

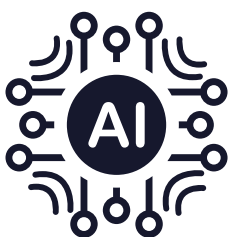


# IDM TECHPARK

GUIDE'S FOR PERFECT CAREER PATHWAY



# AI & ML Course Syllabus



**N.S.D.C.**  
National  
Skill Development  
Corporation



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# About Us

IDMTECHPARK global retail & corporate training solutions provider in Coimbatore, Erode, Trichy & Salem that offers a comprehensive range of training and placement services for both fresher's and professionals seeking new opportunities. The company commenced its IT training business in 2016. A pioneer in IT education, over the years, we have trained over 50k students. Idmtechpark has a wide range of courses, maintains education standards & provides placement assistance.

[www.idmtechparkcoimbatore.com](http://www.idmtechparkcoimbatore.com)  
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# About IDMTECHpark Education Quality

IDMTECHPARK is managed and developed by industry specialists with more than 8 years of expertise in the field. IDMTECHPARK offers a staff of highly skilled professional trainers who deliver effective IT training in a friendly setting, concentrating on the needs of each individual to help them succeed in a demanding work world. In the book of career and success, our staff never leaves a page unturned.

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IDMTECHPARK's versatile instructor-led training class rooms and lower-class sizes enable people to engage more easily and absorb knowledge, resulting in remarkable results for both themselves and the organizations for which they work. Our training programmes are adaptable and customizable to ensure that each participant gets the most out of their time with us. IDMTECHPARK focuses in providing hands-on IT training in over 30 different courses.

- We teach in-demand courses
- We provide impactful learning material
- Our teachers are well-selected & trained
- We follow world-class teaching methods
- Our courses include E-Projects
- We conduct technical workshops
- Exams are held and based on Exams providing Certification
- Certificates are recognized the world over
- Our course timings are flexible





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# Our Recent Placement

Idmtechpark assists students in getting job placements on successful completion of their courses. Idmtechpark also provides recruitment assistance to organizations. Idmtechpark students are shortlisted based on the organization's requirement. To make students job-ready, Idmtechpark conducts workshops e.g. How to do Group Discussions, how to behave in a Personal Interview. From time to time, job fairs & campus recruitments are conducted. Workplace skills such as time management, making effective presentations and communication skills are also provided. All this helps students find appropriate jobs in the IT industry while also helping save companies recruitment costs.

**Krishnaveni M**

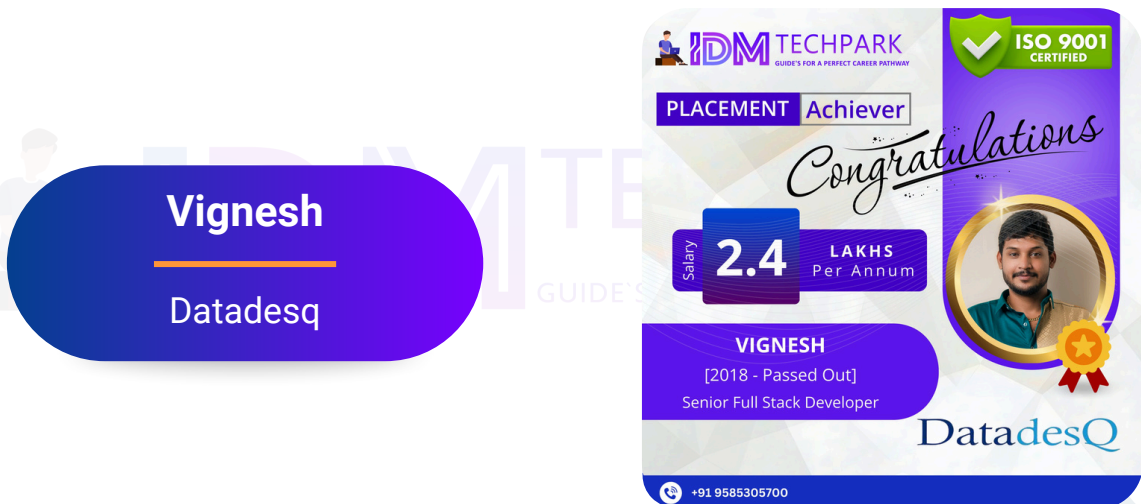
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**Joshwa**

Xccessor



**Vignesh**

Datadesq



**Madhumitha**

Accenture

**Keerthana**

AJS



**Brindha Boopathi**

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**Kavin Kumar**

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**Gowthami**

Genpact



**Surya**

ZUCI



**Pavithra**

Vel Info Tech



**Poovitha**

Gray Matter



**Ramesh**

TDT

**Siva Sankar**  
ST Cloudspark tech



**Nabeel Hisham**  
VTail



**Kalayarasan**  
Violet Infotech

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# Our Alumni Working At



## MODULE 1

# Introduction to AI and Machine Learning

- Definition of AI, ML, and Deep Learning
- Overview of the history and evolution of AI
- Key AI and ML applications
- Types of Machine Learning: Supervised, Unsupervised, Reinforcement Learning
- The role of data in AI/ML
- Understanding the AI & ML lifecycle



## MODULE 2

# Mathematical Foundations for AI & ML

- Linear algebra basics: Vectors, matrices, and operations
- Calculus fundamentals: Derivatives, gradients, and optimization
- Probability and statistics: Bayes' theorem, probability distributions
- Understanding loss functions and cost optimization
- Understanding overfitting and underfitting

## MODULE 3

# Python for AI & ML

- Introduction to Python and its libraries for AI/ML: NumPy, pandas, Matplotlib
- Python programming fundamentals: Data structures, loops, functions
- Working with datasets using pandas and NumPy
- Visualizing data with Matplotlib and Seaborn
- Writing and testing AI/ML algorithms in Python

## MODULE 4

# Data Preprocessing and Feature Engineering

- Importance of data cleaning and preprocessing
- Handling missing values, outliers, and duplicates
- Data normalization and standardization
- Feature extraction and dimensionality reduction
- Feature selection techniques and correlation
- Encoding categorical variables (one-hot, label encoding)

## MODULE 5

# Supervised Learning - Regression

- Introduction to regression models
- Simple linear regression and multiple regression
- Cost function and gradient descent
- Evaluation metrics: MSE, RMSE, MAE,  $R^2$
- Regularization techniques: Lasso, Ridge, Elastic Net
- Practical examples and hands-on implementations



## MODULE 6

# Supervised Learning - Classification

- Introduction to classification models
- Logistic regression and decision boundaries
- Evaluation metrics: Accuracy, Precision, Recall, F1-Score, ROC-AUC
- K-Nearest Neighbors (KNN)
- Support Vector Machines (SVM)
- Naive Bayes classifier
- Practical applications and hands-on examples

## MODULE 7

# Ensemble Methods

- Understanding ensemble learning techniques
- Bagging, Boosting, and Stacking
- Random Forest and its working
- Gradient Boosting and XGBoost
- AdaBoost and LightGBM
- Comparing ensemble methods with single models
- Practical implementation of ensemble models

## MODULE 8

# Unsupervised Learning - Clustering

- Introduction to unsupervised learning
- K-Means clustering algorithm
- Hierarchical clustering and DBSCAN
- Evaluation metrics for clustering: Silhouette score, Dunn index
- Dimensionality reduction techniques: PCA, t-SNE
- Applications of clustering in real-world scenarios

## MODULE 9

# Unsupervised Learning - Association

- Understanding association rule mining
- Apriori algorithm
- Market Basket Analysis
- Frequent itemset mining and generating association rules
- Lift and confidence in association rules
- Applications in retail and e-commerce



## MODULE 10

# Reinforcement Learning (RL) Basics

- Introduction to Reinforcement Learning
- Key components of RL: Agent, Environment, Reward, Action
- Markov Decision Processes (MDPs)
- Q-Learning and Deep Q-Networks (DQN)
- Policy gradient methods
- Applications of RL in gaming, robotics, and autonomous systems

## MODULE 11

# Deep Learning Introduction

- Overview of Deep Learning and Neural Networks
- Structure and functioning of Artificial Neural Networks (ANN)
- Activation functions: Sigmoid, ReLU, Tanh
- Feedforward neural networks and backpropagation
- Introduction to frameworks: TensorFlow and PyTorch
- Hands-on implementation of a simple neural network

## MODULE 12

# Convolutional Neural Networks (CNNs)

- Introduction to Convolutional Neural Networks
- Layers in CNN: Convolutional layer, Pooling layer, Fully connected layer
- CNN architecture and applications in image processing
- Image classification with CNNs
- Transfer learning and pre-trained models (e.g., VGG16, ResNet)
- Hands-on with CNN models using TensorFlow/Keras

## MODULE 13

# Recurrent Neural Networks (RNNs)

- Introduction to Recurrent Neural Networks
- Time series data and sequence modeling
- RNN architecture and limitations
- Long Short-Term Memory (LSTM) networks
- Gated Recurrent Units (GRU)
- Applications of RNNs in text, speech, and time series prediction
- Practical implementation of LSTMs using Keras/TensorFlow

## MODULE 14

# Natural Language Processing (NLP) Basics

- Introduction to Natural Language Processing
- Text preprocessing: Tokenization, stemming, lemmatization
- Bag of Words, TF-IDF, and Word2Vec
- Sentiment analysis and text classification
- NLTK and spaCy libraries
- Hands-on project: Text classification with NLP

## MODULE 15

# Advanced NLP Techniques

- Named Entity Recognition (NER)
- Topic Modeling: LDA (Latent Dirichlet Allocation)
- Sequence-to-sequence models
- Transformer architecture and BERT
- Text generation and machine translation
- Fine-tuning pre-trained models (e.g., BERT, GPT-3)



## MODULE 16

# Anomaly Detection

- Introduction to anomaly detection
- Univariate vs multivariate anomaly detection
- Isolation Forest, One-Class SVM, Local Outlier Factor (LOF)
- Time series anomaly detection
- Applications in fraud detection, network security, and healthcare
- Hands-on anomaly detection examples

## MODULE 17

# Model Evaluation and Selection

- Evaluating the performance of machine learning models
- Cross-validation: K-fold, Stratified K-fold, Leave-One-Out
- Hyperparameter tuning and Grid Search
- Model selection criteria: Bias-variance tradeoff, ROC, AUC
- Overfitting vs underfitting and techniques to mitigate them
- Model interpretability: SHAP and LIME

## MODULE 18

# Model Deployment and Serving

- Introduction to model deployment
- Using Flask/Django to deploy models as APIs
- Containerization with Docker
- Model deployment in cloud platforms: AWS, Google Cloud, Azure
- Continuous Integration/Continuous Deployment (CI/CD) pipelines
- Monitoring deployed models and model versioning

## MODULE 19

# Time Series Forecasting

- Understanding time series data
- Time series decomposition: Trend, Seasonality, Residual
- Autoregressive Integrated Moving Average (ARIMA) models
- Exponential smoothing methods
- Advanced time series methods: SARIMA, Prophet
- Hands-on time series forecasting examples

## MODULE 20

# Transfer Learning and Pre-trained Models

- Introduction to transfer learning
- Fine-tuning pre-trained models for new tasks
- Pre-trained models for image classification (e.g., VGG16, InceptionV3)
- Fine-tuning pre-trained models for NLP (e.g., BERT, GPT-2)
- Applications of transfer learning in limited data scenarios
- Hands-on examples using pre-trained models

## MODULE 21

# Generative Models

- Introduction to generative models
- Generative Adversarial Networks (GANs)
- Variational Autoencoders (VAEs)
- Applications of GANs: Image generation, style transfer, deepfakes
- Training and evaluating generative models
- Hands-on examples with GANs using TensorFlow/PyTorch



## MODULE 22

# Ethics in AI & ML

- Ethical considerations in AI and ML development
- Bias in data and algorithms
- Privacy concerns and GDPR compliance
- AI fairness and accountability
- Transparency in model development
- Ensuring ethical AI in real-world applications

## MODULE 23

# AI in Healthcare

- Applications of AI in healthcare: Diagnosis, prediction, personalized treatment
- Medical imaging and CNNs
- Predictive modeling in healthcare: Patient risk assessment
- AI in drug discovery and genomics
- Ethical considerations and challenges in healthcare AI
- Case study: AI in radiology

## MODULE 24

# AI in Autonomous Systems

- Introduction to autonomous systems
- AI in robotics and self-driving cars
- Computer vision for autonomous vehicles
- Reinforcement learning in autonomous systems
- Simulation tools and environments (e.g., OpenAI Gym)
- Real-world challenges and applications

## MODULE 25

# Final Project and Future Trends

- Building a comprehensive AI/ML project
- End-to-end project workflow: Data preprocessing, model building, evaluation, deployment
- Future trends in AI/ML: Explainable AI (XAI), AI for social good
- Staying updated with AI research and industry developments
- Final project presentations and feedback
- Career paths in AI and ML

# Thank You

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