SparkMentis AI

Python Programming Bootcamp

Course Overview This intensive 8-session Python bootcamp transforms complete beginners into confident programmers capable of building interactive applications and chatbots. Students will master Python fundamentals and create an impressive portfolio showcasing their programming skills.

Course Structure:

- **Duration:** 8 sessions over 4 weeks (2 sessions per week)
- **Session Length:** 90-120 minutes each
- **Format:** Integrated theory and hands-on coding
- **Tools:** Google Colab (in-class), VS Code (homework/projects), GitHub

Module 1: Programming Fundamentals & Development Environment Sessions 1-2

Session 1: Development Setup & Core Programming Concepts

- Python and VS Code installation and configuration
- Google Colab setup for cloud-based development
- Variable assignment and dynamic typing systems
- Data type classification (integers, floats, strings, booleans)
- Input/output operations and string formatting
- Random number generation and basic mathematical operations

Session 2: Control Flow & Iteration Fundamentals

- Boolean logic evaluation and conditional statements
- If/elif/else branching and decision trees
- For loops with range() and iteration patterns

- While loops and break/continue statements
- List operations and basic data processing

Module 2: Data Structures & Functions Sessions 3-4

Session 3: Advanced Data Structures & List Comprehensions

- List methods and advanced operations
- List comprehensions for efficient data processing
- Dictionary data structures and key-value relationships
- Combining lists and dictionaries effectively
- Nested data structures and practical data modeling
- String manipulation and input validation techniques

Session 4: Function Design & Modular Programming

- Function definition with data structure parameters
- Return statements and scope management
- **Functions that process lists and dictionaries**
- Basic exception handling with try/except blocks
- Code organization and documentation best practices
- **Portfolio Project 2:** Data Processing & Analysis Tool

Module 3: Classes, Modules & File Operations Sessions 5-6

Session 5: Essential Classes & Module Organization

- Import statements and standard library usage
- Creating and organizing custom modules
- Simple class creation for data organization
- Basic methods, attributes, and constructor patterns
- Practical class applications (no complex inheritance)
- When to use classes vs functions (practical guidelines)

Session 6: File Operations & Data Persistence

- File handling and basic I/O operations
- CSV file processing for real-world data

- JSON data format for modern applications
- Using classes to organize file operations
- Error handling for file and data operations
- Portfolio Project 3: Personal Data Management System

Module 4: APIs & Interactive Applications Sessions 7-8

Session 7: API Integration & Chatbot Fundamentals

- Simple API calls using requests library
- Working with free APIs (weather, quotes, fun facts)
- JSON data parsing and response handling
- Basic chatbot logic and conversation patterns
- Text processing for intelligent responses
- Error handling for network operations

Session 8: Streamlit Framework & Application Development

- Streamlit fundamentals for rapid app development
- Interactive UI elements (buttons, sliders, text inputs, chat interface)
- Data visualization and dashboard creation
- Integrating APIs with interactive interfaces
- Building simple chatbot interfaces
- Capstone Project: Personal Python Web Application with Chat Features

Expected Learning Outcomes:

Technical Proficiency:

- Write clean Python programs using professional conventions
- Implement data management using dictionaries and file operations
- Learn pair programming and collaborative development
- Build interactive web applications using Streamlit framework
- Debug systematically and handle errors gracefully

Academic Benefits:

- Demonstrated computational thinking and problem-solving abilities
- Foundation for advanced programming languages and concepts
- Evidence of technical creativity and independent project completion
- Build GitHub portfolio suitable for future CS aspirants and internships

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