



# **SWAMI DAYANANDA**

## **COLLEGE OF ARTS & SCIENCE**

**Affiliated to Bharathidasan University, Tiruchirappalli.**

**UGC Recognized u/s 2(f) & 12 (B)**

**Dayananda campus, Manjakkudi – 612 610. Tamilnadu, India.**

**HAND BOOK**

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**DEPARTMENT OF**

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**COMPUTER SCIENCE – B.Sc.,(AI & ML)**

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## **Profile of B.Sc.,(AI & ML)**

With the technological advancement and rapid growth in MNCs and IT, the need for computer professionals is growing day-by-day. Hence, B.Sc.,(AI & ML) is an excellent career choice for those who have always been fascinated by the world of the computer.

B.Sc.,(AI & ML) is a three-year undergraduate course which deals with information technology and computer applications. The course imparts knowledge about different computer applications and how to solve and address the problems which arise from a computer and its applications. The course includes subjects such as core programming languages Python Java and C++, data structure, networking and others. B.Sc.,(AI & ML) provides various opportunities to the students who wish to pursue their career in IT and software.

At a secondary level, the students will be exposed to wider socio-cultural and political issues in relation to contemporary English Literature. This program in English will be serving as an excellent foundation for students who want to do a very deep study. **Career**

### **Options and Job Prospects**

- Since the course is specifically aimed at computers and its uses, there are numerous career opportunities that one can take up after completing their graduation.
- Students can pursue higher studies such as M.Sc, MCA, MBA, M.C.M. to enhance their knowledge and get better job opportunities.
- The programme is designed in such a way that it makes students job ready for the career in IT & Software Industry.
- **Job opportunities:**
  - Big Data Engineer
  - Business Intelligence Developer
  - Data Scientist
  - Machine Learning Engineer
  - Research Scientist
  - AI Data Analyst
  - Product Manager
  - AI Engineer
  - Robotics Scientist



**B.Sc. ARTIFICIAL INTELLIGENCE & MACHINE LEARNING  
CHOICE BASED CREDIT SYSTEM -  
LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)**

**(Applicable to the candidates admitted from the academic year 2022-23 onwards)**

Sem.	Part	Course	Title	Ins. Hrs	Credit	Exam Hours	Marks		Total	
							Int.	Ext.		
I	I	Language Course – I (Tamil \$/Other Languages + #)		6	3	3	25	75	100	
	II	English Course – I		6	3	3	25	75	100	
	III		Core Course – I (CC)	Programming in C and Data Structures	5	5	3	25	75	100
			Core Practical – I (CP)	Programming in C Lab	4	4	3	40	60	100
			First Allied Course – I (AC)		4	4	3	25	75	100
			First Allied Course – II (AC)		3	-	-	-	-	-
	IV	Value Education		2	2	3	25	75	100	
	<b>TOTAL</b>				<b>30</b>	<b>21</b>	-	-	-	<b>600</b>
II	I	Language Course – II (Tamil \$/Other Languages + #)		6	3	3	25	75	100	
	II	English Course – II		6	3	3	25	75	100	
	III		Core Course – II (CC)	Programming in Python	5	5	3	25	75	100
			Core Practical – II (CP)	Programming in Python Lab	4	4	3	40	60	100
			First Allied Course – II (AC)		3	2	3	25	75	100
			First Allied Course – III (AC)		4	4	3	25	75	100
	IV	Environmental Studies		2	2	3	25	75	100	
	<b>TOTAL</b>				<b>30</b>	<b>23</b>	-	-	-	<b>700</b>

\$ For those who studied Tamil upto 10<sup>th</sup> +2 (Regular Stream)

+ Syllabus for other Languages should be on par with Tamil at degree level

# Those who studied Tamil upto 10<sup>th</sup> +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV

\* Extension Activities shall be outside instruction hours.

**List of Allied Courses**

Allied Course I

Allied Course II

**Mathematics**

**Applied Physics**

## SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES

Sl. No.	Part	Types of the Courses	No. of Courses	No. of Credits	Marks
1.	I	Language Courses	4	12	400
2.	II	English Courses	4	12	400
3.	III	Core Courses	9	45	900
4.		Core Practical	6	24	600
5.		Allied Courses I & II	4	16	400
6.		Allied Practical	2	4	200
7.		Major Based Elective Courses	2	8	200
8.		Project	1	3	100
9.	IV	Non-Major Elective Courses	2	4	200
10.		Skill Based Elective Courses	2	4	200
11.		Soft Skills Development	1	2	100
12.		Value Education	1	2	100
13.		Environmental Studies	1	2	100
14.	V	Gender Studies	1	1	100
15.		Extension Activities	1	1	---
16.	<b>Total</b>		<b>41</b>	<b>140</b>	<b>4000</b>

## **PROGRAM OBJECTIVES:**

- Upon completion of this undergraduate programme on B.Sc. Artificial Intelligence and Machine Learning, the students will be able to
- Exhibit good domain knowledge and completes the tasks with expected quality standards.
- To be capable of modelling, designing, implementing and verifying a computing system to meet specified requirements for the benefit of society.
- Design and develop research based solutions for complex problems.
- To possess critical thinking, communication skills, teamwork, leadership skills and ethical behaviour necessary to function productively and professionally.
- Able to apply analytical and critical thinking to identify, formulate and analyse complex problems
- Establish the ability to listen, read, proficiently communicate and articulate complex ideas.

## **PROGRAM OUTCOMES:**

After successful completion of B.Sc. AI &ML program the students are expected to

- Apply the concepts and practical knowledge in analysis, design and development of computing systems and applications to multi-disciplinary problems.
- Provide a concrete foundation and enrich their abilities to qualify for Employment, Higher studies and Research in Artificial Intelligence and Machine Learning with ethical values
- Understand, analyze and develop essential proficiency in the areas related to artificial intelligence and machine learning in terms of underlying statistical and computational principles.
- Learn the basic concepts of AI & ML and apply in various research areas like image processing, speech recognition and Medical diagnostics etc.,
- Find solutions to complex AI problems using various AI tools

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**First Year**

**CORE COURSE I  
PROGRAMMING IN C AND DATA  
STRUCTURES**

**Semester I**

**Code:**

**(Theory)**

**Credit: 5**

**COURSE OBJECTIVES:**

1. To know about the basics of C Programming, Control and Looping Structures and programming with it.
2. To understand Arrays, Pointers and String Processing in C language
3. To know about the basic concepts in Data Structures.

**UNIT - I:**

Basic of C: History of C and its importance – Structure of a C program – Data Types – Constants and Variables – Operators and Expressions – Order of Precedence, Evaluating of Arithmetic Expressions – Type Conversion- Decision Statements: if, if-else, and nested if statements.

**UNIT - II:**

Loops Structures: For Loop, While, Do-while loop – Arrays: - One Dimensional Array, Two-dimensional Arrays, Character Arrays and Strings – Functions: Function with arrays- Function with decision and looping statements - Recursion.

**UNIT - III:**

Pointers: Introduction – Pointer Expressions – Chain of Pointers –Pointers and Arrays – Array of Pointers – Pointers as function arguments – Functions returning Pointers – Pointers to Functions – Function pointer – Structures - declaration, initialization, Array of Structures – Pointer to structures, Structures and functions – Typed of Enumerated data types, Unions.

**UNIT - IV:**

Strings Processing, Standard string library functions – Files: introduction and files functions – Writing and reading in Text mode – Simple application: Display the contents of a file. Write data to a file. Append data to an existing file – File IO – Reading and writing structures.

**UNIT - V:**

Stack: LIFO concept, Stack operations, Array implementation of stack – Queue: FIFO concept, Queue operations, Array implementation of queue – Singly Linked List: concepts, operations – Doubly Linked List: concepts, operations – Trees: General trees, Binary trees.

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

Contemporary Developments Related to the Course during the Semester Concerned.

### **REFERENCE BOOKS:**

1. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, New Delhi, Seventh Edition, 2016.
2. E.Horowitz, S.Sahni and Susan Anderson Freed, "Fundamental Data Structures in C", 2ed, Orient BlackSwan Publisher, 2009.
3. Byron S. Gottfried, "Programming with C", Schaum's Outline Series, Tata-McGraw Hill Edition, New Delhi, 1991.
4. E. Karthikeyan, "A Textbook on C Fundamentals, Data Structures and Problem Solving", Prentice-Hall of India Private Limited, New Delhi, 2008.
5. Yashavant Kanetkar, "Let us C", BPB Publications, Tenth Edition, New Delhi, 2010.
6. Szuhay, Jeff, and Szuhay, Jeff, "Learn C Programming: A Beginner's Guide to Learning C Programming the Easy and Disciplined Way", Packt Publishing, 2020.
7. Jena, Sisir Kumar, and Jena, Sisir Kumar, "C Programming: Learn to Code", CRC Press, 2021.
8. <https://www.tutorialspoint.com/cprogramming/index.htm>
9. <https://www.w3schools.in/data-structures/intro>

### **COURSE OUTCOMES:**

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

- Summarize the basic knowledge to develop C programs
- Manipulate Looping, arrays and functions
- Apply and write programs for solving real world problems
- Create open, read, manipulate, write and close files.
- Understand the basic concepts in data structures.

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**First Year**

**CORE PRACTICAL I  
PROGRAMMING IN C LAB  
(Practical)**

**Semester I**

**Code:**

**Credit: 4**

**COURSE OBJECTIVES:**

- To learn the programming knowledge using C language.
  - To create derived and user defined data types.
  - To demonstrate the functioning of pointers in C.
1. Write a Program
    - a. to convert temperature from degree Centigrade to Fahrenheit.
    - b. to find whether the given number is Even or Odd.
    - c. to find the greatest of Three numbers.
  2. Write a Program to use the switch statement to display Monday to Sunday.
  3. Write a Program to display first Ten Natural Numbers and their sum.
  4. Write a Program to find Multiplication of Two Matrices.
  5. Write a Program
    - a. to find the maximum number in Array using pointer.
    - b. to reverse a number using pointer.
    - c. to add two numbers using pointer.
  6. Write a Program to solve Quadratic Equation using functions.
  7. Write a Program to find factorial of a number using Recursion.
  8. Write a Program to show Call by Value and Call by Reference.
  9. Write a Program to create a file containing Student Details.
  10. Write a program to Implement a stack using singly linked list, Implement Queue using Linked List.

**COURSE OUTCOMES:**

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

- To relate the ways to solve simple programs
- To understand and trace the execution of programs using arrays
- To develop programs with functions and pointers
- To solve data handling problems using files
- To implement stack and queue operations.

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**First Year**

**CORE COURSE II  
PROGRAMMING IN PYTHON**

**Semester II**

**Code:**

**(Theory)**

**Credit: 5**

**COURSE OBJECTIVES:**

- To develop programs using functions and pass arguments in Python.
- To write programs using loops and decision statements in Python.
- To design and program Python applications.

**UNIT - I:**

Introduction to Python: Features of Python - How to Run Python - Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) - Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers – Strings – List – Tuple – Set – Dictionary – Data type conversion.

**UNIT - II:**

Flow Control: Decision Making – Loops – Nested Loops – Types of Loops. Functions: Function Definition – Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

**Unit - III:**

Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. File Handling- Directories in Python.

**UNIT - IV:**

Object-Oriented Programming: Class Definition - Creating Objects - Built-in Attribute Methods - Built-in Class Attributes- Destructors in Python – Encapsulation - Data Hiding – Inheritance - Method Overriding- Polymorphism.

**UNIT - V:**

Exception Handling: Built-in Exceptions-Handling Exceptions-Exception with Arguments - Raising Exception - User-defined Exception - Assertions in Python. Regular Expressions: The match() function - The search() function - Search and Replace - Regular Expression Modifiers: Option Flags-Regular Expression Patterns-Character Classes-Special Character Classes - Repetition Cases - findall() method - compile() method.

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

An Introduction to Interactive Programming in Python - Study on Julia – an high level language approach.

## REFERENCES:

1. Jeeva Jose and P. Sojan Lal, "Introduction to Computing and Problem Solving with PYTHON", Khanna Book Publishing Co, 2016.
2. Mark Summerfield. —Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.
3. Martin C. Brown, —PYTHON: The Complete Reference, McGraw-Hill, 2001
4. Wesley J. Chun, "Core Python Programming", Prentice Hall Publication, 2006.
5. Timothy A Budd, "Exploring Python", Tata McGraw Hill, New Delhi, 2011
6. Jake Vander Plas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly Media, 2016.
7. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
8. 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 recall and understand the features of python programming language
- To illustrate various programming mechanism used in python
- To apply various language construct to write simple programs in python
- To examine the application of object oriented concept in python
- To distinguish the various constructs used in python.

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**COURSE OBJECTIVES:**

- To develop the Numbers, Math functions and Strings.
  - To create different Decision Making statements and Functions.
  - To design GUI Applications in Python.
1. Write a python program that displays the following information: Your name, Full address Mobile number, College name, Course subjects.
  2. Write a python program to find the largest three integers using if-else and conditional operator.
  3. Write a python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbers in order and their sum.
  4. Write a python program to find the product of two matrices [A]m<sub>x</sub>p and [B]p<sub>x</sub>r
  5. Write recursive functions for GCD of two integers.
  6. Write recursive functions for the factorial of positive integer.
  7. Write recursive functions for Fibonacci Sequence up to given number n.
  8. Write recursive functions to display prime number from 2 to n
  9. Write a python program that writes a series of random numbers to a file from 1 to n and display
  10. Write a python program to sort a given sequence: String, List and Tuple.
  11. Write a python program to make a simple calculator.
  12. Write a python program for Linear Search and Binary Search

**COURSE OUTCOMES:**

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

- To recall and relate the features of python programming language
- To compare various programming mechanism used in python
- To construct simple programs in python using various language features
- To distinguish the various constructs used in python
- To apprise the application of object oriented concept in python

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