AI & Machine Learning Foundations
A Practical 12-Week Course for Software Professionals

Ready to transition from software development to the exciting field of Artificial Intelligence and Machine Learning? This intensive course is designed specifically for developers, testers, team leads, and other software professionals seeking the foundational knowledge and practical skills to make the leap.

Course Principles & Objectives

- **Deep Understanding, Not Just Code:** Go beyond superficial tutorials. We focus on the core concepts, underlying math intuition (explained visually and practically), and algorithmic principles behind AI/ML techniques.
- **Practical Application & Skill Building:** Translate theory into action. Learn to build, train, and evaluate real ML models using industry-standard Python libraries.
- **Career-Focused Learning:** Develop tangible skills and projects directly applicable to AI/ML roles or enhancing your current software position with ML capabilities.
- **Leveraging Your Background:** Build upon your existing software engineering strengths, understanding how ML systems are built, deployed, and maintained.

Benefits & Your Capabilities

- **Build a Job-Ready Portfolio:** Complete multiple hands-on projects (data preprocessing, classification, regression, image analysis, text analysis) demonstrating your practical skills to potential employers.
- **Master Core ML & Intro to DL:** Confidently implement and evaluate foundational algorithms (Linear/Logistic Regression, Random Forests) and build/train Deep Learning models (MLPs, CNNs, LSTMs) primarily using **PyTorch**, with exposure to **TensorFlow/Keras**.
- **Understand the "Why":** Gain intuition behind the math and algorithms, enabling you to choose appropriate models and troubleshoot issues effectively.
- **Execute the End-to-End ML Workflow:** Understand and practice the full lifecycle from data gathering and preprocessing to model training, evaluation, and introductory deployment concepts.
- **Boost Your Career Prospects:** Significantly enhance your resume, confidently apply for roles like ML Engineer or Data Scientist (entry/junior level), or apply valuable ML techniques within your current software domain.
- **Speak the Language of AI/ML:** Understand key terminology, concepts, and trends in the rapidly evolving AI landscape.

Course Content Highlights

- **Module 1 & 2: Mastering the ML Workflow & Data Fundamentals:**

- ◦ *Principles:* The AI/ML Landscape, End-to-End Project Lifecycle, Exploratory Data Analysis (EDA), Data Cleaning Strategies, Feature Scaling & Encoding Importance, Effective Data Visualization.
- ◦ *Tools:* Python (NumPy, Pandas), Matplotlib, Seaborn, Scikit-learn Preprocessing.
- **Module 3 & 4: Building & Evaluating Core Machine Learning Models:**
  - ◦ *Principles:* Supervised Learning (Regression vs. Classification), Linear Model Assumptions, Gradient Descent Optimization, Regularization for Overfitting Control, Probabilistic Classification (Logistic Regression), Decision Tree Splitting Logic, Ensemble Power (Random Forests), Robust Model Evaluation (Metrics, Cross-Validation), Handling Data Imbalance.
  - ◦ *Tools:* Scikit-learn Models & Evaluation Metrics.
- **Module 5: Exploring Data Structure:**
  - ◦ *Principles:* Unsupervised Learning Goals, Distance-Based Clustering (K-Means), Dimensionality Reduction Techniques (PCA).
  - ◦ *Tools:* Scikit-learn Clustering & Decomposition.
- **Module 6-10: Diving into Deep Learning with PyTorch:**
  - ◦ *Principles:* Neural Network Building Blocks (Neurons, Activations), Training Dynamics (Backpropagation, Optimizers, Loss), Overfitting Control (Dropout, Early Stopping), Convolutional Neural Networks (CNNs) for Spatial Hierarchies, Recurrent Neural Networks (RNNs/LSTMs) for Sequential Data, Transfer Learning Concepts.
  - ◦ *Tools:* **PyTorch** (Primary Focus: Tensors, Autograd, nn.Module, Training Loops, torchvision), **TensorFlow/Keras** (Introductory Overview & Comparison).
- **Module 11: Understanding Deployment & Responsible AI:**
  - ◦ *Principles:* Model Persistence, Basic API Deployment Concepts, Introduction to MLOps Needs, Awareness of Bias, Fairness, and Ethical Considerations in AI.

Learning Approach

- Engaging live online sessions (2 x 2 hours per week).
- Hands-on coding demonstrations (Primarily PyTorch for DL, Scikit-learn for ML, with Keras intro).
- Practical programming assignments and portfolio-building mini-projects.
- Emphasis on conceptual understanding and math intuition.
- Capstone project integrating multiple course concepts.

Prerequisites: Solid programming experience (any language - Python covered in sessions 1-3). Familiarity with basic software development concepts. No prior ML experience required.

Ready to Transform Your Career?

Course Duration: 12 weeks
Mode: Online
Instructor Support: Live sessions, one-on-one feedback, and project reviews

Key Differences vs. 24-Week AI/ML Course:

- The 12-week course provides a strong, focused foundation covering the *most essential* traditional ML algorithms and introduces core Deep Learning concepts (MLPs, CNNs, LSTMs) primarily in one framework (PyTorch).
- The 24-week course offers significantly *more depth* in all areas, covers a *wider range* of algorithms (SVM, Naive Bayes, Boosting, advanced Unsupervised), provides *proficient mastery* in **both** PyTorch and TensorFlow/Keras, includes dedicated modules on **NLP, MLOps, Advanced CV, Generative Models Intro, and Responsible AI tools**, and features a more extensive capstone project. It's designed for those seeking deeper expertise and broader skillsets.