A. Course Handout

Institute/School Name	Chitkara University Institute of Engineering and Technology		
Department Name	Department of Computer Science & Engineering		
Programme Name	Bachelor of Engineering (B.E.), Computer Science & Engineering		
Course Name	Problem Solving using Python Programming	Session	2022-2023
Course Code	CS22001	Semester/Batch	1st/2022
L-T-P (Per Week)	4-0-4	Course Credits	06
Course Coordinator	Dr. Renu Popli		

1. Objectives of the Course

Python is an open-source, high-level, dynamically-typed, portable, expressive, easy to learn, and well-known programming language. Python is available as an open-source offering and is associated with large global community support. Top companies such as Google, Yahoo!, Pinterest, Disney, Nokia, IBM have python as one of their main programming languages. This course provides a wide scope of learning & understanding of python programming. The main objectives of the course are:

- To understand about writing algorithms and step by step approach in solving problems.
- To understand the basics of python in order to solve any problem(s).
- Design and implementation of logic building programs using python constructs.
- To understand concepts of searching and sorting techniques.
- Design and develop real time python project.

2. Course Learning Outcomes

Student should be able to:

	Course Outcome	POs	CL	KC	Sessions
CLO01	Understand python lexical features, structures and flow control for logic building.	PO1, PO3, PO10	K2	Factual Conceptual	**10**
CLO02	Apply decision statements and loops in python to solve complex problems.	PO1, PO2, PO3, PO4, PO12	K3	Fundamental Conceptual	**10**
CLO03	Implement functions and pass arguments in python.	PO3, PO5, PO12	K3	Conceptual Procedural	**5**
CLO04	Use indexing and slicing to access data in python programs.	PO2, PO3, PO5, PO9, PO11, PO12	K3	Conceptual Procedural	**5**
CLO05	Apply features of lists, tuples, and dictionaries to create solutions for real world problems.	PO5, PO11, PO12	K3	Conceptual Procedural	**12**
CLO06	Develop projects using python programming.	PO3, PO5, PO7, PO10, PO11, PO12	K3	Procedural Fundamental Design Principles	**12**
Total Contact Hours					**54**

Revised Bloom's Taxonomy Terminology

*Cognitive Level =CL

*Knowledge Categories = KC

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO01	H		H							L		
CLO02	H	H	H	M								L
CLO03			H		L							M
CLO04		H	H						M			
CLO05		H	H		M				M		H	M
CLO06			H		H		M			H	M	L

H=High, M=Medium, L=Low

3. ERISE Grid Mapping

Feature Enablement	Level(1-5, 5 being highest)
Entrepreneurship	2
Research	4
Innovation	3
Skills	5
Employability	4

4. Recommended Books:

B01: Thareja, Reema," Python Programming: Using Problem Solving Approach". Oxford University Press c2017.

B02: Zed A.Shaw,"Learn python the hard way", Pearson publications, 3rd edition

B03: Budd, Timothy A., "Exploring Python", MacGraw Hill Education c2017.

B04: David Beazley & Brian K. Jones, "Python Cookbook: Recipes for Mastering Python 3", O'Reilly Media, 3rd Edition.

B05: Allen B. Downney, "Think Python", O'Reilly Media, 3rd Edition.

B06: Ravichandran, R.Saravanan, "Learn to Master Python", Staredu Solution, c2018.

5. Other readings and relevant websites:

Serial No	Link of Journals, Magazines, websites and Research Papers
1.	https://www.codingninjas.com/
2.	https://www.python.org/

3.	https://learnpython.org/
4.	https://www.codecademy.com/learn/python
5.	http://www.pyschools.com/
6.	https://www.codementor.io/learn-python-online

6. Recommended Tools and Platforms

Python 3 IDLE, Anaconda 3 (Jupyter notebook 3.6.0), Google collab, Coding Ninjas(online platform)

7. Course Plan:

Session No.	Topic(s)	Associated Coding Ninjas Modules
1-2	Computer programming - basics, main ingredients in the programming process, Introduction to logic building, pseudo codes and flowcharts.	Flow-Chart
3-4	Anaconda Installation, Running Python Programs, Writing Python Scripts with Jupyter Notebook.	Introduction to Python
5-6	Python Basics: Print statements, comments, simple input/output, output formatting.	Introduction to Python
TEST 1		
7-10	Fundamentals: Variables (simple, assigning multiple values, output variables, global/local variables), Data types (text type, numeric, sequence, mapping, set), Blocks, indentation and Syntax Rules, Operators and Expressions (ALL types), Assignment Statements, Expression Statements, Multiway Branching, casting.	Introduction to Python
11-14	Conditional Statements (if, elif, else), Looping (for, while), match statement, concept of nested looping.	Conditionals and Loops
TEST 2		
15-17	Pattern Designs	Pattern1
		Pattern2
18-20	For loop and range method, Break, continue and pass.	More on loops
21-25	Defining and calling Functions, Type of arguments (required, keyword, default, variable length), Scope Rules (Global/local Statements), Passing Arguments (call by value/call by reference), Recursive Functions, Lambda Expressions.	Functions
26-30	Array/Lists: Introduction to Lists, Operations on Lists, Storage Structure, Resizing and Looping on Lists, Indexing and Slicing, passing variables through Functions, passing Lists through Functions.	Array and Lists
ST 1		
31-33	Two Dimensional Lists: Introduction and Storage, Jagged Lists, List Comprehension.	2 D Lists
34-38	Strings and its relative methods and properties: Concatenation, Slicing, Iterating on strings, Comparison Operators.	Strings
39-43	Tuples, Set and Dictionaries- Introduction, methods and its relative properties	Tuples, Set and Dictionaries
ST 2		
44-45	Modules: Creating Modules, Variables in Modules, Imports and Attributes, Namespaces, Reloading, built in modules, Generating Random values.	Handouts will be provided

46-50	Searching & Sorting: Linear Search, Binary Search, Sorting: Bubble Sort, Selection sort, Insertion Sort and Merge Sort.	Searching and sorting
51-54	Files and Directories, File I/O, File positioning, File operators	Handouts will be provided
End Term Exam		

8. Delivery/Instructional Resources

Lecture No.	Topics	Web References	Audio-Video
1-2	Computer programming - basics, main ingredients in the programming process, Introduction to logic building, pseudocodes and flowcharts.	https://classroom.codingninjas.com/app/classroom/me/20926/content/430930/offering/6231267	https://nptel.ac.in/courses/106106182 https://www.coursera.org/lecture/python-genomics/lecture-1-overview-of-python-5JEcj
3-4	Anaconda Installation, Running Python Programs, Writing Python Scripts with Jupyter Notebook.	https://docs.anaconda.com/anaconda/navigator/tutorials/	https://nptel.ac.in/courses/106106182
5-6	Python Basics: Print statements, comments, simple input/output, output formatting.	https://classroom.codingninjas.com/app/classroom/me/20926/content/430931/offering/6231280	https://nptel.ac.in/courses/106106182 https://nptel.ac.in/courses/106106182
7-10	Fundamentals: Variables (simple, assigningmultiple values, output variables, global/local variables), Data types (text type, numeric, sequence, mapping, set), Blocks, indentation and Syntax Rules, Operators and Expressions (ALL types), Assignment Statements, Expression Statements, Multiway Branching, casting.	https://classroom.codingninjas.com/app/classroom/me/20926/content/430931/offering/6231281	https://www.coursera.org/lecture/python-genomics/lecture-2-1-first-steps-toward-programming-part-1-GbYor

11-20	Conditional Statements (if, elif, else), Looping (for, while), match statement, concept of nested looping, Pattern Designs, for loop and range method, Break, continue and pass.	https://classroom.codingninjas.com/app/classroom/me/20926/content/430932/offering/6231302 https://classroom.codingninjas.com/app/classroom/me/20926/content/430933/offering/6231325 https://classroom.codingninjas.com/app/classroom/me/20926/content/430934/offering/6231339	https://nptel.ac.in/courses/106106182 https://nptel.ac.in/courses/106106182 https://nptel.ac.in/courses/106106182
21-25	Defining and calling Functions, Type of arguments (required, keyword, default, variable length), Scope Rules (Global/local Statements), Passing Arguments (call by value/callby reference), Recursive Functions, Lambda Expressions.	https://classroom.codingninjas.com/app/classroom/me/20926/content/430936/offering/6231369	https://www.coursera.org/lecture/python-genomics/lecture-5-1-functions-part-1-5-54-PGXxZ https://www.coursera.org/lecture/python-genomics/lecture-5-2-functions-part-2-8-20-ylbSK
26-30	Array/Lists: Introduction to Lists, Operations on Lists, Storage Structure, Resizing and Looping on Lists, Indexing and Slicing, passing variables through Functions, passing Lists through Functions.	https://classroom.codingninjas.com/app/classroom/me/20926/content/430938/offering/6231387	https://nptel.ac.in/courses/106106182
31-33	Two Dimensional Lists: Introduction and Storage, Jagged Lists, List Comprehension.	https://classroom.codingninjas.com/app/classroom/me/20926/content/430941/offering/6231453	https://www.coursera.org/lecture/practical-python-for-ai-coding--preparation-for-coding/list-comprehensions-and-two-dimensional-lists-l9u14
34-38	Strings and its relative methods and properties	https://classroom.codingninjas.com/app/classroom/me/20926/content/430940/offering/6231435	https://www.coursera.org/lecture/python-representation/python-strings-bbBTs https://www.coursera.org/lecture/python-data-analysis/python-more-on-strings-HPh3O
39-43	Tuples, Set and Dictionaries-introduction, methods and its relative properties	https://classroom.codingninjas.com/app/classroom/me/20926/content/430942/offering/6231475	https://nptel.ac.in/courses/106106182

44-45	Modules: Creating Modules, Variables in Modules, Imports and Attributes, Namespaces, Reloading, built in modules, Generating Random values.	https://docs.python.org/3/tutorial/modules.html	https://www.coursera.org/lecture/python-genomics/lecture-6-modules-and-packages-10-32-rejwK
46-50	Searching & Sorting: Linear Search, Binary Search, Sorting: Bubble Sort, Selection sort, Insertion Sort and Merge Sort.	https://classroom.codingninjas.com/app/classroom/me/20926/content/430939/offering/6231414	https://www.coursera.org/lecture/python-functions-files-dictionaries/introduction-sorting-basics-9VWfX https://www.coursera.org/lecture/practical-python-for-ai-coding--preparation-for-coding/sorting-and-searching-elements-m4LRp https://www.coursera.org/lecture/python-analysis/sorting-NMRah
51-54	Files and Directories, File I/O, File positioning, File operators	https://python-course.eu/python-tutorial/file-management.php https://docs.python.org/3/tutorial/inputoutput.html#reading-and-writing-files	https://www.coursera.org/lecture/data-analytics-accountancy-1/python-file-i-o-cSSim https://www.coursera.org/lecture/accounting-data-analytics-python/5-1-python-file-io-R6L3h

9. Action plan for different types of learners

Slow Learners	Average Learners	Fast Learners
Remedial Classes, Doubt Sessions, Guided Tutorials	Workshop, Doubt Session	Coding Competitions, Project

10. Evaluation Scheme & Components:

Evaluation Component	Type of Component	No. of Assessments	Weightage of Component	Mode of Assessment
Component 1	Lab Evaluations	02*	30%	Offline
Component 2	Sessional Tests (STs)	02**	20%	Offline
Component 3	End Term Examination	01***	50%	Offline
Total		**100%**		

* Lab Evaluation is mandatory evaluation taken twice in a semester, one will be considered as mid-term evaluation and another one will be final evaluation based on developed project.

** Out of 02 STs, the ERP system automatically picks the best 01 ST.

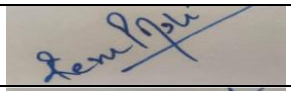
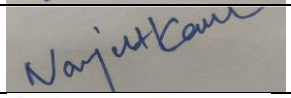
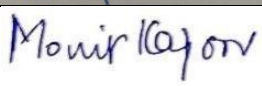
***It is mandatory to complete Coding Ninja Modules and Tests. Further, as per Academic Guidelines minimum 75% attendance is required to become eligible for appearing in the End Semester Examination.

#NPTEL Online Certification Courses (https://onlinecourses.nptel.ac.in/), Dean's Medal of Honor for Certified Students (OPTIONAL).

11. Syllabus of the Course:

Subject: Problem Solving using Python Programming			
S.No.	**Topic (s)**	**No. of Sessions**	**Weightage %**
1	Computer programming - basics, main ingredients in the programming process, Introduction to logic building, pseudo codes and flowcharts. Anaconda Installation, Running Python Programs, Writing Python Scripts with Jupyter Notebook. Python Basics: Print statements, comments, simple input/output, output formatting. Fundamentals: Variables (simple, assigning multiple values, output variables, global/local variables), Data types (text type, numeric, sequence, mapping, set), Blocks, indentation and Syntax Rules, Operators and Expressions (ALL types), Assignment Statements, Expression Statements, Multiway Branching, casting. Conditional Statements (if, elif, else), Looping (for, while), match statement, concept of nested looping. Pattern Designs. For loop and range method, Break, continue and pass.	**20**	**40%**
2	Defining and calling Functions, Type of arguments (required, keyword, default, variable length), Scope Rules (Global/local Statements), Passing Arguments (call by value/call by reference), Recursive Functions, Lambda Expressions. Array/Lists: Introduction to Lists, Operations on Lists, Storage Structure, Resizing and Looping on Lists, Indexing and Slicing, passing variables through Functions, passing Lists through Functions. Two Dimensional Lists: Introduction and Storage, Jagged Lists, List Comprehension. Strings and its relative methods and properties: Concatenation, Slicing, Iterating on strings, Comparison Operators. Tuples, Set and Dictionaries- Introduction, methods and its relative properties.	**23**	**45%**
3	Modules: Creating Modules, Variables in Modules, Imports and Attributes, Namespaces, Reloading, built in modules, Generating Random values. Searching & Sorting: Linear Search, Binary Search, Sorting: Bubble Sort, Selection sort, Insertion Sort and Merge Sort. Files and Directories, File I/O, File positioning, File operators.	**11**	**15%**

This Document is approved by:

Designation	**Name**	**Signature**
Course Coordinator	Dr. Renu Popli	
Head-Academic Delivery	Ms. Navjeet Kaur	
Dean	Dr. Monit Kapoor	
Date (DD/MM/YYYY)	27/09/2022	