

Python Learning Roadmap for AI Engineering

1. Python Basics (Foundations)

- Print function and input
- Variables and data types (strings, integers, floats, booleans)
- Basic operators (arithmetic, comparison, logical)
- String manipulation and methods
- Control structures: if-else, loops (for, while)

2. Python Intermediate Topics

- Functions (definition, parameters, return values)
- Modules and libraries (importing, creating custom modules)
- File handling (reading, writing, appending files)
- Exception handling (try, except, finally)
- List comprehensions
- Python's datetime module

3. Data Structures in Python

- Lists, tuples, sets, and dictionaries
- Operations and methods on data structures
- Stacks and queues using lists
- Nested data structures and accessing elements

4. Object-Oriented Programming (OOP)

- Classes and objects
- Attributes and methods
- Inheritance and polymorphism
- Encapsulation and abstraction

- Magic methods (like `__init__`, `__str__`)

5. Advanced Python Concepts

- Decorators and generators
- Iterators and iterables
- Lambda functions
- Regular expressions
- Python's os and sys modules

6. Libraries for AI and Data Science

- Numerical and Data Manipulation: NumPy, Pandas
- Visualization: Matplotlib, Seaborn
- AI/ML Frameworks: Scikit-learn, TensorFlow, PyTorch
- Natural Language Processing: NLTK, SpaCy
- Data Collection and APIs: Requests, BeautifulSoup, Scrapy

7. Algorithms and Data Structures (AI Focus)

- Sorting and searching algorithms
- Graphs and trees
- Dynamic programming
- Recursion basics

8. Introduction to Machine Learning

- Supervised and unsupervised learning basics
- Regression and classification
- Clustering algorithms
- Neural networks basics

9. Deep Learning

- Neural network architecture
- Convolutional Neural Networks (CNNs)
- Recurrent Neural Networks (RNNs)
- Transfer learning

10. AI-Related Tools and Techniques

- Working with datasets
- Data cleaning and preprocessing
- Feature engineering
- Model evaluation and optimization

11. Real-World Projects

- Build smaller projects like calculators or games
- Progress to data analysis tasks
- Move on to AI-powered applications like chatbots or recommendation systems