

# 3-Month AI/ML Learning Roadmap

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## Month 1: Mathematical Foundations & Python Programming

### Week 1: Python Basics & Environment Setup

- **Monday-Tuesday:** Python fundamentals
  - Resource: [Python.org Official Tutorial](#)
  - Topics: Variables, data types, control flow
- **Wednesday-Thursday:** Python advanced concepts
  - Resource: [Real Python](#)
  - Topics: Functions, classes, modules
- **Friday-Weekend:** Practice projects
  - Resource: [HackerRank Python](#)
  - Build: Simple calculator, to-do list app

### Week 2: Mathematics for AI/ML

- **Monday-Tuesday:** Linear Algebra
  - Resource: [Khan Academy Linear Algebra](#)
  - Topics: Vectors, matrices, eigenvalues
- **Wednesday-Thursday:** Calculus
  - Resource: [Paul's Online Math Notes](#)
  - Topics: Derivatives, partial derivatives, chain rule
- **Friday-Weekend:** Statistics & Probability
  - Resource: [StatQuest YouTube Channel](#)
  - Topics: Mean, variance, distributions, Bayes theorem

### Week 3: Data Science Libraries

- **Monday-Tuesday:** NumPy
  - Resource: [NumPy Official Tutorial](#)
  - Practice: Array operations, broadcasting
- **Wednesday-Thursday:** Pandas
  - Resource: [Pandas Documentation](#)
  - Practice: Data manipulation, cleaning
- **Friday-Weekend:** Matplotlib & Seaborn
  - Resource: [Matplotlib Tutorials](#)

- Project: Data visualization dashboard

## Week 4: Introduction to ML

- **Monday-Tuesday:** ML Fundamentals
    - Resource: [Google's Machine Learning Crash Course](#)
    - Topics: Supervised vs unsupervised learning
  - **Wednesday-Thursday:** Scikit-learn basics
    - Resource: [Scikit-learn Tutorials](#)
    - Practice: Simple classification problems
  - **Friday-Weekend:** First ML Project
    - Resource: [Kaggle Learn](#)
    - Build: Iris dataset classification
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## Month 2: Core Machine Learning Algorithms

### Week 5: Supervised Learning - Regression

- **Monday-Tuesday:** Linear Regression
  - Resource: [Andrew Ng's Course \(Coursera\)](#)
  - Implementation: From scratch & with scikit-learn
- **Wednesday-Thursday:** Polynomial & Ridge Regression
  - Resource: [Towards Data Science](#)
  - Practice: Boston housing price prediction
- **Friday-Weekend:** Logistic Regression
  - Resource: [StatQuest Logistic Regression](#)
  - Project: Credit card fraud detection

### Week 6: Supervised Learning - Classification

- **Monday-Tuesday:** Decision Trees
  - Resource: [Visual Introduction to ML](#)
  - Practice: Customer churn prediction
- **Wednesday-Thursday:** Random Forests & Ensemble Methods
  - Resource: [DataCamp Tutorial](#)
  - Implementation: Ensemble voting classifier
- **Friday-Weekend:** Support Vector Machines
  - Resource: [SVM Explained](#)
  - Project: Image classification

### Week 7: Unsupervised Learning

- **Monday-Tuesday:** K-Means Clustering

- Resource: [K-Means Clustering Visualization](#)
  - Practice: Customer segmentation
- **Wednesday-Thursday:** Hierarchical Clustering & DBSCAN
  - Resource: [Scikit-learn Clustering Guide](#)
  - Implementation: Document clustering
- **Friday-Weekend:** Principal Component Analysis (PCA)
  - Resource: [PCA Visualization](#)
  - Project: Dimensionality reduction visualization

## Week 8: Model Evaluation & Improvement

- **Monday-Tuesday:** Cross-validation & Metrics
    - Resource: [Machine Learning Mastery - Metrics](#)
    - Topics: Accuracy, precision, recall, F1-score
  - **Wednesday-Thursday:** Feature Engineering
    - Resource: [Python Data Science Handbook](#)
    - Practice: Creating polynomial features
  - **Friday-Weekend:** Hyperparameter Tuning
    - Resource: [Kaggle Feature Engineering Course](#)
    - Project: End-to-end ML pipeline
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## Month 3: Deep Learning & Advanced Topics

### Week 9: Neural Networks Fundamentals

- **Monday-Tuesday:** Perceptron & Activation Functions
  - Resource: [Neural Networks and Deep Learning](#)
  - Implementation: Build perceptron from scratch
- **Wednesday-Thursday:** Backpropagation
  - Resource: [3Blue1Brown Neural Network Series](#)
  - Practice: Gradient descent visualization
- **Friday-Weekend:** Introduction to TensorFlow/Keras
  - Resource: [TensorFlow Tutorials](#)
  - Project: MNIST digit classifier

### Week 10: Convolutional Neural Networks (CNN)

- **Monday-Tuesday:** CNN Architecture
  - Resource: [Stanford CS231n](#)
  - Topics: Convolution, pooling, filters
- **Wednesday-Thursday:** Popular CNN Architectures
  - Resource: [Papers with Code](#)
  - Study: LeNet, AlexNet, VGG

- **Friday-Weekend:** CNN Project
  - Resource: [Keras CNN Examples](#)
  - Build: Image classification app

## Week 11: Recurrent Neural Networks (RNN)

- **Monday-Tuesday:** RNN & LSTM Basics
  - Resource: [Understanding LSTM Networks](#)
  - Topics: Sequence modeling, vanishing gradients
- **Wednesday-Thursday:** Text Processing & NLP
  - Resource: [NLTK Book](#)
  - Practice: Tokenization, word embeddings
- **Friday-Weekend:** RNN Project
  - Resource: [TensorFlow Text Generation](#)
  - Build: Sentiment analysis model

## Week 12: Advanced Topics & Capstone Project

- **Monday-Tuesday:** Transfer Learning
    - Resource: [TensorFlow Transfer Learning](#)
    - Practice: Fine-tune pre-trained models
  - **Wednesday-Thursday:** GANs & Autoencoders
    - Resource: [GAN Lab Interactive](#)
    - Experiment: Generate synthetic data
  - **Friday-Weekend:** Capstone Project
    - Resource: [Kaggle Competitions](#)
    - Build: Complete end-to-end ML project
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## Additional Resources & Tips

### Free Learning Platforms:

- [Coursera](#): Audit courses for free
- [Fast.ai](#): Practical deep learning course
- [MIT OpenCourseWare](#): Free MIT courses
- YouTube Channels:
  - [Sentdex](#)
  - [Two Minute Papers](#)
- [Google Colab](#): Free GPU for training

### Tips for Success:

1. **Code Daily:** Even 30 minutes makes a difference!
2. **Join Communities:**

- [Reddit r/MachineLearning](#)
  - [Discord ML Community](#)
3. **Document Progress:** Keep a learning journal
  4. **Build Projects:** Theory + Practice = Mastery
  5. **Stay Curious:** AI/ML is evolving rapidly!

### Milestone Projects:

- **Month 1:** Data analysis dashboard
  - **Month 2:** ML web app deployment
  - **Month 3:** Custom deep learning model
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## Progress Tracking Template

Week	Topics Covered	Projects Completed	Next Steps
1	Python Basics	Calculator App	Review OOP
2	Linear Algebra	Math problems	Khan Academy
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## Quick Reference Links

### Datasets:

- [Kaggle Datasets](#)
- [UCI Machine Learning Repository](#)
- [Google Dataset Search](#)

### Documentation:

- [Scikit-learn Documentation](#)
- [TensorFlow Documentation](#)
- [PyTorch Documentation](#)

### Tools:

- [Google Colab](#)
  - [Jupyter Notebooks](#)
  - [VS Code](#)
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### Congratulations!

By completing this roadmap, you'll have a solid foundation in AI/ML! Remember, learning is a journey, not a destination. Keep exploring and building!