3-Month AI/ML Learning Roadmap

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

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

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

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

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

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!