UNIVERSITY OF PETROLEUM & ENERGY STUDIES

College of Engineering Studies

Dehradun

COURSE PLAN

Programme   : B. Tech. CSE (Artificial Intelligence & Machine Learning)

Course   : Python Programming Lab

Subject Code : CSAI 1001

No. of credits : 1

Semester   : I

Session   : August 2019 – December 2019

Batch   : 2019 - 2023

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Approved By

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COURSE PLAN

A. **PREREQUISITE**
   a. Basic knowledge of Computer
   b. Basic knowledge of Mathematics

B. **COURSE OBJECTIVES**

   a. Master the fundamentals of writing Python scripts
   b. Learn core Python scripting elements such as variables and flow control structures
   c. Discover how to work with lists and sequence data
   d. Use Python to read and write files
   e. Make their code robust by handling errors and exceptions properly
   f. Work with the Python standard library
   g. Explore Python's Iterator and Generators
   h. Write Python functions to facilitate code reuse

C. **PROGRAM OUTCOMES (POs) and PROGRAM SPECIFIC OUTCOMES (PSOs) for AI&ML:**

   C1. PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

   PO1: **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

   PO2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

   PO3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

   PO4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

   PO 5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

   PO6: **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

   PO7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development.

PO8: **Ethics**: Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.

PO9: **Individual and Teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C2. PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1. Perform system and application programming using computer system concepts, concepts of Data Structures, algorithm development, problem solving and optimizing techniques.

PSO2. Apply software development and project management methodologies using concepts of front-end and back-end development and emerging technologies and platforms.

PSO3. To create & develop most efficient solutions by applying machine learning with analytical emphasis on industrial and research

D. COURSE OUTCOMES FOR Python Programming Lab: At the end of this course student should be able to

CO1. Understanding of procedural, object-oriented and functional programming paradigm using Python.

CO2. Use basic data structures - list, string, tuple, set & dictionary in python.

CO3. Understand various functional programming concepts like class, functions, mutable & immutable data, recursion.

CO4. Understand file handling and using python library (Numpy)

Table: Correlation of POs and PSOs v/s COs

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			2		3				2		1				
CO2	2	1	1		2								2	1	1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO13	PSO14	PSO15
CO3	2	2	1	1	2								2	1	
CO4	2	2	2		2								2	2	1

1: Slight (Low)   2: Moderate (Medium)   3: Substantial (High)

Course Code	Course Title	Engineering Knowledge PO 1	Problem analysis PO 2	Design/development of solutions PO 3	Conduct investigations of complex problems PO 4	Modern tool usage PO 5	The engineer and society PO 6	Environment and sustainability PO 7	Ethics PO 8	Individual or team work PO 9	Communication PO 10	Project management and finance PO 11	Life-long Learning PO 12	System and application programming PSO 13	Software Project Management PSO 14	Applying AI&ML PSO 15
CSAI1101	Python Programming Lab	**2**	**2**	**2**		**1**								**2**	**1**	**1**

E. **COURSE OUTLINE**

S.no	Lab Exercise	Contents
1.	**Lab. Exercise 1**	Python Installation, Basic Python Programs, How program works, print statements,
2.	**Lab. Exercise 2**	Use of input statements, operators
3.	**Lab. Exercise 3**	Conditional Statement: if, elif and nested if statements
4.	**Lab. Exercise 4**	Use of Loops: for and while, nested loops
5.	**Lab. Exercise 5**	Use of string and set
6.	**Lab. Exercise 6**	Dictionary, Tuple, Lists
7.	**Lab. Exercise 7**	File handling, open a file, and read/write a file.

8.	**Lab. Exercise 8**	Methods and Function, Various inbuilt functions and lambda function
9.	**Lab. Exercise 9**	Classes and objects, constructors
10	**Lab Exercise 10**	Numpy Arrays

Recommended Books:

1. Python Programming - Using Problem Solving Approach First Edition (Reema Thareja)

F. **PEDAGOGY**
   1.1 PREREQUISITE: Basic knowledge of Programming, Data Structure and logic for solving programs.

G. **COURSE COMPLETION PLAN**

S.no	No. of experiments planned	No. of experiments completed	No .of internal lab tests planned	No .of internal lab tests conducted	No. of internal viva planned	No. of internal viva conducted
1	10	10	1	1	2	2

H. **EVALUATION & GRADING**

Students will be evaluated based on the following continues evaluation system:

Sl. No.	Description	% of Weightage
1	Lab record & Continuous Assessment	40
2	Viva-Voce/Quiz	50
3	General Discipline	10

CONTINUOUS ASSESSMENT: Based on the weekly evaluation of the experiments actually performed by the students in the Laboratory and submitted on the same day or on the next turn.

The continuous Assessment will be displayed on LMS on monthly basis i.e. on the last two or three working days of every month. Min. 10 experiments to be performed by each student.

VIVA-VOCE/QUIZ: Students will be informed a week before the date of viva and will be conducted by after actually performing the experiments. Two Viva-Voce examinations will be

held, one after completion of at least three experiments by each student/three turns of Laboratory Class and second after completion of at least six experiments by each student/six turns of Laboratory Class. In addition to the Viva-Voce Examination, a Quiz examination based on objective type questions will be held after completion of experiments by each student/nine turns of laboratory class. Those who do not appear in Viva-Voce and quiz examinations shall lose their marks.

GENERAL DISCIPLINE: Based on student's regularity, punctuality, sincerity and behavior in the class.

GRADING:

The overall marks obtained at the end of the semester comprising the above two mentioned shall be converted to a grade.

Practical No 1

Q1) Say Hello to the user :
    Print Hello Everyone !!!
Q2) Print Hello World in the following way :
    Hello
    World
Q3) Print Hello World in the following way :
    Hello
            World
Q4) say Hello to the user :
    Declare a string variable called x and assign it the value "Hello".
    Print out the value of x
Q5) Print the following :
    ' Brian's mother : He's not the messiah.
     He's a very naughty boy ! '
Q6) Write a python programme to print the following string in a specific format (see the output)
    Output :
    Twinkle, Twinkle, little star,
            How I wonder What you are !
            Up above the world so high,
            Like a diamond in the sky.
    Twinkle, Twinkle, little star,
             How I wonder What you are.
Q7) Take two variable a and b. Assign your first name and last name. Print your Name after adding your First name and Last name together.
Q8) Give yourself a nickname :

Declare three variables, consisting of your first name, your last name and Nickname. Write a Program that prints out your first name, then your nickname in parenthesis and then your last name.

Example output : George (woody) Washington.

Q9) Print your name three times like

GeorgeGeorgeGeorge

Q10) Print your name three times like

George　　George　　George

Q11) Declare and assign values to the variables first name, last name, address, DOB, Programme, semester, SAP ID and print in the following way :

NAME : NIKUNJ BANSAL   SAP ID : 500069944

DATE OF BIRTH : 13 Oct 1999

ADDRESS : UPES

Bidholi Campus

Pincode : 248007

Programme : AI & ML   Semester : 1

Practical no 2

Q1) Declare these variables (x, y and z) as integers. Assign a value of 9 to x, Assign a value of 7 to y, perform addition, multiplication, division and subtraction on these two variables and Print out the result.

Q2) Compute the area of a square having side(S) equal to 145 units. Assign the result to a variable named area and print it.

Q3) Compute the area of a triangle having base 120 units (B) AND Height 33 units (H). Assign the result to a variable named area and print it.

Q4) Write a Program where the radius of a circle is 12 units. Compute the area of a circle.

Q5) Write a Python program to solve (x+y)*(x+y)

Test data : x = 4 , y = 3

Expected output : (4+3)^2 = 49

Q6) Write a program to compute the length of the hypotenuse (c) of a right triangle having sides a = 133 , b = 72 units. Hint : remember the Pythagoras theorem.

Q7) The user enters two numbers. Store the numbers in two variables called input1 and input2. Swap the values of the two variables so that input1 has the value of input2 and vice versa. Print out the two variables.

Q8) Write a python program to get the least common multiple (LCM) of two positive integers.

Q9) Write a python program to compute the greatest common divisor (GCD) of two positive integers.

Q10) Write a program for printing following pattern by assigning a value 1 to a variable a:

 A)   1

               1   2

               1   2   3

        1   2   3   4

B)   A

```
  A   A   A
A   A   A   A   A
```

Practical No 3

Q1) Write a program to find simple interest.

Q2) Write a program to find volume of cone.

Q)3 Write a program to find area of triangle.

Q4) Write a program to convert given seconds into hours, minutes and remaining seconds.

Q5) Write a program to convert given inches to feet and inches format.

Q6) Write a program to calculate volume of cylinder.

Q7) Write a program to swap two numbers.

Practical No 4

Q1) Find a factorial of given number.

Q2) To find whether the given number is Armstrong number.

Q3) Print Fibonacci series up to given term.

Q4) Write a program to find prime number.

Q5) Check whether given number is palindrome or not.

Q6) Write a program to print sum of digits.

Q7) Count and print all numbers divisible by 5 or 7 between 1 to 100.

Q8) All lower case to upper in string.

Q9) Print prime numbers between 1 and 100.

Q10) Print the table for a given number:

5 * 1 = 5

5 * 2 = 10………..

Practical No 5

Q1) Write a program to count and display the number of capital letters in a given string.

Q2) Count total number of vowels in a given string.

Q3) Input a sentence and print words in separate lines.

Q4) Program to count number of unique words in a given sentence.

Q5) A program to scan n values and print square of each number.

Q6) Take two sets and apply set operators on them :

S1 = {Red ,yellow, orange , blue }

S2 = {violet, blue , purple}

Practical No 6

Q1) Scan n values in range 0-3 and print the number of times each value has occurred.

Q2) Take 3 numbers as input and store their tables in a list whose elements are table of the number user has entered.

Q3) Store details of movies in any dictionary you want. each movie Must store details like name, year, director name, production cost, collection made (earning).

& Perform the following :-

A) print all movie details

B) Display name of movies released before 2015

C) print movies that made a profit.

D) print movies that made a loss.

E) print movies directed by a particular director.

Q4) Take a paragraph as input from user and randomly jumble all the letters in each word except for first and last letter. Keep the special symbols at its actual position.

Practical no 7

Q1. Add few names, one name in each row, in "name.txt file" .
   a) Count no of names
   b) Count all names starting with vowel
   c) Find longest name

Q2. Store integers in a file.
   a) Find the max number
   b) Find average of all numbers
   c) Count number of numbers greater than 100

Q3. Student details name,roll no, marks of phy, chem & maths are to be maintained in a text file.
   a) Display the details of all students
   b) Average marks in each subject
   c) Average marks of all students
   d) Find topper of the class

Practical no 8

Q1. Write a Python function to find the maximum and minimum numbers from a sequence of numbers. Note: Do not use built-in functions.

Q2. Write a Python function that takes a positive integer and returns the sum of the cube of all the positive integers smaller than the specified number.

Q3. Write a Python function to find a distinct pair of numbers whose product is odd from a sequence of integer values.

Practical No 9

Q1. Create a class of student with suitable details. Create 3 objects and display details of all students.

Q2. Add constructor in the above class and implement following functions:

a) To add new student
b) To remove existing student
c) Change marks of a student
d) Find percentage of a student

Practical No10

Q1. Create numpy array to find sum of all elements in an array.

Q2. Create numpy array of (3,3) dimension. Now find sum of all rows & columns individually. Also find 2nd maximum element in the array.

I. TEXT BOOKS:

1. Learning Python – Mark Lutz, O'reilly publication

J. GUIDELINES

Cell Phones and other Electronic Communication Devices: Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.

E-Mail and online learning tool: Each student in the class should have an e-mail id and a pass word to access the LMS system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.

Attendance: Students are required to have **minimum attendance of 75%** in each subject. Students with less than said percentage shall **NOT** be allowed to appear in the end semester examination.

Passing criterion: At course completion, the student is awarded with a grade (on a 10-point scale) based on the overall marks obtained comprising the above two mentioned out of 100 marks. Students scoring less than 35 absolute marks in individual course shall be awarded a 'F' grade. Students scoring 85 marks and above as composite score shall be awarded a 'O' grade. The minimum individual course grade is 'C'.The student who is debarred due to shortage of attendance or with Grade 'F' for a lab course will need to repeat the continuous evaluation during summer vacation (June-July) after the registration by payment of the prescribed fee per subject as notified by the University. The grades are awarded based on the performance of the students and capping as per the University guidelines. All other rules and regulations such as requirement of passing, etc. will remain same.