

# GRAPHIC ERA HILL UNIVERSITY, DEHRADUN

## SEMESTER I

Name of Department: - Computer Science and Engineering

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|----|-----------------------------|------------------------------|--------------------|---|
| 1. | Course Code:                | <b>TCS102</b>                | Course Title:      | <b>Introduction to Python Programming</b> |
| 2. | Contact Hours:              | <b>L: 3</b>                  | <b>T: 0</b>        | <b>P: 0</b>                               |
| 3. | Examination Duration (Hrs): | <b>Theory 3</b>              | <b>Practical 0</b> |   |
| 4. | Relative Weight:            | <b>CIE 25</b>                | <b>MSE 25</b>      | <b>ESE 50</b>                             |
| 5. | Credits:                    | <b>3</b>                     |                    |   |
| 6. | Semester:                   | <b>I</b>                     |                    |   |
| 7. | Category of Course:         |                              |                    |   |
| 8. | Pre-requisite:              | Basic knowledge of Computer. |                    |   |

9. <b>Course Outcome:</b>	<p>After completion of the course the students will be able to:</p> <p>CO1: Learn the concepts of IT and understand the fundamentals of basic building blocks of computer science.</p> <p>CO2: Identify and describe the fundamental data types and basic operators used in Python programming.</p> <p>CO3: Explain the purpose and usage of functions in Python, including parameters, return values, and modules.</p> <p>CO4: Apply data structures like lists, tuples, and dictionaries to organize and manipulate data for engineering problems.</p> <p>CO5: Analyse the differences between object-oriented programming concepts like inheritance, polymorphism, and encapsulation, and their impact on program design.</p>
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CO6: Evaluate and apply libraries like NumPy, Pandas, Matplotlib, and Seaborn to design Python programs for numerical computing, data analysis, cleaning, and visualization in basic engineering problems.

10. **Details of the Course:**

Sl. No.	Contents	Contact Hours
1	<b>Unit 1: Fundamentals of Computer</b>  Generation of computers, Block Diagram, Computer system memory hierarchy, Input/ Output, RAM/ ROM, Software & Hardware, understanding concept of bit and bytes, Operating System- functions and its types, Computer Networks, Internet and its services.	08
2	<b>Unit 2: Python Basics and Functions</b>  Syntax and Semantic Basics: Identifiers, Keywords, Data types: strings and string handling, integers, floats, Variable assignments and expressions, operators, Basic input/output operations, control statements, match-case  Defining and calling functions: Function parameters and return values, Lambda functions, Using built-in modules, Creating and using custom modules, recursive functions, Exception handling basics	10
3	<b>Unit 3: Data Handling</b>  Lists: creation, indexing, slicing, and methods Tuples: usage and when to use  Dictionaries: creating, accessing, and manipulating, sets Regular Expressions: usage and applications  Reading from and writing to files: text and binary files	08
4	<b>Unit 4: Basics of Object-Oriented Programming</b>  Introduction to classes and objects, Attributes and methods, Inheritance: extending classes  Polymorphism: using a unified interface	10

	Encapsulation: private and public members  Abstraction: why to use abstraction	
5	<b>Unit 5: Libraries for AI and ML</b>  NumPy: arrays, array operations, statistical operation, Linear algebra operation, slicing, indexing, reshaping  Pandas: DataFrame operations, indexing, merging, grouping  Matplotlib and Seaborn: basic plotting, figures, and axes, outliers, statistical data visualization, histograms, scatter plots, box plots.  Data cleaning techniques and Exploratory data analysis (EDA), correlation.	10
	Total	<b>46</b>

### Text Books:

Authors Name	Title	Edition	Publisher, Country	Year
Yahwant Kanetkar	Let Us Python	5 <sup>th</sup> Edition	BPB, India	2023
Eric Matthes	Python Crash Course: A Hands- On, Project-Based Introduction to Programming	3 <sup>rd</sup> Edition	No Starch Press, USA	2023
Mark Lutz	Learning Python	5 <sup>th</sup> Edition	O'Reilly Media, USA	2013
Wes McKinney	Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython	2 <sup>nd</sup> Edition	O'Reilly Media, USA	2017

### Reference Books:

Authors Name	Title	Edition	Publisher, Country	Year
Charles H. Roth Jr., Larry L. Kinney	Fundamentals of Logic Design	7 <sup>th</sup> Edition	CL Engineering, India	2015
John P Hayes	Computer Architecture and Organization	3 <sup>rd</sup> Edition	McGraw Hill	2017

### Course Articulation Matrix

CO	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
TCS102.1	Learn the concepts of IT and understand the fundamentals of basic building blocks of computer science.	1	-	-	-	1	1	-	1	1	-	1	3	2	1
TCS102.2	Identify and describe the fundamental data types and basic operators used in Python programming	1	2	-	1	-	2	-	-	-	-	2	3	2	1
TCS102.3	Explain the purpose and usage of functions in Python, including parameters, return values, and modules.	1	-	2	1	-	2	-	-	2	-	-	2	1	1
TCS102.4	Apply data structures like lists, tuples, and dictionaries to organize and manipulate data for engineering problems.	-	-	3	-	-	-	-	-	-	-	-	3	1	1
TCS102.5	Analyze the differences between object-oriented programming concepts like inheritance, polymorphism, and encapsulation, and their impact on program design.	-	3	-	-	-	-	2	3	2	2	2	3	2	1
TCS102.6	Evaluate and apply libraries like NumPy, Pandas, Matplotlib, and Seaborn to design Python programs for numerical computing, data analysis, cleaning, and visualization in basic engineering problems.	1	2	-	-	-	-	1	1	1	-	1	2	2	-
<b>TCS102</b>		1	2.33	2.5	1	1	1.66	1.5	1.66	1.5	2	1.5	2.66	1.66	1

2025-26 onwards

2025-26 onwards