CS-316 Advanced Programming

Credit Hours: 2-1

Prerequisite: CS-114 Fundamentals of Programming

Course Objectives: The objective of learning Python programming is to understand fundamental concepts like variables, data types, and control structures, and to develop the ability to write and execute functional code. Learners aim to work with data structures, create functions, handle errors, and perform file operations. They also gain experience using libraries, building simple applications, and preparing for advanced topics like automation, web development, and data science. The ultimate goal is to write efficient, reusable, and reliable Python programs.

Course Contents: Introduction To Python Programming, Variables, Data Types Conversion, Math Module, Conditional Statements, Loops, Functions, Control Flow, Variable Scope, List Operations, Dictionary, OOP Basics, Recursion, Inheritance Basics, Attribute Access, Reading From Files, Writing To Files, Files In Different Locations And Working With Csv Files, Working With Apis, Math Libraries, Sqlalchemy For Databases, Pipeline.

Course Outcomes: Upon completion of this course, students will be able to write code using core programming concepts. They will also be capable of developing real-world applications with widely used libraries and tools.

Textbook: Udayan, Das, Lawson Aubrey, Mayfield Chris, and Norouzi Narges. "Introduction to Python Programming." (2024).

Reference books:

1. Kuhlman D. A python book: Beginning python, advanced python, and python exercises. Lutz: Dave Kuhlman; 2009 Mar 31.
2. Sebastian Raschka Vahid Mirjalili, Python Machine Learning Second Edition (2020)

Weekly Breakdown

Week	***Section***	***Topics***
1	1.1, 1.2, 1.3,1.4,1.5, 1.6, 1.7, 1.8	Background, Input/output, Variables, String basics, Number basics, Error messages, Comments, Why Python?
2	2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7	The Python shell, Type conversion, Mixed data types, Floating-point errors, Dividing integers, The math module, Formatting code
3	4.1, 4.2, 4.3, 4.4, 4.6, 4.7,	Boolean values, If-else statements, Boolean operations, Operator precedence, Nested decisions, Conditional expressions
4	5.1, 5.2, 5.3, 5.4, 5.5	While loop, For loop, Nested loops, Break and continue, Loop else
5	6.1, 6.2, 6.3, 6.4, 6.5, 6.6	Defining functions, Control flow, variable scope, Parameters, Return values, Keyword arguments
6	7.1, 7.2, 7.3, 7.4, 7.5	Module basics, importing names, the help function, finding modules
7	8.1, 8.2, 8.3, 8.4	Modifying and iterating lists, Sorting and reversing lists, Common list operations, Nested lists
8	10.1, 10.2, 10.3, 10.4, 10.5	Dictionary basics, Dictionary creation, Dictionary operations, Conditionals and looping in dictionaries Nested dictionaries and dictionary comprehension
9	**Mid Semester Exam**	
10	11.1, 11.2, 11.3,	Object-oriented programming basics, Classes and instances, Instance methods,
11	12.1, 12.2, 12.3	Recursion basics, Math recursion, Recursion with strings and lists
12	13.1, 13.2, 13.3, 13.4, 13.5	Inheritance basics, Attribute access, Methods, Hierarchical inheritance, Multiple inheritance and mixin classes
13	14.1, 14.2, 14.3, 14.4, 14.5	Reading from files, Writing to files, Files in different locations and working with CSV files, Handling exceptions, Raising exceptions

14	1.9 (Ref book1)	Working with APIs, Math libraries, SQLAlchemy for databases
15	Ch 2 (Ref book 2)	Pipeline
16	Project	Students implement a final project incorporating advanced Python skills, Project presentations
17	Revision	
18	**End Semester Exam**	