**1. Core Python Concepts**

* **Data Types and Variables**
  + Integer, Float, String, Boolean
  + Lists, Tuples, Sets, Dictionaries
  + Mutable vs Immutable Objects
* **Control Flow**
  + if-elif-else statements
  + Loops: for, while
  + Loop control: break, continue, pass
* **Functions**
  + Defining and calling functions
  + Default and keyword arguments
  + \*args and \*\*kwargs
  + Lambda functions
* **Object-Oriented Programming (OOP)**
  + Classes and Objects
  + Inheritance, Polymorphism
  + Encapsulation and Abstraction
  + Magic/Dunder Methods (\_\_init\_\_, \_\_str\_\_, \_\_repr\_\_, etc.)
  + Decorators and Property methods
* **Exception Handling**
  + try, except, else, finally
  + Custom exceptions
* **Modules and Packages**
  + Importing modules (import, from ... import)
  + sys, os, random, math, itertools, etc.
  + Creating and using custom modules

**2. Advanced Python Concepts**

* **Data Structures and Algorithms in Python**
  + Stacks, Queues, Linked Lists
  + Hashmaps, Trees, Graphs
  + Sorting and Searching Algorithms
* **File Handling**
  + Reading and writing files
  + Working with JSON and CSV files
* **Iterators and Generators**
  + iter() and next()
  + Generator functions with yield
* **Regular Expressions**
  + Using the re module
  + Pattern matching, groups, and substitutions
* **Concurrency and Parallelism**
  + Multithreading (threading module)
  + Multiprocessing (multiprocessing module)
  + Async programming (asyncio, await)

**3. Python for Data Handling**

* **Libraries**
  + **Numpy**: Arrays and mathematical operations
  + **Pandas**: DataFrames, data manipulation
  + **Matplotlib/Seaborn**: Data visualization
  + **SQLAlchemy**: Database interaction
* **Data Cleaning and Preprocessing**
  + Handling missing data
  + Data transformation and scaling
* **Working with APIs**
  + REST API calls with requests
  + Authentication, JSON handling

**4. Python for Software Development**

* **Web Development**
  + Basics of Flask/Django
  + Building REST APIs
  + Templating with Jinja2
  + WebSocket communication (for real-time updates)
* **Testing**
  + Unit testing with unittest or pytest
  + Mocking, assertions, and test coverage
* **Logging**
  + Using the logging module
  + Configuring log levels and handlers

**5. Python for Machine Learning and AI**

* **ML Libraries**
  + **Scikit-learn**: ML models, preprocessing, evaluation
  + **TensorFlow/Keras**: Neural networks and deep learning
* **Data Analysis**
  + Statistical operations with Python
  + Time-series analysis with Pandas
* **Model Deployment**
  + Using Flask/Django for serving ML models
  + Tools like Docker for containerization

**6. Problem-Solving and Competitive Programming**

* Practice solving algorithmic problems on platforms like:
  + LeetCode
  + HackerRank
  + Codeforces
* Focus on:
  + Dynamic Programming
  + Graph algorithms (DFS, BFS, Dijkstra's)
  + String manipulation
  + Matrix problems

**7. Industry-Relevant Tools and Techniques**

* **Version Control**
  + Git: Branching, merging, pull requests
* **Docker and Kubernetes**
  + Writing Dockerfiles
  + Basics of Kubernetes deployment
* **Cloud Platforms**
  + AWS (Lambda, S3)
  + Azure or Google Cloud
* **CI/CD Pipelines**
  + Understanding Jenkins, GitHub Actions, or GitLab CI