*PYTHON LEARNING SCHEDULE*

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# Timeline

| Week | Topics |
| --- | --- |
| 1st week | Topics 1 + 2 |
| 2nd week | Topic 3 |
| 3rd week | Topic 4 |
| 4th week | Topic 4 (continued) |
| 5th week | Topics 5 + 6 + 7 |
| 6th week | Topics 8 + 9 |
| 7th week | Topic 10 |
| 8th week | Topic 10 (continued) |
| 9th week | Topic 14 |
| 10th week | Topic 14 (continued) |
| 11th week | Topic 14 (continued) |
| 12th week | Topic 11 |
| 13th week | Topic 12 |
| 14th - 18th weeks | Topics 13 + 15 + 16 |

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# Topics

### **1. Python Basics**

* Introduction to Python: History, features, and setup
* Python syntax, variables, and data types (int, float, string, boolean)
* Basic input/output and comments
* Arithmetic, comparison, and logical operators

### **2. Control Flow**

* Conditional statements (if, elif, else)
* Loops: for loops, while loops
* Loop control statements: break, continue, pass

### **3. Functions**

* Defining and calling functions
* Function arguments (positional, keyword, default, arbitrary arguments)
* Return values and scope of variables
* Lambda functions and higher-order functions
* Recursion basics

### **4. Data Structures+**

* Lists: Creating, accessing, modifying, slicing, and list comprehensions
* Tuples: Immutability, usage, packing/unpacking
* Sets: Unique values, set operations (union, intersection, difference)
* Dictionaries: Key-value pairs, dictionary methods, and comprehension
* Arrays vs. Lists

### **5. Strings**

* String methods and operations
* Formatting strings (f-strings, format method)
* String slicing and indexing
* Regular expressions (basic pattern matching)

### **6. Exception Handling**

* try, except, else, finally
* Custom exceptions and raising exceptions

### **7. File Handling**

* Opening, reading, writing, and closing files
* Working with files in different modes (r, w, a, etc.)
* Using with for file operations

### **8. Object-Oriented Programming (OOP)**

* Classes and objects
* Attributes and methods
* Constructor (\_\_init\_\_) and destructors
* Inheritance, polymorphism, and encapsulation
* super() and method overriding
* Dunder methods (\_\_str\_\_, \_\_repr\_\_, etc.)

### **9. Modules and Packages**

* Importing modules and packages
* Using pip to install external packages
* Creating custom modules and packages

### **10. Advanced Data Structures**

* Stacks, Queues, and Linked Lists (introductory concepts for DSA)
* Trees and Graphs (basic implementations)
* Heaps, Hash tables, and priority queues

### **11. Functional Programming**

* map(), filter(), and reduce()
* zip() and list comprehension for functional programming
* Decorators and closures
* Generator functions and yield

### **12. Working with Libraries for DSA**

* collections (Counter, defaultdict, deque)
* itertools for combinatorial operations
* functools for caching and higher-order functions

### **13. Data Science Basics (Optional)**

* Introduction to numpy and pandas for data manipulation
* Basics of data analysis using libraries like matplotlib and seaborn

### **14. Algorithms and Problem Solving Techniques**

* Basic algorithms(prime number etc)
* Searching algorithms (linear, binary search)
* Sorting algorithms (bubble, selection, merge, quicksort)
* Understanding recursion for problem-solving
* Dynamic programming and memoization basics
* Backtracking and brute-force techniques

### **15. Advanced Topics (Beyond Core Python)**

* **Concurrency and Parallelism**: threading, multiprocessing, async programming with asyncio
* **Web Development Basics**: Flask or Django for understanding web frameworks
* **Database Interaction**: sqlite3, SQLAlchemy for ORM, basics of interacting with SQL/NoSQL databases
* **Network Programming**: socket programming, HTTP requests with requests library
* **Data Serialization**: JSON, XML, CSV handling, pickle for object serialization
* **Testing and Debugging**: Unit testing with unittest, pytest, debugging techniques
* **Advanced Libraries**: Popular libraries for data analysis (pandas, numpy), visualization (matplotlib, seaborn), and machine learning (scikit-learn, tensorflow)

### **16. Best Practices**

* Writing clean and Pythonic code (PEP 8)
* Using virtual environments for project management
* Writing documentation and type hints (typing module)
* Version control basics with Git