

Machine Learning with Python Course Catalog – 90 Days

Day	Module	Topics Covered
1-3	Introduction to Machine Learning	Overview of Machine Learning, Types of Machine Learning (Supervised, Unsupervised, Reinforcement Learning), Key Libraries (NumPy, Pandas, Matplotlib, Scikit-learn, TensorFlow)
4-6	Python for Machine Learning	Python Basics for ML, Numpy Arrays, Pandas DataFrame, Data Cleaning and Preprocessing, Visualizing Data with Matplotlib and Seaborn
7-9	Data Preprocessing	Handling Missing Values, Feature Scaling (Normalization, Standardization), Encoding Categorical Data, Train-Test Split
10-12	Supervised Learning - Regression	Introduction to Linear Regression, Simple and Multiple Linear Regression, Polynomial Regression, Evaluating Regression Models (MSE, RMSE, R-Squared)
13-15	Supervised Learning - Classification	Introduction to Classification, Logistic Regression, K-Nearest Neighbors (KNN), Naive Bayes, Support Vector Machines (SVM), Evaluating Classification Models (Accuracy, Precision, Recall, F1-Score)
16-18	Model Evaluation and Validation	Cross-Validation, Bias-Variance Tradeoff, Overfitting and Underfitting, Hyperparameter Tuning, Grid Search and Random Search
19-21	Unsupervised Learning - Clustering	K-Means Clustering, Hierarchical Clustering, DBSCAN, Evaluation of Clustering Algorithms (Silhouette Score, Elbow Method)
22-24	Unsupervised Learning - Dimensionality Reduction	Principal Component Analysis (PCA), t-SNE, Feature Selection, Curse of Dimensionality
25-27	Ensemble Learning	Introduction to Ensemble Methods, Bagging, Random Forests, Boosting, AdaBoost, Gradient Boosting, XGBoost
28-30	Neural Networks Basics	Introduction to Neural Networks, Perceptron Model, Feedforward Neural Networks, Activation Functions, Backpropagation
31-33	Deep Learning - Introduction	Deep Learning Overview, Deep Neural Networks (DNN), TensorFlow Basics, Keras Introduction, Building a Basic Neural Network Model
34-36	Convolutional Neural Networks (CNN)	Introduction to CNNs, Convolution Layers, Pooling Layers, Flattening, Fully Connected Layers, CNN Architecture, CNN for Image Classification
37-39	Recurrent Neural Networks (RNN)	Introduction to RNNs, Sequence Data, Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), Applications of RNNs

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40-42	Natural Language Processing (NLP)	Introduction to NLP, Text Preprocessing (Tokenization, Lemmatization, Stop Words Removal), Bag of Words, TF-IDF, Word Embeddings (Word2Vec, GloVe)
43-45	Text Classification with Machine Learning	Sentiment Analysis, Text Classification with Naive Bayes, Logistic Regression, and SVM, Feature Extraction Techniques
46-48	Introduction to Time Series Analysis	Time Series Data, Time Series Forecasting, ARIMA Model, Seasonal Decomposition, Evaluation Metrics for Time Series Models
49-51	Introduction to Reinforcement Learning	Reinforcement Learning Overview, Markov Decision Processes, Q-Learning, Exploration vs Exploitation, Applications of Reinforcement Learning
52-54	Model Deployment - Introduction	Model Deployment Overview, Saving and Loading Models, Flask for Model Deployment, Introduction to Docker for ML Models
55-57	Model Deployment with Flask	Building a Web Application with Flask, Integrating ML Models into Flask, Handling User Input, Displaying Predictions
58-60	Model Deployment with Docker	Introduction to Docker, Dockerizing ML Models, Creating Docker Containers for Python ML Applications, Docker Compose
61-63	Hyperparameter Tuning and Model Optimization	Grid Search, Random Search, Bayesian Optimization, Feature Engineering, Feature Importance
64-66	Advanced Techniques in Machine Learning	Support Vector Regression (SVR), KNN Regressor, Decision Trees for Regression, Feature Selection and Importance
67-69	Advanced Neural Networks	Autoencoders, Generative Adversarial Networks (GANs), Deep Reinforcement Learning, Advanced Neural Network Architectures
70-72	Transfer Learning	Overview of Transfer Learning, Using Pre-trained Models, Fine-tuning Models for Specific Tasks, Applications of Transfer Learning
73-75	Anomaly Detection	Introduction to Anomaly Detection, Techniques for Anomaly Detection, Isolation Forest, One-Class SVM
76-78	Model Explainability and Interpretability	LIME, SHAP, Feature Importance, Explainable AI (XAI), Interpreting Complex Models
79-81	Model Evaluation Techniques	ROC Curve, Precision-Recall Curve, AUC Score, Cross-Validation Methods, Model Comparison Techniques
82-84	Deployment to Cloud (AWS, GCP, Azure)	Introduction to Cloud Computing, Cloud Platforms Overview, Deploying Models on AWS/GCP/Azure, Using Cloud Machine Learning APIs

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85-87	Advanced Data Engineering	Data Pipelines, ETL Process, Data Integration, Big Data Tools (Apache Spark), Working with Large Datasets
88-89	Capstone Project - End-to-End Solution	Building an End-to-End ML Solution, Data Collection, Data Preprocessing, Model Training, Evaluation, Deployment
90	Final Project & Certification	Final Hands-on Project Presentation, Review of Key Concepts, Final Exam, Certification of Completion