5. ML Career Revival Program

Designed specifically for professionals looking to shift careers or return after a break:

ML Career Revival: Transform Career Breaks into Breakthroughs

Module	Topics	Duration
Module 1: Python for Data Science	Python Basics: - Introduction to Python - Data types (int, float, list, tuple, dictionary, set) - Control flow: loops, if-else statements - Functions and Modules - Error handling and exceptions - File handling (reading and writing files) Libraries for Data Science: - NumPy, Pandas, Matplotlib, Seaborn for data manipulation and visualization	20 hours
Module 2: Mathematics for Machine Learning	Linear Algebra: - Vectors, Matrices, and Tensors - Matrix operations, Eigenvalues, and Eigenvectors Calculus: - Derivatives and Gradients - Optimization techniques (Gradient Descent) Statistics: - Descriptive statistics (Mean, Median, Mode, Variance, Std. Dev.) - Probability Theory (Bayes' Theorem, Conditional Probability, Random Variables) - Probability Distributions (Normal, Binomial, Poisson)	20 hours

Module 3: Data Preprocessing & Visualization	Data Preprocessing: - Handling missing data, dealing with outliers, scaling and normalization - Feature engineering and selection Data Visualization: - Matplotlib and Seaborn for data visualization - Plot types: Histograms, Boxplots, Scatter Plots, Heatmaps - Visualizing correlations, trends, and distributions	15 hours
Module 4: Introduction to Machine Learning	Supervised Learning: - Linear Regression, Logistic Regression - K-Nearest Neighbours (KNN) - Decision Trees, Random Forests - Support Vector Machines (SVM) Model Evaluation and Metrics: - Cross-validation, Confusion Matrix - Accuracy, Precision, Recall, F1-score, AUC-ROC	20 hours
Module 5: Advanced Machine Learning	Ensemble Methods: - Bagging, Boosting (XGBoost, AdaBoost) - Stacking Unsupervised Learning: - K-Means Clustering, DBSCAN - Hierarchical Clustering - PCA (Principal Component Analysis) for dimensionality reduction	20 hours
Module 6: Introduction to Deep Learning	Neural Networks: - Perceptron, Activation functions (Sigmoid, Tanh, ReLU) - Feedforward networks, Backpropagation - Optimizers (SGD, Adam) Introduction to CNNs: - Convolutional Layers, Pooling Layers	20 hours

	- Architectures: LeNet, AlexNet, VGG	
Module 7: Advanced Deep Learning	Convolutional Neural Networks (CNNs): - Object detection (YOLO, R-CNN) - Transfer Learning with Pretrained Networks - Fine-tuning CNNs for Custom Tasks Recurrent Neural Networks (RNNs): - LSTMs, GRUs - Sequence to Sequence Models, Time Series Prediction	25 hours
Module 8: Natural Language Processing (NLP)	Text Preprocessing: - Tokenization, Lemmatization, and Stemming - Word Embeddings: Word2Vec, GloVe - TF-IDF and Bag of Words Advanced NLP Models: - LSTM for Text Classification - Transformers, BERT, GPT-2/3 for NLP tasks	20 hours
Module 9: Reinforcement Learning (RL)	Basics of RL: - Markov Decision Processes (MDPs) - Q-learning and Deep Q Networks (DQN) - Policy Gradient Methods - Applications in Game AI, Robotics	15 hours
Module 10: Model Deployment & Monitoring	Model Deployment: - Flask for API development - Docker for containerization - Cloud deployment with AWS/GCP Model Monitoring and Maintenance: - Model drift detection	10 hours

	- Logging, version control	
Module 11: Career Development & Soft Skills	Portfolio Development: - Creating a strong GitHub portfolio - Resume Building, LinkedIn Optimization - Soft Skills: Communication, Teamwork, Problem-solving	5 hours
Total Theory + Lab Hours		**150 hours**

Project Phase	Details	Duration
Phase 1: Project Selection and Planning	- Select project topics: AI in Healthcare, Smart Cities, Finance, E-commerce, etc. - Define problem statement, data collection, and preprocessing steps	10 hours
Phase 2: Model Development and Experimentation	- Apply algorithms from supervised, unsupervised, and deep learning models - Experiment with hyperparameters and fine-tuning	15 hours
Phase 3: Evaluation and Optimization	- Evaluate model performance using metrics (Accuracy, Precision, Recall, AUC) - Improve models using hyperparameter optimization, regularization	10 hours
Phase 4: Reporting and Final Presentation	- Prepare documentation, reports, and visualizations - Prepare and present final project findings and results	10 hours
Phase 5: Portfolio and Post-Project Support	- Create a portfolio on GitHub - Resume and LinkedIn optimization, interview preparation	5 hours
Total Project Hours		**50 hours**