BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI -24

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

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

Year : First	**Allied Course–I**	**Semester : 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. YashavantKanetkar& 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

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	1	3	3	2	3	2	2	1	3	3	2	3	2	2.4
CO2	3	3	2	2	2	3	3	1	3	3	2	3	3	3	2	2.5
CO3	3	3	3	3	3	2	3	2	1	1	3	2	3	2	2	2.4
CO4	2	2	3	2	1	3	2	2	2	2	3	3	3	3	3	2.4
CO5	3	3	2	1	3	2	2	2	3	3	2	2	2	2	3	2.3
Average	**2.8**	**2.8**	**2.2**	**2.2**	**2.4**	**2.4**	**2.6**	**1.8**	**2.2**	**2.0**	**2.6**	**2.6**	**2.6**	**2.6**	**2.4**	**2.4**

Mean Co : 2.4

3 - Strong, 2 - Medium , 1- Low

Year : First **Allied Course Practical – 1** **Semester : II**

PYTHON PROGRAMMING LAB

Code : **(Practical)** **Credits: 4**

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

COURSE OBJECTIVES:

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.

Year : First **Allied Course– 2** **Semester : II**

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

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.

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, YoshuaBengio& Aaron Courville, *Deep Learning*, 1st Edition, MIT Press, 2016.

Mapping with Programme Outcomes and Programme Specific Outcomes

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Mean Co : 2.4

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