

# Course Outline

## Advanced Python Programming & Applications

### Week 1: Introduction to Python & Development Environment

- Motivational Lecture
- Course Introduction
- Success Stories
- Job Market Overview
- Course Applications
- Institute/Work Ethics
- Python Introduction
  - Creator and creation date
  - Famous applications built with Python
  - Python versions and minor differences
- Python Installation (3.7+ version)
- Setting up Anaconda
  - PIP (Module Installations)
  - Virtual Environments
- Python IDEs or Text Editors
  - Jupyter Notebooks
  - PyCharm Community Edition
  - Spider

### Week 2: Introduction to Python Basic Programming

- Basic Syntax (No Semicolon, Indentation, No Parenthesis)
- PEP8
- Keywords
- Variables & Literals

- Starting with Expressions
- Basic Types
- Working with Variables
- Arithmetic Operators
  - Unary
  - Binary
  - +, -, \*, /, //, %, \*\*
- Percentage and Ratio Examples
- Operator Precedence
- Type Conversion/Casting
- Introduction to Data Structures
  - List
  - Dictionary
  - Tuple
  - Sets

### **Week 3: Introduction to Debugging & User Interactions & Strings**

- Debugging
  - Syntax Errors
  - Runtime Errors
  - Semantic Errors
  - Locating and Resolving Errors
- User Interactions
  - Output/Print (Constants, Variables)
  - Input
- Introduction to Strings
  - Input and Output
  - Concatenation

#### Week 4: Advanced Strings & Introduction to Functions

- String Formatting
- String Mutation
- String Methods
  - Upper, Lower, Count, Strip, Replace, Join, Split, Substring, Index, Negative Index
- Introduction to Functions
  - Syntax
  - Calling Methods
  - Arguments
  - Return

#### Week 5: List Data Type & Methods

- List Methods
  - Append, Pop, Prepend, Sort, Count, Index (+ve and -ve), Insert, Remove
- List Comprehension
- List Mutation

#### Week 6: Dictionary Data Type & Methods

- Dictionary Methods
  - Keys, Values, Items, Get, Merging, Pop, Clear, Copy
- Dictionary Comprehension
- Dictionary Mutation

#### Week 7: Tuples & Sets

- Tuples
  - Definition
  - Built-in Methods
  - Mutation
- Sets

- Definition
- Built-in Methods
- Frozen Sets
- Mutation

### **Week 8: Flow Control**

- Conditions
  - Simple, Multiple, Nesting
  - Logical Operators
- Loops
  - While, For, Nesting
  - Range, Break, Continue
  - Over List, Over String
- Exception Handling
  - Try, Except, Finally

### **Week 9: Functions**

- Syntax, Define, Calling
- Benefits: Reuse, Code Separation
- Arguments: Default, Optional, Pass by Value & Reference
- Recursive Functions
- Lambda Functions
- Variable Scope: Global, Local

### **Week 10: Projects**

- Example Projects
  - Paper Scissors Rock Game
  - Temperature Calculator
  - Unit Conversion System

- Number Guessing Game
- Marks Grade/Average Calculations

### **Week 11: Packages/Modules & Object-Oriented Programming**

- Packages
  - Examples (math, csv, os, sys)
- Modules
  - `__init__.py` file
  - Import
- Classes and Objects
  - Methods, Static Methods, Accessors
  - Private, Public
  - Self, Properties, Constructor (`__init__()`)

### **Week 12: Advanced OOP 1**

- Inheritance
  - Single, Multiple, Method Overriding
- Polymorphism
- Composition
- Operator Overloading

### **Week 13: I/O Operations**

- File Handling
  - Open, Modes (w, w+, wb, r), With Keyword
- File Types
  - TXT, CSV, JSON, XML
- Nested Data Structures
  - Arrays, Dictionaries

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#### **Week 14: Python Applications and Frameworks**

- Desktop Applications
  - QT, PyGUI, Tkinter
- Web Applications
  - Flask, Django
- Machine Learning & AI & Data Science
  - PyTorch, Pandas, NumPy, SciPy, TensorFlow

Week 15: Mid Term Assignment

#### **Week 16: Introduction to Data Science & Structured/Unstructured Data**

- Data Science Introduction
- Working with Structured Data
  - Numpy, Pandas, Matplotlib
- Introduction to Unstructured Data

#### **Week 17: Data Science Project**

#### **Week 18: Working with Unstructured Data**

- Audio and Image Data

#### **Week 19: Introduction to TensorFlow**

- TensorFlow API Hierarchy
- Graph and Session
- Visualizing a Graph

Week 20: TensorFlow Project

**Week 21-26: Employable Project/Assignment or On-Job Training**

- Project Guidelines
- Project Assignments based on Trainee's Skills
- Leading to Employment or Start-up Entrepreneurship

**Week 22: Introduction to Django or Flask**

- Database, HTML, CSS
- Migrations, Views, MVC, URLs, Templates

Week 23: Django Mini Project

**Week 24: Django Rest Framework**

- JSON, API Calls, Token Auth, Serializers

**Week 25: Final Project Progress****Week 26: Final Project Evaluation**

- Job Market Searching
- Self-employment
- Fundamentals of Business Development
- Entrepreneurship and Startup Funding
- Business Strategies and Analysis
- Final Assessment