3. Advanced AI Course with Project and Internship Support

Advanced Machine Learning + Project + Internship Course (220 hours)

Module	Topics	Duration
Module 1: Python Basics and Data Science Libraries	Python for Machine Learning: - Introduction to Python, Data Types, Control Structures, Functions, and Modules - Python Libraries for Data Science (NumPy, Pandas, Matplotlib, Seaborn) - Data Structures: Lists, Tuples, Dictionaries - Introduction to Jupyter Notebooks	15 hours
Module 2: Statistics and Probability for Machine Learning	Descriptive Statistics: - Mean, Median, Mode, Variance, Standard Deviation - Data Distribution (Normal, Binomial) Probability Theory: - Conditional Probability, Bayes' Theorem - Probability Distributions: Normal, Poisson, and Exponential - Hypothesis Testing, p-values	15 hours
Module 3: Data Preprocessing and Feature Engineering	Data Cleaning and Transformation: - Handling missing values, outliers, scaling, and normalization - Feature Encoding (One-Hot Encoding, Label Encoding) - Feature Engineering and Selection Techniques - PCA (Principal Component Analysis) for Dimensionality Reduction	20 hours
Module 4: Supervised Learning Algorithms	Regression Models: - Linear Regression, Polynomial Regression - Logistic Regression for classification Classification Models: - Decision Trees, Random Forests	25 hours

	- Support Vector Machines (SVM), K-Nearest Neighbors (KNN) - Naive Bayes Classifier	
Module 5: Model Evaluation and Optimization	Model Evaluation: - Cross-validation, GridSearchCV - Performance Metrics: Accuracy, Precision, Recall, F1-Score, AUC-ROC Hyperparameter Tuning: - Random Search, Grid Search, and Bayesian Optimization Handling Overfitting and Underfitting: - Regularization Techniques (L1, L2)	20 hours
Module 6: Unsupervised Learning	Clustering: - K-Means Clustering, DBSCAN, Agglomerative Clustering - Hierarchical Clustering - Dimensionality Reduction (PCA, t-SNE) Anomaly Detection: - Isolation Forest, One-Class SVM	15 hours
Module 7: Deep Learning Fundamentals	Introduction to Neural Networks: - Perceptron, Activation Functions (Sigmoid, ReLU) - Feedforward Neural Networks - Backpropagation and Optimization (Gradient Descent, Adam) Advanced Deep Learning: - Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), LSTM	20 hours
Module 8: Advanced Deep Learning	CNN Architectures: - VGG, ResNet, InceptionNet - Object Detection (YOLO, SSD) RNN and LSTM Networks:	20 hours

	- Sequence Models for Time Series Prediction - Applications in NLP: Text Classification, Sentiment Analysis	
Module 9: Natural Language Processing (NLP)	Text Preprocessing: - Tokenization, Lemmatization, Stemming - TF-IDF, Bag of Words, Word2Vec Advanced NLP Models: - Transformers (BERT, GPT) - Named Entity Recognition (NER), Sentiment Analysis	15 hours
Module 10: Reinforcement Learning (RL)	Reinforcement Learning Basics: - Markov Decision Processes (MDPs) - Q-learning, Deep Q Networks (DQN) - Policy Gradient Methods, Actor-Critic Methods	15 hours
Module 11: Model Deployment and Monitoring	Model Deployment: - Flask for API Development - Docker for Containerization - Cloud Deployment (AWS, GCP, Azure) Model Monitoring: - Model Drift, Real-time Monitoring	10 hours
Module 12: Career Development and Soft Skills	Soft Skills for AI Professionals: - Communication and Presentation Skills - Networking and Professional Branding - Resume Building, LinkedIn Optimization	5 hours
	Total Theory + Lab Hours	**150 hours**

Project Phase	Details	Duration
Phase 1: Project Planning and Research	- Selecting project topics based on real-world applications (Healthcare, Finance, Smart Cities, E-commerce, etc.)	10 hours

	- Problem statement definition, data collection, and exploration	
Phase 2: Model Development	- Experiment with multiple algorithms (Supervised, Unsupervised, Deep Learning) - Preprocessing, feature selection, and engineering	20 hours
Phase 3: Model Evaluation and Optimization	- Cross-validation and hyperparameter tuning - Model evaluation using different metrics (AUC-ROC, Precision, Recall, etc.) - Model Optimization	15 hours
Phase 4: Final Report and Presentation	- Documenting results, methodology, and findings - Preparing presentation slides and demo	20hours
Phase 5: Portfolio Development	- Create a GitHub repository for project code - Support for finalizing resume, LinkedIn profile, and interview preparation	5 hours
	Total Project Hours	**70 hours**