completion, participants will be awarded a Certificate Programme in Deep Learning and AI from IITM Pravartak and the Centre of Outreach and Digital Education (CODE), IITM. The minimum marks is 40% and minimum attendance required is 75% to qualify for the certificate of completion.

Note: The certificate shown above is for illustrative purposes only and may not be an exact prototype of the actual certificate. IITM Pravartak reserves the right to change the certificate and specifications without notice.

Evaluation **Criteria**

- Programming Assignments - **30%**
- Hackathon - **15%**
- Quizzes and Exam - **55%**

Programme
Investment & Fee

Programme Fee INR 2,00,000 + GST

Instalment Schedule

Particulars	Remarks	Fee
Booking Amount	Within 7 days post selection	INR 20,000 + GST
Instalment I	Apr 3, 2023	INR 30,000 + GST
Instalment II	Aug 3, 2023	INR 90,000 + GST
Instalment III	Dec 3, 2023	INR 60,000 + GST

Note:
- *GST (currently @ 18%) will be charged extra on these components*
- *Postage charges for books and study materials sent to locations outside of India will be paid for by the participant.*
- *Campus immersion accommodation will have to be taken care by the participants.*

Instalment Schedule

Round 1	Round 2
Feb 9, 2023 INR 1,500 + GST	**Mar 1, 2023** INR 2,000 + GST

Note: Admissions are on a first-come, first-serve basis. There might not be subsequent rounds if seats are filled in the initial rounds.

Key
Timelines

- Programme Starts – **March 30, 2023**
- Start Date of Classes – **April 16, 2023**
- Live Online Sessions* - **Saturday & Sunday, 3:30 PM - 5:30 PM**
- 2-day Hackathon - **During the Campus Immersion**

**The schedule will be 4 hours/ week and will be confirmed closer to the programme start date. If a programme session falls on a public holiday, the session would be held on the following weekend.*

Emeritus Career Services

- Career management modules are on:
  -Building an Impressive Resume & Cover Letter
  -Building an Impressive LinkedIn Profile
  -Navigating Job Search
  -Interview Preparation

Note:
- This service consisting of the four career management modules is available only for Indian residents enrolled into select Emeritus programmes.
- This service is provided by Emeritus. IITM Pravartak is NOT involved in providing this service.

- IITM Pravartak will not provide any kind of placement assistance to the programme participants.

Past Participants of Emeritus Work at:

ICICI Bank · Microsoft · Infosys Navigate your next · HDFC BANK We understand your world
airbnb · TCS TATA CONSULTANCY SERVICES · OLA · Flipkart
JSW · wipro Science Education Fellowship · Honeywell · J.P.Morgan
Jio · Mahindra · accenture · Cognizant

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Programme **Collaboration**

IITM Pravartak is funded by the Department of Science and Technology, Government of India, under its National Mission on Interdisciplinary Cyber-Physical Systems, and hosted as a Technology Innovation Hub (TIH) by IITM. The NM-ICPS is a comprehensive Mission aimed at complete convergence with all stakeholders by establishing strong linkages between academia, industry, Government, and International Organizations.

Established in 1986, the Centre for Continuing Education (CCE), now renamed **Centre for Outreach and Digital Education (CODE), IITM** coordinates the outreach and online programmes. The centre's activities include coordinating the Web-enabled MTech programs;- coordinating NPTEL and GIAN courses; coordinating IITM' BS in Data Science; Short-Term skilling programmes targeted towards industry; Quality Improvement programmes, meant for faculty in engineering institutions; support for conferences, book writing, etc.

Emeritus offers a portfolio of high-impact online programmes. Working with Emeritus gives IITM Pravartak and CODE, IITM the advantage of broadening its access beyond their on-campus offerings in a collaborative and engaging format that stays true to the quality of IITM Pravartak and CODE, IITM . Emeritus' approach to learning is built on a cohort-based design to maximise peer-to-peer sharing and includes video lectures with world-class faculty and hands-on project-based learning. More than 250,000 students from over 160 countries have benefitted professionally from Emeritus' courses.

Application Requirements

PROFESSIONAL EXPERIENCE DOCUMENTS

- For Previous Organisation/s: Relieving letters
- For Current Organisation: Current Salary Slip or Bonafied Certificate from the HR Department on company letterhead

GRADUATION AND POST-GRADUATION EDUCATION

- Marksheet – Individual or consolidated (all semesters)
- Passing Certificate – If Any
- Diploma/ Degree/ Doctorate Certificate

ID PROOF

- Any Government-issued photo ID like PAN Card/ Driving License/ Passport, etc.

System Requirements

This programme includes live online classes. To attend a live online class you will need to have a PC/ Laptop/ Mac with:

Speakers and microphone: built-in or a USB plug-in or wireless Bluetooth

OS: Either MacOS 10.7 or higher OR Windows 8 OR Linux/ Ubuntu

Webcam: built-in or USB plug-in

An internet connection: Minimum bandwidth of 3.0 Mbps (up/ down)

Processor: with Dual Core 2Ghz or higher (i3/ i5/ i7 or AMD equivalent)

Browser: IE 11+, Edge 12+, Firefox 27+, Chrome 30+

RAM: 4 GB or higher

Zoom software client installed on your PC/ Laptop/ Mac

We use the Zoom software application to conduct live online classes. Zoom works on a variety of PCs/ Laptops/ Mac systems and also on phones and tablets.

You can join your live online class from a phone or tablet if it supports the Zoom client.

We recommend that you attend classes from a PC/ Laptop/ Mac.

Kickstart your career in
Deep Learning and AI

Apply for the programme here

APPLY NOW

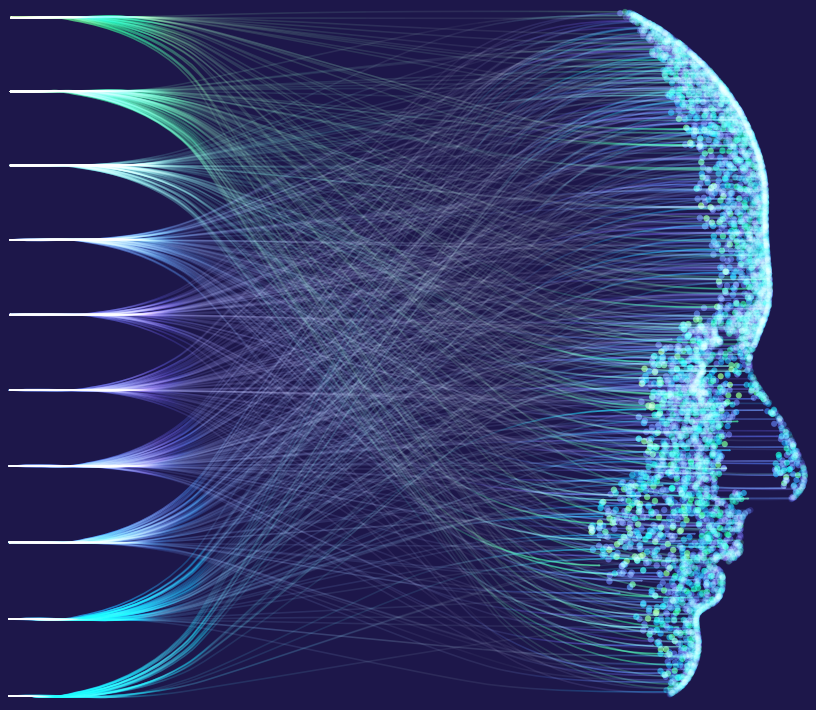
Finance Options Available

KNOW MORE

WhatsApp an Advisor On +91 74120 81081*

**This number does not accept any calls. Please message your queries.*

SCHEDULE A CALL



For registration and any other information, please get in touch with us at **iitmadras.execed@emeritus.org**

In collaboration with

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