

2-Month Data Science Learning & Project Plan

This structured 8-week curriculum is designed for beginners to gain hands-on experience in Data Science. You'll explore the fundamentals of Python, math for ML, machine learning, deep learning, and NLP, culminating in deploying real-world models.

Week 0: Introduction to Data Science & AI

- What is Data Science? What is AI?
- Real-world use cases across industries
- Debunking myths: Will AI take our jobs?
- How to shape your role in the AI revolution

Week 1: Python for Data Science

- Python basics: data types, loops, functions
- NumPy for numerical computing
- Pandas for data manipulation
- Matplotlib & Seaborn for visualization

Week 2: Mathematical Foundations

- Probability & Bayes' Theorem
- Linear Algebra: vectors, matrices, dot products
- Calculus: derivatives, gradients (conceptual)

Week 3: Machine Learning Concepts

- Supervised & Unsupervised Learning
- Algorithms: Linear Regression, KNN, Decision Trees, Clustering
- Feature engineering & preprocessing
- Model evaluation: Accuracy, F1, ROC AUC
- Hyperparameter tuning: Grid search, CV

Weeks 4–5: Real-World ML Practice

- Hands-on ML project using real datasets
- Data cleaning, EDA, training & testing models
- Using Scikit-learn Pipelines for modular code
- Present results with visualizations

Week 6: Deep Learning Basics

- Neural Nets: perceptron, layers, weights
- Activation functions: ReLU, Sigmoid
- Forward & Backpropagation (conceptual + code)
- Build simple models using PyTorch or TensorFlow

Week 7: Model Lifecycle & Deployment

- Lifecycle: development → testing → deployment → monitoring
- Model versioning using pickle
- Wrap ML model in a Flask API
- Deploy on Heroku or Render
- Basic model monitoring concepts

Week 8: Introduction to NLP (Natural Language Processing)

- Text preprocessing: tokenization, stopwords removal, stemming
- Bag of Words & TF-IDF
- Build a text classifier (e.g. spam detection)
- Sentiment analysis using scikit-learn or HuggingFace
- Optional: Intro to Transformers (BERT/GPT)