

SCHOOL OF ENGINEERING AND APPLIED SCIENCES

Department of Computer Science Engineering

COURSE FILE

For

Computational Thinking and Programming (ECSE103L)

Faculty Name : Dr. Vipul Kumar Mishra
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Dr. Madhushi Verma

Course Type : Foundation

Semester and Year: I Semester I

L-T-P : 2-1-4

Credits : 5

Department : Computer Science Engineering

Course Level : UG



Bennett University

Greater Noida, Uttar Pradesh



Bennett University

Course Details:

Course Name:	Computational Thinking and Programming	Course Code:			ECSE103L
Department:	Computer Science Engineering	Type:			Foundation
L-T-P Structure	2-1-4	Credits	5	Pre-requisite:	NA
Course Objectives	Software play instrumental roles in many disciplines. Researchers often need to write programs to process, analyse their data and visualize their result in appropriate format. This course leads the students to understand the need of programming in various disciplines, basic concepts of algorithm, the process of computational problem solving in an efficient manner, how to write simple programs using Python, file handling and exception handling using Python, basic concepts of modularity and object-oriented programming., etc.				
Course Outcome	At the end of the course, the students will be able to: <ol style="list-style-type: none"> 1. Implement a given algorithm in Python by using standard programming constructs such as, repetitions, functions, modules, aggregated data (arrays, lists, etc.), etc. 2. Explain the output of a given Python program and identify and correct errors in a given Python program. 3. Write simple programs using the features of object-oriented programming language such as, encapsulation, polymorphism, inheritance, etc. 				
Course Contents:	Topics			No. of Hours	
1	Introduction: Introduction to Computer Science; Computer Algorithms; Computer Hardware; Computer Software;			2	
2	The process of Computational Problem Solving; Introduction to Python programming language; Data and Expressions: Literals; Variables and Identifiers;			2	
3	Operators; Expressions and Data Types; Boolean Expressions;			2	
4	Control Structures; Selection Control; Iterative Control;			2	
5	Lists: List Structures; Lists in Python; Iterating Over Lists in Python;			2	

6	Functions: Program routes; Calling Value Returning Functions; Calling Non-value Returning Functions; Parameter Passing; Keyword and Default Arguments in Python;	2
7	Variable Scope; Modular design: Modules; Top-Down Design;	2
8	Python Modules; File Handling: Opening, Reading and Writing Text Files;	2
9	Sequences. Strings. Files. Exceptions.	2
10	Data Collections, Applying Lists , List Operations,	2
11	Dictionaries and Sets: Dictionary Type in Python; Set Data Type in Python;	2
12	Non-Sequential Collections, Dictionary Basics, Dictionary Operations	2
13	Object-Oriented Programming: Introduction to Object Oriented Programming;	2
14	Encapsulation; Data abstraction	2
15	Inheritance; Polymorphism;	2
16	Graphics Programming: Graphics Programming, Using Graphical Objects, Interactive Graphics	2
17	Graphics Objects, Entry Objects, Displaying Images, Generating Colors	2
18	Advance Library Such as Numpy, scipy,panda, Matplotlib	2
Lab Work:	The lab component of this course is designed to introduce online-coding platform such as CoLab from google and Jupiter Notebook to the students and provide hands-on experience with the concepts taught in the lectures.	
Text Book:	1. C. Dierbach, "Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus", Wiley, 2015 edition, 2015, ISBN-978-81-265-5601-4.	
References:	1. Allen B. Downey, O'Reilly, "Think Python: How to Think Like a Computer Scientist", 2 nd Edition, 2015, ISBN-978-1-491-93936-9. 2. Martin C. Brown, "Python: The Complete Reference", McGraw-Hill, ISBN-9780072127188.	

Evaluation Components:

Components of Course Evaluation	Percentage
Mid Term Examination	20
End Term Examination	30
Continuous Lab Evaluation	10
Quiz	10
Assignment	5
Continuous Evaluation	5
Project	20

Lecture wise Plan

Lecture Number	Topics
1	Introduction: Introduction to Computer Science; Computer Algorithms; Computer Hardware; Computer Software;
2	The process of Computational Problem Solving; Introduction to Python programming language
3	Data and Expressions: Literals; Variables and Identifiers;
4	Operators; Expressions and Data Types
5	Logical operator; Boolean operator; Boolean Expressions;
6	Control Structures; Selection Control
7	Iterative Control;
8	Lists: List Structures; Lists in Python
9	Iterating Over Lists in Python;
10	Functions: Program routes; Calling Value Returning Functions; Calling Non-value Returning Functions
11	Parameter Passing; Keyword and Default Arguments in Python;
12	Variable Scope; Modular design
13	Modules; Top-Down Design;
14	Python Modules; File Handling:
15	Operation in file, Reading and Writing Text Files;
16	Revision 1
17	Sequences. Strings
18	Files. Exceptions
19	Data Collections
20	Applying Lists , List Operations
21	Dictionary Type in Python

22	Set Data Type in Python;
23	Non-Sequential Collections
23	Dictionary Operations
24	Revision 2
25	Introduction to Object Oriented Programming;
26	Class, Object
27	Encapsulation, Data abstraction
28	Inheritance
29	Polymorphism;
30	Graphics Programming: Graphics Programming, Using Graphical Objects,
31	Interactive Graphics, Displaying Images, Generating Colors
32	Graphics Objects, Entry Objects,
33	Test Case: Numpy
34	Test Case: scipy
35	Test Case: panda, Matplotlib
36	Revision 3