

**(For B.Sc. Mathematics, Electronics, Geography & Chemistry - Allied Courses)**

**(For the candidates admitted from the academic year 2026 - 2027 onwards)**

**ALLIED COURSE - I  
PYTHON PROGRAMMING**

**Code:**

**(Theory)**

**Credits: 4**

**COURSE OBJECTIVES:**

This course aims to:

- Solve computational problems using Python conditional and looping statements.
- Define Python functions and use function calls to modularize programs.
- Use Python data structures such as lists, tuples, and dictionaries effectively.
- Perform input/output operations and manage files using Python.
- Handle exceptions and develop structured Python applications.

**UNIT - I: INTRODUCTION**

Fundamentals of Computing - Identification of Computational Problems - Algorithms and Building Blocks of Algorithms - Statements and Control Flow Algorithm Notation - Pseudocode and Flowcharts - Programming Languages - Data, Expressions, Variables and Keywords - Operator Precedence - Comments - Python Interactive and Script Mode

**UNIT - II: CONDITONAL AND LOOPING STATEMENT**

Conditional Statements - Boolean Values and Operators - Simple if Statement if-else Statement - Nested if Statements - Chained Conditional Statements (if-elif-else)- Iterative Statements - while Loop - for Loop - break Statement - continue Statement - pass Statement - Nested Loops

**UNIT - III: FUNCTION AND STRING**

Functions - Structure of a Function - Return Values - Parameters and Arguments - Local and Global Scope - Recursive Functions - Strings - String Operations - String Functions and Methods - String Slicing

**UNIT - IV: LIST, TUPLE AND DICTIONARY**

Lists - List Creation - List Operations - List Functions and Methods - List Slicing - Tuples - Tuple Creation - Tuple Operations - Tuple Methods - Dictionaries Dictionary Creation - Dictionary Operations - Dictionary Methods - Advanced List Processing - List Comprehensions.

## **UNIT - V: FILES AND EXCEPTION**

Files - Types of Files - Reading and Writing Files - File Modes - Copying Files - Command Line Arguments - Exceptions - Exception Handling - Modules Packages.

## **UNIT – VI: CURRENT CONTOURS (for Continuous Internal Assessment Only):**

Contemporary Developments Related to the Course during the Semester Concerned.

### **RECOMMENDED BOOKS:**

1. Kenneth Leroy Busbee & Dave Braunschweig, Programming Fundamentals: A Modular Structured Approach, 2nd Edition, Creative Commons, 2020.
2. Yashavant Kanetkar & Aditya Kanetkar, Let Us Python, BPB Publications, 2019.

### **REFERENCES:**

1. Mark Summerfield. — Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.
2. Martin C. Brown, —PYTHON: The Complete Reference, McGraw- Hill, 2001
3. Wesley J. Chun, “Core Python Programming”, Prentice Hall Publication, 2006.
4. Timothy A Budd, “Exploring Python”, Tata McGraw Hill, New Delhi, 2011
5. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 3, Shroff/O Reilly Publishers, 2016 Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

### **COURSE OUTCOMES:**

Upon successful completion of this course, the students would be able to:

|     |                                                                                               |
|-----|-----------------------------------------------------------------------------------------------|
| CO1 | Explain the fundamentals of computing, algorithms, flowcharts, and Python programming basics. |
| CO2 | Develop Python programs using conditional and looping statements to solve problems.           |
| CO3 | Design modular programs using functions and perform string manipulations.                     |
| CO4 | Apply Python data structures such as lists, tuples, and dictionaries in problem solving.      |
| CO5 | Implement file handling, exception handling, modules, and packages in Python applications.    |

### Mapping with Programme Outcomes and Programme Specific Outcomes

| <b>Cos</b>     | <b>PO<br/>1</b> | <b>PO<br/>2</b> | <b>PO<br/>3</b> | <b>PO<br/>4</b> | <b>PO<br/>5</b> | <b>PO<br/>6</b> | <b>PO<br/>7</b> | <b>PO<br/>8</b> | <b>PO<br/>9</b> | <b>PO<br/>10</b> | <b>PSO<br/>1</b> | <b>PSO<br/>2</b> | <b>PSO<br/>3</b> | <b>PSO<br/>4</b> | <b>PSO<br/>5</b> | <b>Mean<br/>COs</b> |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|---------------------|
| <b>CO1</b>     | 3               | 3               | 1               | 3               | 3               | 2               | 3               | 2               | 2               | 1                | 3                | 3                | 2                | 3                | 2                | 2.4                 |
| <b>CO2</b>     | 3               | 3               | 2               | 2               | 2               | 3               | 3               | 1               | 3               | 3                | 2                | 3                | 3                | 3                | 2                | 2.5                 |
| <b>CO3</b>     | 3               | 3               | 3               | 3               | 3               | 2               | 3               | 2               | 1               | 1                | 3                | 2                | 3                | 2                | 2                | 2.4                 |
| <b>CO4</b>     | 2               | 2               | 3               | 2               | 1               | 3               | 2               | 2               | 2               | 2                | 3                | 3                | 3                | 3                | 3                | 2.4                 |
| <b>CO5</b>     | 3               | 3               | 2               | 1               | 3               | 2               | 2               | 2               | 3               | 3                | 2                | 2                | 2                | 2                | 3                | 2.3                 |
| <b>Average</b> | <b>2.8</b>      | <b>2.8</b>      | <b>2.2</b>      | <b>2.2</b>      | <b>2.4</b>      | <b>2.4</b>      | <b>2.6</b>      | <b>1.8</b>      | <b>2.2</b>      | <b>2.0</b>       | <b>2.6</b>       | <b>2.6</b>       | <b>2.6</b>       | <b>2.6</b>       | <b>2.4</b>       | <b>2.4</b>          |

Mean Co: 2.4

3 - Strong, 2 - Medium, 1- Low

**ALLIED COURSE PRACTICAL - I**  
**PYTHON PROGRAMMING LAB**

**Code:**

**(Practical)**

**Credits: 4**

**COURSE OBJECTIVES:**

This course aims to:

- Understand the fundamental syntax, data types, and operators in Python
- Enable students to implement control flow structures and loops for logic building
- Provide hands-on experience with Python data structures like Lists, Tuples, Dictionaries
- Train students in modular programming using functions and standard modules
- Introduce file handling and error management techniques in Python

**EXERCISES:**

1. Write a program to perform arithmetic operations and use basic input/output functions
2. Write a program to convert temperature from Fahrenheit to Celsius and vice versa.
3. Write a program to check whether a year is a leap year or not
4. Implement programs using conditional statements (if-else, else -if) and looping constructs (for, while).
5. Demonstrate string manipulation techniques and built-in string methods.
6. Create and manipulate Lists and Dictionaries (e.g., sorting, searching, updating).
7. Develop a Python script using User-Defined Functions and Recursive functions.
8. Write a program to perform file read/write operations and handle common exceptions.
9. Demonstrate the use of Tuples and Sets and perform basic operations.
10. Write programs using built-in Python modules such as Math and Random.

**COURSE OUTCOMES:**

Upon successful completion of this course, the students would be able to:

|     |                                                                |
|-----|----------------------------------------------------------------|
| CO1 | Understand and execute basic Python scripts.                   |
| CO2 | Apply logical structures to solve computational problem.       |
| CO3 | Efficiently manage and organize data using Python collections. |
| CO4 | Design modular programs for better code reusability.           |
| CO5 | Develop, debug, and maintain file-based Python applications.   |

**ALLIED COURSE - 2**  
**BASICS OF ARTIFICIAL INTELLIGENCE**

**Code:** (Theory)

**Credits: 4**

**COURSE OBJECTIVES:**

This course aims to:

- Introduce the fundamental concepts and principles of Artificial Intelligence.
- Familiarize students with basic AI technologies and techniques.
- Provide knowledge of AI applications in various fields.
- Develop awareness of AI tools and their practical uses.
- Understand the ethical, social, and future aspects of AI.

**UNIT - I: INTRODUCTION TO ARTIFICIAL INTELLIGENCE**

Definition and meaning of Artificial Intelligence (AI) - History and evolution of AI - Characteristics of intelligent systems - Types of AI: Narrow AI, General AI, and Super AI - AI in everyday life - Advantages and limitations of AI

**UNIT – II: FUNDAMENTALS OF AI**

Introduction to Machine Learning - Types of Machine Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning - Basics of Neural Networks - Introduction to Natural Language Processing (NLP) - Introduction to Computer Vision - Role of data in AI systems

**UNIT – III: APPLICATIONS OF AI**

AI in Healthcare: Disease diagnosis and medical assistance - AI in Education: Personalized learning and assessment - AI in Agriculture: Smart farming and crop monitoring - AI in Business and Banking: Customer service and fraud detection - AI in Transportation: Autonomous vehicles and traffic management - AI in Smart Cities and Public Services - AI in Media and Entertainment

**UNIT – IV: AI TOOLS AND PRACTICAL USES**

Introduction to AI-powered tools - Chat bots and Virtual Assistants - Generative AI tools for text, image, and content creation - AI for information retrieval and summarization - AI in productivity and decision support systems - Demonstration of simple AI applications - Guidelines for effective use of AI tools.

**UNIT – V: ETHICS, CHALLENGES, AND FUTURE OF AI**

Introduction to AI Ethics - Privacy and Data Security - Bias and Fairness in AI systems - Social and economic impact of AI - AI and employment opportunities - Challenges and risks associated with AI - Responsible use of AI - Future trends and emerging applications of AI

## **UNIT – VI: CURRENT CONTOURS (for Continuous Internal Assessment Only):**

Contemporary Developments Related to the Course during the Semester Concerned

### **RECOMMENDED BOOKS:**

1. Tom Taulli, Artificial Intelligence Basics: A Non-Technical Introduction, 1st Edition, Apress, 2019.
2. Jeff Heaton, Artificial Intelligence for Humans, Volume 1: Fundamental Algorithms, 2nd Edition, Heaton Research, 2015.
3. Oliver Theobald, Machine Learning for Absolute Beginners, 2nd Edition, Scatterplot Press, 2023.

### **REFERENCES:**

1. Stuart Russell & Peter Norvig, Artificial Intelligence: A Modern Approach, 4th Edition, Pearson, 2021.
2. Elaine Rich, Kevin Knight & Shivashankar B. Nair, Artificial Intelligence, 3rd Edition, McGraw-Hill Education, 2009.
3. Wolfgang Ertel, Introduction to Artificial Intelligence, 3rd Edition, Springer, 2023.
4. David L. Poole & Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, 3rd Edition, Cambridge University Press, 2023.
5. Ian Goodfellow, Yoshua Bengio & Aaron Courville, Deep Learning, 1st Edition, MIT Press, 2016.

### **COURSE OUTCOMES:**

Upon successful completion of this course, the students would be able to:

|     |                                                                                        |
|-----|----------------------------------------------------------------------------------------|
| CO1 | Explain the basic concepts and technologies of AI.                                     |
| CO2 | Identify AI applications across various domains.                                       |
| CO3 | Use simple AI tools effectively.                                                       |
| CO4 | Understand ethical and social implications of AI.                                      |
| CO5 | Appreciate the future potential of Artificial Intelligence in their respective fields. |

### **Mapping with Programme Outcomes and Programme Specific Outcomes**

| COs     | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | Mean COs |
|---------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|----------|
| CO1     | 3    | 3    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2     | 3     | 2     | 2     | 2     | 2     | 2.3      |
| CO2     | 3    | 3    | 3    | 2    | 2    | 2    | 2    | 2    | 2    | 2     | 3     | 3     | 2     | 2     | 2     | 2.4      |
| CO3     | 3    | 3    | 3    | 2    | 3    | 2    | 2    | 2    | 2    | 2     | 3     | 3     | 3     | 2     | 2     | 2.6      |
| CO4     | 2    | 3    | 2    | 2    | 3    | 2    | 2    | 2    | 2    | 2     | 2     | 3     | 3     | 3     | 2     | 2.4      |
| CO5     | 2    | 2    | 2    | 2    | 2    | 3    | 3    | 3    | 2    | 2     | 2     | 2     | 2     | 2     | 3     | 2.3      |
| Average | 2.6  | 2.8  | 2.4  | 2.0  | 2.4  | 2.2  | 2.2  | 2.2  | 2.0  | 2.0   | 2.6   | 2.6   | 2.4   | 2.2   | 2.2   | 2.4      |

Mean Co: 2.4

3 - Strong, 2 - Medium, 1- Low