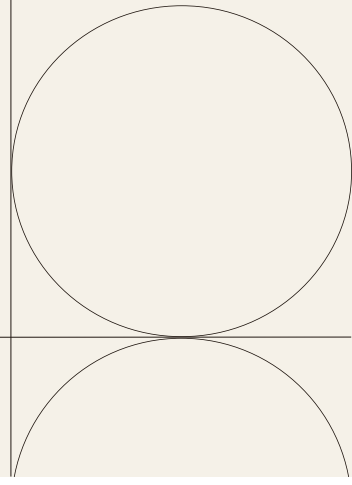# AYOMI
AI-Classes

AI (Artificial Intelligence) & ML (Machine Learning) Syllabus

1. Introduction to Artificial Intelligence & Machine Learninge	• What is Artificial Intelligence? • Types of AI: Narrow AI vs. General AI • What is Machine Learning? • AI vs. Machine Learning vs. Deep Learning • Applications of AI and ML • Real-world examples of AI and ML

2. Mathematics for Machine Learning and AI	• Linear Algebra:
	  ○ Vectors, Matrices,
	  ○ Eigenvalues/Eigenvectors
	  ○ Matrix operations
	  ○ Singular Value Decomposition (SVD)
	• Probability & Statistics:
	  ○ Probability distributions (Normal, Binomial, Poisson, etc.)
	  ○ Bayes' Theorem
	  ○ Hypothesis Testing, p-values, confidence intervals
	• Calculus:
	  ○ Derivatives and Gradients
	  ○ Optimization techniques (Gradient Descent)
	• Optimization:
	  ○ Convex vs. Non-convex problems
	  ○ Stochastic Gradient Descent (SGD)

3. Programming for AI and MLDates	• Introduction to Python (or R)
	• Key Libraries:
	  ○ Python: NumPy, Pandas, Matplotlib, Seaborn, Scikit-learn, TensorFlow, Keras, PyTorch
	  ○ R: ggplot2, dplyr, caret
	• Data Structures and Algorithms for AI
	• Functions, Loops, Recursion, and Debugging
	• Software Development Practices for AI (Version control with Git)

4.Supervised Learning Algorithms	• Regression: ○ Linear Regression

- Polynomial Regression
- Regularized Regression (Ridge, Lasso)
- Classification:
  - Logistic Regression
  - k-Nearest Neighbors (k-NN)
  - Support Vector Machines (SVM)
  - Decision Trees and Random Forests
  - Naive Bayes
  - Ensemble Methods (Bagging, Boosting, AdaBoost, Gradient Boosting)
- Model Evaluation:
  - Cross-validation
  - Accuracy, Precision, Recall, F1 Score
  - ROC-AUC curve
- Hyperparameter Tuning (Grid Search, Random Search)

5.Unsupervised Learning Algorithmstives	- Clustering: - k-Means Clustering - Hierarchical Clustering - DBSCAN - Dimensionality Reduction: - Principal Component Analysis (PCA) - t-Distributed Stochastic Neighbor Embedding (t-SNE) - Autoencoders - Anomaly Detection (Isolation Forest)
6.Deep Learning Audience	- Introduction to Neural Networks: - Perceptron and Feedforward Neural Networks - Activation Functions (ReLU, Sigmoid, Tanh) ○ - Backpropagation and Gradient Descent - Advanced Deep Learning Architectures: - Convolutional Neural Networks (CNNs) for Image Data - Recurrent Neural Networks (RNNs) for Sequential Data - Long Short-Term Memory (LSTM) Networks - Transfer Learning and Fine-tuning Pre-trained Models - Generative Models:

	○ Generative Adversarial Networks (GANs)
	○ Variational Autoencoders (VAE)
7. Natural Language Processing (NLP)	• Text Preprocessing (tokenization, stemming, lemmatization) ●
	• Bag-of-Words (BoW) Model
	• Term Frequency-Inverse Document Frequency (TF-IDF)
	• Word Embeddings (Word2Vec, GloVe, FastText)
	• Sequence Models:
	○ Recurrent Neural Networks (RNN)
	○ LSTM, GRU
	• Advanced NLP Models:
	○ Transformer Networks (BERT, GPT, T5)
	○ Attention Mechanisms and Self-Attention
	• Applications of NLP:
	○ Text Classification, Named Entity Recognition (NER), Sentiment Analysis
8.Reinforcement Learning	• Introduction to Reinforcement Learning (RL)
	• Key Concepts: Agent, Environment, Actions, Rewards
	• Markov Decision Processes (MDPs)
	• Q-Learning and Temporal Difference Learning
	• Policy Gradient Methods
	• Deep Reinforcement Learning (DRL)
	• Applications of RL (Game Playing, Robotics)
9. Ethics and Bias in AI	• AI Bias and Fairness
	• Transparency and Explainability (Explainable AI)
	• Ethical Considerations in AI
	• Privacy and Security in Machine Learning
10. Advanced Topics (Optional)	• Time Series Analysis and Forecasting
	○ ARIMA Models, LSTM for time series prediction
	• AI in Computer Vision
	○ Object Detection and Segmentation (YOLO, SSD, Faster R-CNN)

	○ Transfer Learning in Vision Models ● AI in Healthcare, Autonomous Vehicles, Robotics ● Federated Learning ● Meta-Learning ● Graph Neural Networks (GNNs)
11. Model Deployment and Production	● Introduction to Model Deployment ● Model Deployment with Flask/Django ● Containerization with Docker ● Cloud Platforms (AWS, Google Cloud, Azure) ● Model Monitoring and Versioning
12. Capstone Project	● Real-world problem solving using AI/ML ● End-to-End implementation of a model ● Documentation, Reporting, and Presentation