Machine Learning Learning Path

	Main Topic	Sub Topics	Week	Date
1	**Introduction to ML**			
1.1		Types of Machine Learning	week 1	04-21-2025
1.2		ML Lifecycle Overview	week 1	04-21-2025
1.3		Applications of ML in real world	week 1	04-21-2025
2	**Data Preprocessing**			
2.1		Loading and Cleaning Data	week 1	04-23-2025
2.2		Handling Missing Values	week 1	04-23-2025
2.3		Encoding (Label Encoding, One-Hot Encoding)	week 1	04-26-2025
2.4		Feature Scaling: Standardization vs Normalization	week 2	04-28-2025
2.5		Outlier Detection	week 2	04-28-2025
2.6		Feature Engineering & Binning	week 2	04-28-2025
2.7		Feature Selection Techniques: * Filter, Wrapper, Embedded Methods * Forward Selection, Backward Elimination	week 2	04-30-2025
2.8		Examples	week 2	04-30-2025
3	**Model Validation & Evaluation**			
3.1		Train/Test Split	week 2	05-02-2025
3.2		Cross-Validation: K-Fold, StratifiedKFold, OOB	week 3	05-04-2025
3.3		Bias vs Variance	week 3	05-06-2025
3.4		Overfitting, Underfitting	week 3	05-06-2025
3.5		s	week 3	05-08-2025
3.6		Performance Metrics: * Regression: MAE, MSE, RMSE, R^2 * Classification: Accuracy, Precision, Recall, F1 Score, ROC-AUC, Confusion Matrix * Unsupervised: Silhouette Score, Davies-Bouldin Score	week 3	05-11-2025
4	**Supervised Learning**			

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1	**Introduction to ML**			
1.1		Types of Machine Learning	week 1	04-21-2025
4.1		Regression * Linear Regression (Intuitive Understanding, Working Mechanism Mathematical Foundation Hyperparameters & Tuning Assumptions & Sensitivities, Code Snippets & Implementation) * Polynomial Regression Ridge, * Lasso, ElasticNet	week 4	05-17-2025
4.2		Classification * Logistic Regression * K-Nearest Neighbors * Decision Trees * Random Forest * Naive Bayes * Support Vector Machines (SVM) * Gradient Descent Variants (Batch, Stochastic, Mini-Batch)	week 5	05-24-2025
5	**Ensemble Techniques**			
5.1		Bagging vs Boosting	week 6	05-27-2025
5.2		Voting Classifier	week 6	05-27-2025
5.3		Bagging: Random Forest	week 6	05-29-2025
5.4		Boosting: AdaBoost, Gradient Boosting, XGBoost	week 7	06-01-2025
5.5		Creating Custom Ensemble Classifier	week 7	06-04-2025
6	**Unsupervised Learning**			
6.1		Clustering	week 7	06-07-2025
6.2		K-Means Algorithm	week 8	06-10-2025
6.3		DBSCAN (Density-Based Clustering)	week 8	06-14-2025
6.4		Hierarchical Clustering (Agglomerative)	week 9	06-16-2025
6.5		PCA (Principal Component Analysis)	week 9	06-18-2025
6.6		SVD (Singular Value Decomposition)	week 9	06-21-2025
7	**Recommender Systems**			
7.1		Intro to Recommendation Engines	week 10	06-23-2025
7.2		Collaborative Filtering	week 10	06-25-2025

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1	**Introduction to ML**			
1.1		Types of Machine Learning	week 1	04-21-2025
7.3		Content-Based Filtering	week 10	06-27-2025
7.4		Matrix Factorization Techniques (SVD)	week 10	06-28-2025
8	**Market Basket Analysis**			
8.1		Association Rules	week 11	06-30-2025
8.2		Apriori Algorithm	week 11	07-02-2025
8.3		Support, Confidence, Lift	week 11	07-04-2025
9	**Mini Projects & Capstone Ideas**			
9.1		Mini Project 1 – Regression	week 12	07-04-2025
9.2		Mini Project 2 – Classification	week 12	07-11-2025
9.3		Mini Project 3 – Clustering	week 13	07-15-2025
9.4		Mini Project 4 – Recommendation System	week 13	07-20-2025
10	**Interview - FAQ**		week 15	07-25-2025