Fr. Conceicao Rodrigues College of Engineering

Father Agnel Ashram, Bandstand, Bandra-West, Mumbai-50

Department of Computer Engineering

S.E. (Computer) (semester IV)

(2020-2021)

Course Outcomes & Assessment Plan

Subject: Skill Base Lab Course: Python Programming (CSL 405)   **Credits-2**

Syllabus:
Module 1 : Python Basics
Data types in python, Operators in python, Input and Output, Control statement, Arrays in python, String and Character in python, Functions, List and Tuples, Dictionaries Exception, Introduction to OOP, Classes, Objects, Interfaces, Inheritance

Module 2: Advanced Python
Files in Python, Directories, Building Modules, Packages, Text Processing, Regular expression in python.

Module 3 : Data structure in Python
Link List, Stack, Queues, Dequeues

Module 4: Python Integration Primer
Graphical User interface, Networking in Python, Python database connectivity, Introduction to Django

Module 5 : MultiThreading
Thread and Process,Starting a thread,Threading module, Synchronizing threads,Multithreaded Priority Queue

Module 6: Numpy and Pandas
Creating NumPy arrays, Indexing and slicing in NumPy, creating multidimensional arrays, NumPy Data types,Array Attribute,Indexing and Slicing,Creating array views copies,Manipulating array shapes I/O. Basics of Pandas,Using multilevel series,Series and Data Frames,Grouping, aggregating, Merge DataFrames.

Textbooks:
1   Dr. R. Nageswara Rao, "Core Python Programming", DreamtechPress
2   Beginning Python: Using Python 2.6 and Python 3.1. James Payne, Wrox Publication
3   Anurag Gupta,G. P. Biswas, "Python Programming",McGraw-Hill
4   E Balagurusamy, "Introduction to computing and problem-solving using python",McGrawHill Education

References:
1   Learn Python the Hard Way, 3rd Edition, Zed Shaw's Hard WaySeries
2   Laura Cassell,Alan Gauld, "Python Projects", Wrox Publication

Course Objectives:

1 Basics of Python programming
2 Decision Making, Data structure and Functions in Python
3 Object Oriented Programming using Python
4 Web framework for developing

Course Outcomes:

Upon completion of this course students will be able to:

Upon completion of this course students will be able to:
CSL405.1: Demonstrate basic concepts of python such as control statements, basic data structures, functions and oops in python. (Comprehension)
CSL405.2: Explore file handling and text processing in python. (Comprehension)
CSL405.3: Develop program for data structure using built in functions in python. (Apply)
CSL405.4: Develop python based web application using Django framework and networking concepts. (Apply)
CSL405.5: Perform data analysis using Numpy and Pandas libraries. (Apply, Analyze)
CSL 405.6: Develop real world application using frameworks/libraries in python. (B3: Apply,Analyze)

Course outcomes Target:

CSL405.1 : 2.5

CSL405.2 : 2.5

CSL405.3 : 2.5

CSL405.4 : 2.5

CSL405.5 : 2.5

CSL405.6 : 2.5

Mapping of CO and PO/PSO:

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

	PO1 (Eng kno w)	PO2 (Ana)	PO3 (Des ign)	PO4 (inv estig atio n)	PO5 (tool s)	PO6 (eng gsoc i)	PO7 (Env)	PO8 (Eth)	PO9 (ind/T eam)	PO10 (comm.)	PO11 (PM)	PO12 (life long)	PSO1	PSO2
CSL405.1	3	1	1		2								3	3
CSL405.2	3	1	1		2								3	3
CSL405.3	3	2	1		2								3	3
CSL405.4	3	2	3		2								3	3
CSL405.5	3	3	3		2								3	3
CSL405.6	3	3	3		3				3	2	2	2	3	3
TOTAL	18	12	12		13				3	2	2	2	18	18
Course TO PO	3	2	2		2.16				3	2	2	2	3	3

CO- Assessment Tools:

		Direct Methods						Indirect Methods
		Laboratory	Quiz	Assignment	Mini Project			Course Exit Survey
CSL405.1		40% (Lab 1,2)	20% Quiz(1)	20% Assignment1	20%			100%
CSL405.2		40% (Lab 3,5)	20% Quiz(2)	20% Assignment1	20%			100%
CSL405.3		40% (Lab 4)	20% Quiz(3)	20% Assignment1	20%			100%
CSL405.4		40% Lab(6,7,8,9)	20% Quiz(4)	20% Assignment2	20%			100%
CSL405.5		40% (Lab 10,11)	20% Quiz(5)	20% Assignment2	20%			100%
CSL405.6		30% (All labs)	----	-----	70%			100%

Content beyond Syllabus:
Implementation Machine Learning Algorithms using Python.
Data visualization suing Python.

Action Plan:
Expert lecture to demonstrate implementation of Machine Learning Algorithms and Data Visualization using advanced Tools such as Google Colab or kaggle.

List of Experiments:

Exp No.	Topic	Title	CO

1	Basics of Python	Numbers (Any one)
		
		  a. To compute prime factors of an integer
		  b. To Find all Numbers in a Range which are Perfect Squares and Sum of all Digits in the Number is Less than 10
		
		Strings (Any one)
		
		  a. To Count the Occurrences of Each Word in a Given String Sentence.
		  b. To find duplicate characters in a given string, and remove it.
		
		List (Any one)
		
		  a. To Remove the Duplicates from a List.
		  b. To Read a List of Words and Return the Length of the Longest One
		
		Arrays (Any one)
		
		  c. Write a Python program to find a pair with highest product from a given array of integers.
		  d. Perform a right circular shift on elements of an array as per shifts mentioned by user.
		
		Functions (Any three)
		
		  Write python scripts using functions (implement any two functions)
		
		  a. To generate and print a dictionary that contains a number (between 1 and n) in the form (x, x*x).
		  b. To merge two dict,
		  c. To sort a dictionary by key.
		  d. To print all unique values in a dictionary.
		  e. To find the highest 3 values in a dictionary.
		  f. To Count the Frequency of Words Appearing in a String Using a Dictionary.
			CSL405.1

2	**Python OOPM**	1. Write a Python class to find a pair of elements (indices of the two numbers) from a given array whose sum equals a specific target number. Input: numbers = [10,20,10,40,50,60,70], target=50 Output: 3, 4	**CSL405.1**

2. Write a Python class to get all possible **unique** subsets from a set of distinct integers.
Input : [4, 5, 6]
Output : [[], [6], [5], [5, 6], [4], [4, 6], [4, 5], [4, 5, 6]]

Implement any Two out of the following three

3. **Exception handling:** An interactive calculator: Program reads an expression as input and has to calculate the value of expression. The program throws an exception if the given expression is not in expected format.

Example: Assumption, the expression uses operators that are binary (a+b),

Valid Input: 3+2, Output: 5

Input: 3+2+4, Output: Appropriate message

4. **Thread:** Create two threads to check if a number if prime. First thread starts the check from 2 to mid of search and second thread starts search from mid +1 till number-1.

5. **Inheritance:** Using the Account class as a base class, write two derived classes called SavingsAccount and CurrentAccount. A SavingsAccount object, in addition to the attributes of an Account object, should have an **interest variable** and a method which adds interest to the account. A CurrentAccount object, in addition to the attributes of an Account object, should have an **overdraft limit** variable. Ensure that you have overridden methods of the Account class as necessary in both derived classes.

Now create a **Bank class**, an object of which contains an array of Account objects. Accounts in the array could be instances of the Account class, the SavingsAccount class, or the CurrentAccount class. Create some test accounts (some of each type).

Write an update method in the bank class. It iterates through each account, updating it in the following ways: Savings accounts get interest added (via the method you

		already wrote); CurrentAccounts get a letter sent if they are in overdraft.	
3	**Python Files and Directories**	1. Write a python program which will count the spaces, tabs, and lines in any given text file. Check if the file exists. If file does not exists then handle that exception. 2. The file cities_and_times.txt contains city names and times. Each line contains the name of the city, followed by the name of the day ("Sun") and the time in the form hh:mm. Read in the file and create an alphabetically ordered list of the form [('Amsterdam', 'Sun', (8, 52)), ('Anchorage', 'Sat', (23, 52)), ('Ankara', 'Sun', (10, 52)), ('Athens', 'Sun', (9, 52)), ('Atlanta', 'Sun', (2, 52)), ('Auckland', 'Sun', (20, 52)), ('Barcelona', 'Sun', (8, 52)), ('Beirut', 'Sun', (9, 52)),	**CSL405.2**
4	**Python Data structures**	1) Write a program to sort a queue in python without using extra space **2)** Write a python program to Implement shopping cart using linked-list. The user should be able to add item, remove item, display all the items and calculate total amount of the cart. Each Item details contains (Item name, quantity, price).	**CSL405.3**
5	**Text Processing**	Program to demonstrate Text processing concepts using nltk /re libraries	**CSL405.2**
6	**Networking**	(Perform Any 2) 1. WAP to copy a file from client to server using tcp socket 2. WAP for sending an email 3. WAP to develop chat application 4. WAP to build Echo Server	**CSL405.4**
7	**GUI**	Creating GUI with python containing widgets such as labels, textbox, radio, checkboxes and custom dialog boxes.	**CSL405.4**
8	**Database programming**	Program to demonstrate CRUD (create, read, update and delete) operations on database (SQLite/ MySQL) using python.	**CSL405.4**

9	**Web application using Django**	Design the sample web page using Django framework for the web site.	**CSL405.4**
10	**Numpy**	Program to demonstrate use of NumPy: Array objects	**CSL405.5**
11	**Pandas**	Program to demonstrate Data Series and Data Frames using Pandas.	**CSL405.5**
12	**Mini Project**	Select a problem statement addressing the real – world problem, analyze the problem and develop solution for the same using Python framework/Libraries.	**Maps to all Cos**

Tools used for Experiments: Python IDLE, any python editor like Spyder, Jupyter or Picharm, Kaggle.

Rubrics for Experiments and Programming Assignment Grading:

Sr. No	Performance Indicator	Below average	Average	Good	Excellent	Marks
1	On time Submission (2)	-	Submitted after deadline (1)	Early or on time submission(2)		
2	Test cases and output (4)	Incorrect output (1)	Expected output is verified only for few test cases (2)	Expected output is Verified for all test cases but is not presentable (3)	Expected output is obtained for all test cases. Presentable and easy to follow (4)	
3	Coding efficiency (2)	The code is not structured at all.(0)	The code is structured but not efficient (1)	The code is structured and efficient. (2)	-	
4	Knowledge(2)	Basic concepts not clear (0)	Understood the basic concepts (1)	Could explain the concept with suitable example (1.5)	Could relate the theory with real world application(2)	
	Total Marks					

Mini Project Assessment:

Students to work in a group minimum two and maximum three students for a Mini project. Students have to select the problem statement addressing the real-world problems preferably keeping in mind **societal, health an environmental** issue. Analyze the problem and develop solution for the same by applying the concept learnt in theory and laboratory. The students' progress on their project will be discussed in the practical session. Finally, at the time of submission the students will present the demonstration of their project. At the end, well documented Project report is to be submitted to department.

Mini-Project Schedule:

Sr. No	Topic	submission
1	Abstract Submission	3rd week of Feb 2021
2	Project Approval	4th week of Feb 2021
3	First Review	$10^{th} - 12^{th}$ April 2021
4	Final Demonstration	2nd week of May
5	Report Submission	2nd week of May

Rubrics for assessment of Mini project

Indicator	Very Poor	Poor	Average	Good	Excellent
Timeline - Maintains project deadline (2)	Project not done (0)	More than two session late (0.5)	Two sessions late (1)	One session late (1.5)	Early or on time (2)
Complexity of the chosen problem (4)	N/A	Simple (1)	Moderate (2)	Complex(3)	Too Complex(4)
Completeness (6)	N/A	< 40% complete (1)	~ 60% complete (2)	~ 80% complete (3-4)	100% complete (5-6)
Project specific Technical Features (4)	N/A	60-65% of features (1)	65-70%of features (2)	70-80% of features(3)	Most of the features taught(4)
Project Report (4)	N/A	Poor organization, Major content missing, Not as per guidelines.	Good organization , Few of the project aspects missing (2)	Well organized, Major aspects of the project covered, as per guide lines (3)	Very well organized , covering major and minute details of the project , as per guidelines (4)

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Lesson Plan: PYTHON PROGRAMMING

Semester IV   **Year: 2020-21**

Modes of Content Delivery:

I	Class Room Teaching	V	Self Learning Online Resources	Ix	Industry Visit
Ii	Tutorial	Vi	Slides	X	Group Discussion
Iii	Remedial Coaching	vii	Simulations/Demonstrations	Xi	Seminar
Iv	Lab Experiment	viii	Expert Lecture	Xii	Case Study

Pattern: two week lectures, 1 week Theory

Lecture No	Topics to be covered	Planned Dates	Actual Dates	Content Delivery Method/Learning Activities
Module 1: Python Basics			
1	Data types in python, Operators in python, Input and Output	27-01-2021		Online Teaching, Slides, Live Demo
2	Control statement, Arrays in python , String and Character in python	02-02-2021		Online Teaching, Slides, Live Demo
3	Functions, List and Tuples, Dictionaries	04-02-2021		Online Teaching, Slides, Live Demo
4	Exception, introduction to OOP, Classes, Objects	09-02-2021		Online Teaching, Slides, Live Demo
5	Interfaces, Inheritance	11-02-2021		Online Teaching, Slides, Live Demo
6	Files in Python, Directories,	16-02		Online Teaching, Slides, Live Demo
7	Building Modules, Packages,	18-02 (22-02 To 26-02 PR)		Online Teaching, Slides, Live Demo
8	Text Processing, Regular expression in python	2-03-2021		Online Teaching, Slides, Live Demo
9	Stack	4-03-2021		Online Teaching, Slides, Live Demo
10	Queues	9-03-2021		Online Teaching, Slides, Live Demo

11	Linked list, Dequeue	16-03-2021		Online Teaching, Slides, Live Demo
Module 4: Python Integration Primer				
12	Graphical User interface	18-03-2021 (22-02 To 26-03 PR)		Online Teaching, Slides, Live Demo
13	Networking in Python	30-03-2021		Online Teaching, Slides, Live Demo
14	Python database connectivity	01-04-2021		Online Teaching, Slides, Live Demo
15	Introduction to Django	06-04-2021		Online Teaching, Slides, Live Demo
Module 5: MultiThreading				
16	Thread and Process	08-04-2021		Online Teaching, Slides, Live Demo
17	Synchronizing threads	20-04-2021		Online Teaching, Slides, Live Demo
18	Starting a thread, Threading module	22-04-2021		Online Teaching, Slides, Live Demo
19	Multithreaded Priority Queue	27-04-2021		Online Teaching, Slides, Live Demo
Module 6: Numpy and Pandas				
20	Creating NumPy arrays, Indexing and slicing in NumPy.	29-04-2021		Online Teaching, Slides, Live Demo
21	creating multidimensional arrays, NumPy Data types, Array Attribute	11-05-2021		Online Teaching, Slides, Live Demo
22	Indexing and Slicing, Creating array views copies, Manipulating array shapes I/O	13-05-2021		Online Teaching, Slides, Live Demo
23	Basics of Pandas,	17-05-2021		Online Teaching, Slides, Live Demo
24	Using multilevel series, Series and Data Frames,	EXTRA Lecture		Online Teaching, Slides, Live Demo
25	Grouping, aggregating, Merge Data Frames	EXTRA Lecture		Online Teaching, Slides, Live Demo

Online Resources used:

1. **Introduction to Python W3 schools :**
   https://www.w3schools.com/python/python_intro.asp
2. **Python Tutorial – Tutorial points :**
    https://www.tutorialspoint.com/python/index.htm
3. **Learn Python Programming – Programmiz :**
   https://www.programiz.com/python-programming
4. **How to learn Python in 21 days - Geeks for Geeks :**
   https://www.geeksforgeeks.org/how-to-learn-python-in-21-days/
5. **The Python Tutorial :**
   https://docs.python.org/3/tutorial/

Videos:

1. **Installation of Anaconda:**
    https://www.jcchouinard.com/install-python-with-anaconda-on-windows/
2. **Joy of Computing Using Python (NPTEL) :**
   https://nptel.ac.in/courses/106/106/106106182/
3. **TKinter for GUI:**
   https://www.youtube.com/watch?v=VMP1oQOxfM0
4. **Python Pandas Tutorial: Data Analysis with Python;**
   https://www.youtube.com/watch?v=UB3DE5Bgfx4

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