



Data Science

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Data Science Course

Fundamentals of AI

Module 1: Understanding AI

- Introduction to Artificial Intelligence and its importance in data science.
- Key concepts of AI and its relationship with Machine Learning.
- Understanding AI goals, logic, and intelligent behavior.
- Real-world examples and AI-driven innovations.

Module 2: Application Life Cycle

- Overview of the AI and data science project lifecycle.
- Data collection, cleaning, and preparation stages.
- Model building, validation, and deployment.
- Continuous monitoring and model updates.

Module 3: Data Fundamentals

- Understanding structured and unstructured data.
- Types of data: numerical, categorical, and textual.
- Importance of data integrity and accuracy.
- Data storage formats and sources for data science.

Module 4: Computing for AI

- Introduction to computing environments for AI.
- Hardware and software used in data-driven projects.
- Understanding GPUs, TPUs, and cloud computing.
- Tools and platforms for scalable AI computations.

Module 5: AI Applications

- AI use cases across various industries.
- Predictive analytics and automation.
- AI in business intelligence and decision-making.
- Case studies on impactful AI applications.

Python for AI

Module 1: Introduction to Python

- Importance of Python in AI and data science.
- Installing Python and setting up Jupyter/VS Code.
- Writing and executing Python scripts.
- Understanding variables, syntax, and data types.

Module 2: Core Python Concepts

- Lists, tuples, sets, and dictionaries.
- Conditional statements and looping structures.
- Functions and modular programming.
- File handling and exception management.

Module 3: Object-Oriented Programming (OOP) in Python

- Understanding classes and objects.
- Encapsulation, inheritance, and polymorphism.
- Practical examples of OOP in AI projects.
- Reusability and modular design principles.

Module 4: Essential Libraries for AI & Data Science

- Introduction to NumPy, Pandas, and Matplotlib.
- Understanding arrays and dataframes.
- Data visualization using Seaborn.
- Using Scikit-learn for machine learning tasks.

Module 5: Data Handling & Preprocessing

- Cleaning and formatting raw datasets.
- Handling missing values and duplicates.
- Data normalization and encoding.
- Preparing data for modeling and analysis.

Module 6: Project

- End-to-end Python project on data preparation and visualization.
- Combining libraries for complete analysis.
- Implementing automation in data workflows.
- Presentation of project findings.

Statistics for AI

Module 1: Introduction to Statistics for AI & Data Science

- Importance of statistics in data-driven AI.
- Understanding populations, samples, and data distributions.
- Central tendency and variability measures.
- Statistical visualization techniques.

Module 2: Descriptive Statistics

- Measures of mean, median, and mode.
- Standard deviation and variance.
- Outlier detection and summary statistics.
- Visualizing descriptive insights using Python.

Module 3: Probability Basics

- Understanding probability theory and random variables.
- Probability distributions and their types.
- Conditional probability and Bayes theorem.
- Real-world probability applications in AI.

Module 4: Inferential Statistics

- Sampling and hypothesis testing.
- Confidence intervals and p-values.

- t-tests, chi-square, and ANOVA applications.
- Making statistical conclusions with data.

Module 5: Exploratory Data Analysis (EDA)

- Visualizing data patterns and relationships.
- Correlation analysis and feature insights.
- Identifying missing values and anomalies.
- Hands-on EDA using Pandas and Seaborn.

Module 6: Statistical Foundations for Machine Learning & Project

- Regression and correlation analysis.
- Feature selection using statistical principles.
- Statistical validation in ML workflows.
- Capstone project integrating all statistical methods.

Machine Learning

Module 1: Introduction to Machine Learning

- Understanding the ML ecosystem.
- Types of ML: supervised, unsupervised, and reinforcement.
- Data preparation and model lifecycle.
- ML in data science applications.

Module 2: Supervised Learning

- Regression and classification models.
- Algorithms: Linear Regression, Decision Trees, and SVM.
- Model evaluation metrics and performance.
- Case study: predictive analytics project.

Module 3: Unsupervised Learning

- Clustering and dimensionality reduction.
- K-Means, Hierarchical Clustering, and PCA.
- Association rules and anomaly detection.
- Practical examples for pattern discovery.

Module 4: Model Evaluation & Optimization

- Overfitting, underfitting, and bias-variance trade-off.
- Hyperparameter tuning and cross-validation.
- Regularization techniques for better models.
- Evaluating performance using metrics.

Module 5: Feature Engineering & Project

- Feature extraction, selection, and scaling.
- Encoding categorical variables.
- Building optimized datasets for ML models.
- End-to-end ML project implementation.

Deep Learning

Module 1: Neural Networks Basics

- Introduction to neurons and perceptrons.
- Activation functions and loss functions.
- Gradient descent and backpropagation.
- Introduction to TensorFlow and Keras.

Module 2: Artificial Neural Networks (ANNs)

- Building ANN architectures.
- Training and tuning ANN models.
- Handling overfitting using dropout.
- Real-world predictive ANN project.

Module 3: Convolutional Neural Networks (CNNs)

- CNN architecture and components.
- Feature extraction from images.
- Image classification and object detection.
- Practical CNN-based case study.

Module 4: Natural Language Processing (NLP)

- Understanding text data and tokenization.
- Text cleaning, stemming, and lemmatization.
- Sentiment analysis and text classification.
- Applications of NLP in chatbots and automation.

Module 5: Recurrent Neural Networks (RNNs)

- Sequence modeling and time-series analysis.
- RNN, LSTM, and GRU architectures.
- Text and sequence generation using RNNs.
- Case study: time-series forecasting.

Tools & Platforms



An interactive coding environment for writing, testing, and visualizing Python code, commonly used for data analysis.



A professional-grade Python IDE with robust debugging, testing, and package management features for data analytics projects.



A lightweight, extensible code editor with Python and FastAPI support.



A cloud-based Jupyter Notebook for Python with free GPU/TPU support for ML projects.



A fundamental Python library for numerical computations, supporting large arrays, matrices, and mathematical functions.



A data manipulation and analysis library for working with structured data, including DataFrames and Series.



A Python framework for building interactive web-based dashboards with live data visualizations.



An AI-enhanced code editor built on VS Code, offering smart completions and debugging



AI-powered tools and APIs for coding, automation, and natural language processing.



Google's AI model for assisting in code generation, debugging, and research.



Get **Skilled** to Reach Your Goal

Skillkoder is an AI-driven skilling platform designed to make high-quality learning affordable and accessible to everyone, everywhere.



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