

Advanced Certification in

Applied Data Science, Machine Learning and Edge AI



Electronics & ICT Academy
Indian Institute of Technology Guwahati

An Initiative of Ministry of Electronics & Information Technology(Meity)



इंटरकॉमिनेशन्स की एवं
सूचना प्रौद्योगिकी मंत्रालय
MINISTRY OF
ELECTRONICS AND
INFORMATION TECHNOLOGY

Course Curriculum

Duration: 6 Months (140Hrs)

DS | ML | DL | Generative AI



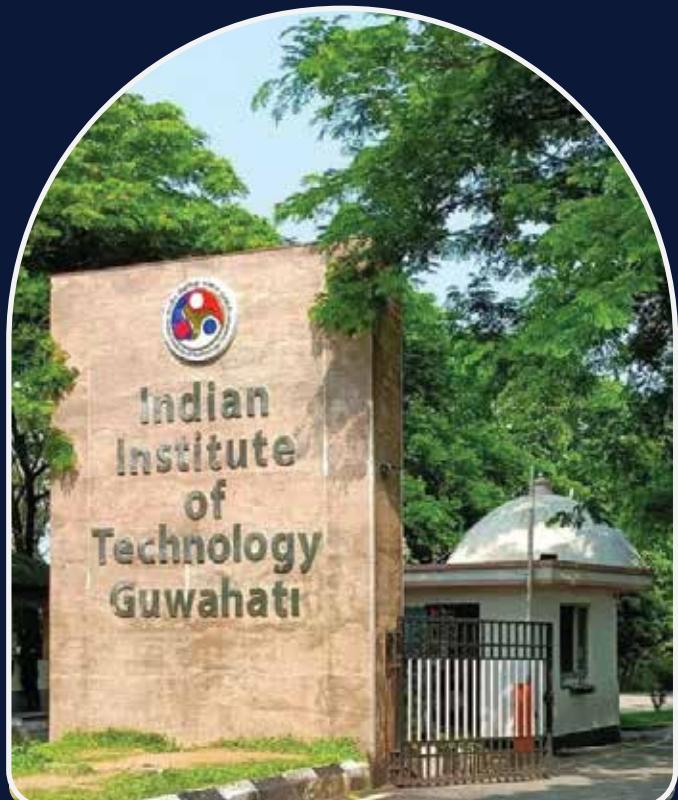
In Collaboration With



About The IIT Guwahati

Indian Institute of Technology Guwahati (IIT Guwahati), the sixth member of the IIT fraternity, was established in 1994. The institute began its academic programmes in 1995. Currently, it comprises eleven departments and three interdisciplinary academic centres, covering major disciplines in engineering, science, and humanities. IIT Guwahati offers BTech, BDes, MA, MDes, MTech, MSc, and PhD programmes.

Within a short span of time, IIT Guwahati has established world-class infrastructure and earned a strong academic reputation.



About The E&ICT Academy IIT Guwahati

Electronics and ICT Academy aims to provide specialized training to the faculties and working professionals, Arts, Commerce, Science colleges and polytechnic institutes by developing short term training programmes on fundamental and advanced topics in IT, Electronics & Communication, Product Design, Manufacturing. In addition, the Academy conducts specialized customized training programmes and research promotion workshops for corporate sector & educational institutions.





About The Program

Most of the technological advancements in the recent times you see around have an element of Data Science, Machine Learning in it. This 6 month Applied Data Science, Machine Learning & Edge AI course is uniquely designed by E&ICT Academy, IIT Guwahati, and industry leaders, to make you master exactly what the Data Science, Machine Learning jobs market demands. The objective of our state-of-the-art Applied Data Science, Machine Learning & Edge AI Certification Course is to perfectly prepare you for the Data Analytics, Data Science & Machine Learning job roles you aspire for. You will learn real-world Data Science, Machine Learning, Deep Learning & Data Analytics skills through multiple hands-on projects, transforming you into a sought after New Age DS, ML & DA Specialist.

Data Analytics, Data Science & Visualization with Python

Module-1: Python Basics

- ✓ What is Python
- ✓ Application of Python
- ✓ Why use Python for AI-ML Installation
Anaconda/Other Idle
- ✓ Python Tokens
- ✓ Data Types in Python
- ✓ Conditional Statement
- ✓ Loops in Python
- ✓ Functions in Python
- ✓ Advance Functions
- ✓ File Handling
- ✓ Mini Project

Module-2: Intro to Git & Github and Kaggle

- ✓ Git and GitHub
- ✓ kaggle

Module-3: Python NumPy & Pandas

- ✓ Introduction to NumPy
- ✓ Exploring a NumPy Array
- ✓ Indexing & Slicing a NumPy Array
- ✓ Manipulating a NumPy Array
- ✓ Performing Mathematical & Statistical Functions using NumPy
- ✓ Performing Linear Algebra Operations using NumPy
- ✓ Introduction to Pandas
- ✓ Exploring Pandas Series
- ✓ Introduction to Pandas DataFrame
- ✓ Importing & Exporting Data
- ✓ Implementing basic DataFrame functionalities
- ✓ Exploring Descriptive Statistics with Pandas
- ✓ Mini Project

Module-4: R Language Essentials

- ✓ Fundamentals of R
- ✓ Vectors & control statements
- ✓ Functions in R
- ✓ Matrices & strings
- ✓ Lists & arrays in R
- ✓ Data visualization in R

Program Curriculum

Modules-5: Exploratory Data Analysis (EDA)

- ✓ Data Types
- ✓ Dispersion & Skewness
- ✓ Data imputation
- ✓ Data Pre-processing
- ✓ Data Cleaning
- ✓ Data Manipulation
- ✓ Advanced Manipulation
- ✓ **Mini Project**

Module-6: SQL For Data Analytics

- ✓ SQL Basic
- ✓ SQL Joins
- ✓ SQL Aggregations
- ✓ Subqueries and Temp Tables
- ✓ SQL Data Cleaning
- ✓ Window Functions
- ✓ **Mini Project**

Module-7: Data Analysis with Excel

- ✓ Key Formulas and Functions, Ranges and Tables
- ✓ Data Cleaning – Text Functions, Dates and Times
- ✓ Conditional Formatting, Sorting and Filtering
- ✓ Dashboard Creation
- ✓ Analysis with Pivot Tables
- ✓ Data Analysis in Excel – Trends and Patterns
- ✓ Data Visualization in Excel – Charts and Plots
- ✓ Functions in Python
- ✓ Advance Functions
- ✓ File Handling
- ✓ **Mini Project**

Module-8: Data Visualization with Python

- ✓ Why Data Visualization?
- ✓ Introduction to Data Visualization
- ✓ Libraries & Tools for Data Visualization in Python
- ✓ Static Data Visualization Using Seaborn
- ✓ Interactive Data Visualization Using Plotly Express
- ✓ Interactive Animations & Facet Plots

Program Curriculum

Module-9: Tableau for Business Intelligence

- ✓ Understanding Data
- ✓ Creating Your First visualization
- ✓ Tableau Calculations
- ✓ Formatting Visualizations
- ✓ Manipulating Data in Tableau
- ✓ Creating Dashboards AND Stories
- ✓ Distributing & Publishing Your Visualization
- ✓ Mini Project**

Module-10: Visual Storytelling using Power BI

- ✓ Introduction To Power BI
- ✓ Creating Power BI Reports, Auto Filters
- ✓ Report Visualization And Properties
- ✓ Chart And Map Report Properties
- ✓ Hierarchies And Drildown Reports
- ✓ Power BI Deployment & Cloud
- ✓ Improving Power BI Reports And More...
- ✓ Mini Project**

Capstone Project- 1 in Data Analytics

Applied Maths, Statistics and Probability for ML & AI

Module-1: Mathematics for Machine Learning & AI

- ✓ Linear Algebra
- ✓ Multi-variable Calculus
- ✓ Introduction to Calculus

Module-2: Statistics for Machine Learning & AI

- ✓ Applications of Statistics
- ✓ Sampling techniques
- ✓ Introduction to Statistics
- ✓ Descriptive Statistics
- ✓ Categories of Data
- ✓ Measure Used in Descriptive Statistics
- ✓ Basic Terminologies in Statistics
- ✓ Z-Scores

Module-3: Probability

- ✓ What is Probability?
- ✓ Random Variables
- ✓ Rules of probability
- ✓ Probability Distribution Functions
- ✓ Types of Probability
- ✓ Mini Project

Module-4: Inferential Statistics

- ✓ Introduction to Inferential Statistics
- ✓ One Sample Z test
- ✓ Hypothesis Testing
- ✓ One Sample T test
- ✓ Normal Distribution
- ✓ Independent Sample T test
- ✓ P-value
- ✓ Chi-square test
- ✓ One-tailed and Two-tailed tests
- ✓ ANOVA

Capstone Project- 2

Machine Learning Specialization

Module-1: Introduction to Machine Learning

- ✓ What is Machine Learning?
- ✓ Applications of Machine Learning
- ✓ Machine Learning in your daily life
- ✓ Machine Learning in Retail
- ✓ Steps Involved in Machine Learning

Module-2: Regression

- ✓ Introduction to Regression
- ✓ Linear Regression
- ✓ Evaluation Metrics in Regression Models
- ✓ Logistic Regression
- ✓ **Mini Project**

Module-3: Supervised Classification

- ✓ Why Use Classification?
- ✓ Application of Classification Algorithms
- ✓ Introduction to Classification
- ✓ Types of Classification Algorithms
- ✓ Classification: Decision Tree
- ✓ Classification: Random Forest
- ✓ ML in Banking & Finance - Benefits
- ✓ Classification: SVM
- ✓ Classification: KNN
- ✓ Classification: Naïve Bayes
- ✓ Evaluating Classification Models
- ✓ Model Optimization Techniques
- ✓ Model Boosting Techniques
- ✓ Introduction to PyCaret
- ✓ Dealing with Unbalanced Datasets
- ✓ **4 Mini Projects**

Program Curriculum

Module-4: Unsupervised Learning

- ✓ What is Unsupervised Learning?
- ✓ Application of Unsupervised Learning
- ✓ Introduction to Clustering
- ✓ Types of Clustering
- ✓ Partitioning Methods: K-means, DBSCAN, Spectral
- ✓ Hierarchical Methods: Hierarchical
- ✓ **2 Mini Projects**

Module 5 :- Dimension Reduction

- ✓ PCA
- ✓ Factor Analysis
- ✓ LDA
- ✓ **Mini Project**

Module-6: Association Rules Mining

- ✓ What are Association Rules?
- ✓ Association Rule Parameters
- ✓ A-priori Algorithm
- ✓ Market Basket Analysis

Module-7: Recommendation System

- ✓ What is a Recommendation System?
- ✓ Need for a Recommendation System
- ✓ Recommendation System Use Cases
- ✓ Applications of Recommendation System
- ✓ Types of Recommendation Systems
- ✓ Collaborative Filtering
- ✓ Content Based Filtering
- ✓ Matrix Factorization
- ✓ Pros and Cons of Collaborative Filtering
- ✓ Hybrid Recommender System
- ✓ **Mini Project**

Module-8: Time-series Forecasting

- ✓ Introduction to forecasting data
- ✓ Properties of Time Series data
- ✓ Features of Time Series data
- ✓ Markov Processes - Overview and Terminologies
- ✓ Naive, Average and Moving Average Forecasting
- ✓ Exponential Smoothing
- ✓ ARIMA Approach
- ✓ **Mini Project**

Program Curriculum

Module 09 - Machine Learning Model Deployment

- ✓ Overview of Machine Learning Models
- ✓ Machine Learning System Architecture
- ✓ Research Environment
- ✓ Packaging, Serving and Deploying the model
- ✓ Differential Testing And More...

Deep Learning Basics with TensorFlow & Text Processing

Module-1: Introduction to Deep Learning

- ✓ What is Deep Learning
- ✓ Curse of Dimensionality
- ✓ Machine Learning vs. Deep Learning
- ✓ Use Cases of Deep Learning
- ✓ Human Brain vs. Neural Network
- ✓ What is Perceptron?
- ✓ Learning Rate
- ✓ Epoch
- ✓ Batch Size

Module-2: Tensorflow 2.0 with Tensor Board

- ✓ Introduction to Tensorflow 2.x
- ✓ Installing Tensorflow 2.x
- ✓ Introduction to TensorBoard
- ✓ Defining Sequence model layers
- ✓ Activation Function
- ✓ Layer Types
- ✓ Model Compilation
- ✓ Model Optimizer
- ✓ Model Loss Function
- ✓ Model Training
- ✓ Digit Classification using Simple Neural Network in Tensorflow 2.x
- ✓ Mini Project

Module-5: Text Processing Methods

- ✓ Bag of Words
- ✓ Countvectorizer
- ✓ Term Frequency (TF)
- ✓ Inverse Document Frequency (IDF)
- ✓ Converting text to features and labels
- ✓ Multinomial Naive Bayes Classifier
- ✓ Leveraging Confusion Matrix Assignment
- ✓ Word Embeddings
- ✓ Word2Vec
- ✓ Mini Project

Program Curriculum

Generative AI Specialization & ChatGPT, Prompt Engineering, Explainable AI

Module-1: Introduction To Generative AI

- ✓ Introduction to Generative AI Models
- ✓ The Future of Generative AI
- ✓ Types of Generative AI Models
- ✓ Ethical Considerations in Generative AI Models & ChatGPT
- ✓ Popular Generative AI Models
- ✓ Benchmarking & Evaluating Models

Module-2: ChatGPT, Prompt Engineering, Explainable AI

- ✓ ChatGPT
- ✓ Fine-tuning ChatGPT
- ✓ Deploying and Scaling ChatGPT
- ✓ Maintaining ChatGPT
- ✓ Security and Privacy Considerations
- ✓ Monitoring and Debugging ChatGPT
- ✓ **Mini Project**

Explainable AI

Prompt Engineering

Advanced Prompt Engineering Techniques

Edge AI

Module-1: Edge AI

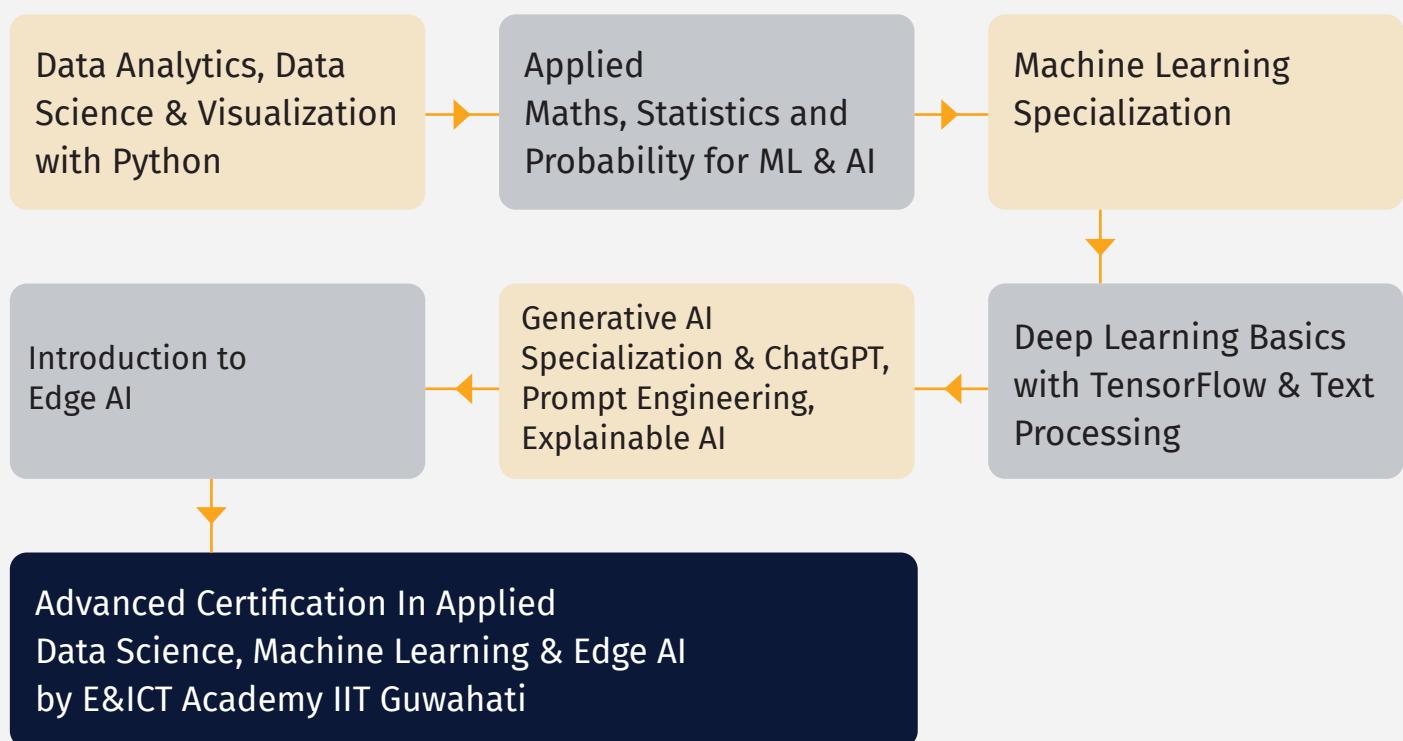
- ✓ Edge vs Cloud Computing
- ✓ Motivation behind Edge AI
- ✓ Edge AI applications
- ✓ Implementation process of Algorithms
- ✓ Inferences deployment on Edge

Major Capstone Project

Tools, Languages & Frameworks



Learning Path



CONTACT

THANK YOU!

Contact Details



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Program Information

Advanced Certification In Applied Data Science,
Machine Learning & Edge AI

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