



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Branch: Electronics and Communication

Subject Code: BE05000411

Subject Name: Python Programming

WEF Academic Year :	2024-25
Semester :	5
Category of the Course :	Professional Elective Course - 2

Course Outcome :

After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
01	To test and debug code written in python	UN
02	To create applications using Python Programming	AP
03	To perform file operations to read and write data in files	AP
04	To write programs for general purpose I/O devices using MicroPython	CR

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Teaching and Examination Scheme

Teaching/Learning Scheme in hrs/semester					Total Credits	Assessment Pattern and Marks					Total Marks
L	T	P	PBL*	TH	TH/30	Theory		Practical			
						ESE (E)	PA (M)	PA (I)	PBL(I)	ESE (V)	
45	0	30	15	90	3	70	30	20	30	50	200

Where L = Lecture, T= Tutorial, P= Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, ESE = End-Semester Examination, PA = Progressive Assessment

* **Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.**

Course Content :

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction, Data Types and Operators: Installation and working with Python, Variables and data types in python, Perform computations and create logical statements using Python's operators: Arithmetic, Assignment, Comparison, Logical, Membership, Identity, Bitwise operators, list, tuple and string operations	8	20%



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2	Python Decision making and Loops: Write conditional statements using If statement, if ...else statement, elif statement and Boolean expressions, While loop, For loop, Nested Loop, Infinite loop, Break statement, Continue statement, Pass statement, Use for and while loops along with useful built-in functions to iterate over and manipulate lists, sets, and dictionaries. Plotting data, Programs using decision making and loops.	10	20%
3	Python Functions and Modules: Defining custom functions, Organizing Python codes using functions, Create and reference variables using the appropriate scope, Basic skills for working with lists, tuples, work with dates and times, get started with dictionaries, Importing own module as well as external modules, Programming using functions, modules and external packages	10	20%
4	Python File Operations: An introduction to file I/O, use text files, use CSV files, use binary files, Handle a single exception, handle multiple exceptions, Illustrative programs, Exercises	8	15%
5	MicroPython: Introduction, main difference between MicroPython and Python, Installation of MicroPython on Hardware, MicroPython libraries, GPIO programming on MicroPython Hardware, Sensor Programming using MicroPython	9	25%

This syllabus is mapped with following United Nation's Sustainable Development Goals:

SDG 3 - Good Health and Well-being

SDG 4 - Quality Education.

SDG 7 – Clean and affordable energy,

SDG 8 - Decent Work and Economic Growth,

SDG 9 - Industry, Innovation and Infrastructure,

SDG 11 - Sustainable Cities and Communities,

SDG 12 - Responsible Consumption and Production,

SDG 13 -Climate Action



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Reference Book :

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2. Python Programming Fundamentals- A Beginner's Handbook by Nischay kumar Hegde
3. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication
4. Introduction to Python for Engineers and Scientists, By. Sandeep Nagar, Apress
5. MicroPython for the Internet of Things (A Beginner's guide to programming with Python on microcontrollers) By. Charles Bell, Apress

Suggested Course Practical List :

1. Write Python programs to understand control structures
2. Write Python programs to understand list and tuples
3. Use conditional statements and loops in Python programs
4. Write python programs to create functions and use functions in the program
5. Import module and use it in Python programs
6. Write python program to plot data using PyPlot
7. To become familiar with MicroPython and NodeMCU. Configure NodeMCU for MicroPython.
8. Write program in MicroPython to send digital data on GPIO pins of NodeMCU and glow LED connected with NodeMCU or any other MicroPython supported board.
9. Connect Digital/Analog I/O module with NodeMCU and write program to display temperature in MicroPython.
10. Connect NodeMCU with with WiFi Access Point and transmit data from NodeMCU to Cloud. Connect Digital/Analog I/O module with NodeMCU and send temperature and light data on cloud (Thingspeak, Firebase or any other cloud service)

Major Equipment/software:

1. NodeMCU boards or any other microcontroller board supporting MicroPython firmware
2. Digital analog Input Output boards consisting LEDs, Switches, LDR, Temperature sensor, POT

Laboratory/Learning Resources Required:

1. NPTEL Video lecture on Python Programming
2. <https://www.coursera.org/learn/python-programming>
3. Python Software
4. Turtle - <https://docs.python.org/2/library/turtle.html>
5. PyLab - <https://scipy.github.io/old-wiki/pages/PyLab>
6. Anaconda software



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Activities suggested under Self-learning/Team Work:

Sl. No.	Name of the activity	No. of hours	Evaluation Criteria
1.	Industry/Research laboratory visit	Visit = 5h, Report preparation = 5h Total = 10h	Based on report submitted. Report should contain observations and calculations based on industry/ lab data.
2.	Technical Video based learning related to the subject	Duration of video = 5h Report preparation = 5h Total = 10h	Report /presentation based on the video learning outcomes.
3.	Assignment writing. Numericals based assignment is preferable.	5 assignments of 2h each. Total = 10h	Based on the assignment submitted.
4.	Problem solving/Coding using C, C++, Python, SCILAB, MATLAB, MS-EXCEL or any other relevant software	5 small coding based assignment of 2h each. Total = 10h	Based on the coding solution submitted.
5.	Self learning on-line course	Minimum duration of the course should be 10h.	Examination based assessment at the end of course. Based on the certificate produced.
6.	Complex problem solving	Maximum 2 problem. Study of the problem and solution finding, Total = 10h	Based on the depth of the solution submitted.
7.	Videos on Industrial safety aspects based on subject	Duration of video = 5h Report preparation = 5h Total = 10h	Based on quiz/report submitted
8.	Discussion on research paper based on relevant subject	5 research paper = 20 h	Summarize research paper and evaluation critical parameters
9.	Poster/chart/power point preparation on technical topics	Duration = 6 h	Based on poster/chart preparation and presentation skills
10.	Working/non-working model on technical topics	Working = 12 h Non- working = 8 h	Based on inter department/external evaluation
11.	Industrial exposure for 2-3 days to observe and provide tentative solutions on	Duration = 15 h for industrial exposure	Based on evaluation of critical problems and solutions



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	society/environment/health/any other issue	Problem identification and tentative solution = 10 h Total = 20 h	
12	Group Discussion on emerging/trending technical topics based on subject	Duration = 1 h each	Based on performance in group discussion, technical depth, knowledge etc.
13.	Real world case studies-based learning	Duration of data collection/study = 5h Report preparation = 5h Total = 10h	Based on in-depth study, technical depth, data collected, fact finding, etc.
14.	Application/Software development	Duration = 10 h	Depending on the complexity of the Application/Software

Note:

1. All the suggested activity should be related to the subject.
2. The number of hours are suggestive. Faculty can sub-divide the number of hours based on the activity. However, total number of hours is fixed.
3. Rubrics for the evaluation can be prepared by the faculty.

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