

B. Sc Artificial Intelligence and Machine Learning

Course Structure and Syllabus

(For the candidates admitted from the academic year 2025-2026 onwards)

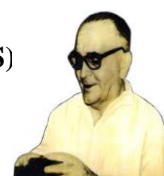
Choice Based Credit System (CBCS)

&

Learning Outcomes-Based Curriculum Framework (LOCF)



THANTHAI HANS ROEVER COLLEGE (AUTONOMOUS)
(Approved by NAAC, Affiliated to Bharathidasan University)
ELAMBALUR, PERAMBALUR – 621 220



VISION

To construct a centre of excellence for the students, mould them to meet the present need of IT industry and to attain academic excellence by continuous progress of the faculty through research activities.

MISSION

To provide an educational possibility to all expectant youth to shine in life by means of inculcating academic excellence, promoting human values and creating social responsibility

Programme Outcomes (POs):

PO1:Computational Foundations: Apply the basic knowledge of computers, math and algorithms to solve real-world problems.

PO2:Problem Solving and Programming: Understand problems and solve them by writing code using different programming styles and tools.

PO3:Software Design and Development: Plan and build software systems using good methods and practices.

PO4:Team work: Work well in a team or lead a group to complete software projects successfully.

PO5:Creating and exploring new ideas: Try out new ideas, learn new technologies, and do small experiments to improve solutions.

PO6:Security and Ethics: Write code and build systems that are safe, protect user data, and follow ethical rules.

PO7:Using Modern Tools: Use the latest computer tools and technologies to write, test, and manage software.

PO8:Life long Learning: Keep learning new things to stay up to date with changes in computer science and technology.

Program Specific Outcomes (PSOs)

PSO1:Think in a critical and logical based manner

PSO2:Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and real time application related sciences.

PSO3:Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.

PSO4:Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.

PSO5:Develop a range of generic skills helpful in employment, internships& societal activities.

B.Sc. Artificial Intelligence and Machine Learning

Choice-Based Credit System – Learning Outcome-Based Curriculum Framework

(For the candidate admitted from the academic year 2025 -2026)

Semester	Part	Course Code	Title of the Course	Int. Hrs /Week	Credits	End Sem. Exam Hrs	Max. Marks		
							CIA	ESE	Total
I	I	25UT1 / H1	Tamil I / Hindi I	6	3	3	25	75	100
	II	25UE1	English I	6	3	3	25	75	100
	III	25UAI1CC1	Programming in C and Data Structures	6	5	3	25	75	100
		25UAI1CP1	Programming in C and Data Structures Lab	5	4	3	40	60	100
		25UMA1AC1	Mathematical Computing	5	4	3	25	75	100
	IV	25UVE	Value Education	2	2	3	25	75	100
		25UAIVA1	Value Added Course*	--	2*	3	50	50	100*
Total				30	21	-	-	-	600
II	I	25UT2 / H2	Tamil II	6	3	3	25	75	100
	II	25UE2	English II	6	3	3	25	75	100
	III	25UAI2CC2	Object Oriented Programming using Java	5	5	3	25	75	100
		25UAI2CP2	Object Oriented Programming using Java Lab	3	3	3	40	60	100
		25UMA2AC2	Statistical Computing	4	3	3	25	75	100
		25UMA2ACP	Statistical Computing Lab	2	2	3	40	60	100
	IV	25UI2NME1	Desktop Applications	2	2	3	25	75	100
		25UES	Environmental Studies	2	2	3	25	75	100
		25UAIVA2	Value Added Course*	--	2*	3	50	50	100*
Total				30	23	-	-	-	800
III	I	25UT3 / H3	Tamil III	6	3	3	25	75	100
	II	25UE3	English III	6	3	3	25	75	100
	III	25UAI3CC3	Python Programming	6	4	3	25	75	100
		25UAI3CP3	Python Programming Lab	3	3	3	40	60	100
		25UPH3AC3	Digital Electronics	5	4	3	25	75	100
	IV	25UI2NME2	Web Designing	2	2	3	25	75	100
		25UAI3SE1	Digital Marketing	2	2	3	40	60	100
		25UAIVA3	Value Added Course*	--	2*	3	50	50	100*
Total				30	21	-	-	-	700

Semester	Part	Course Code	Title of the Course	Int. Hrs /Week	Credits	End Sem. Exam Hrs	Max. Marks		
							CIA	ESE	Total
IV	I	25UT4 / H4	Tamil IV	6	3	3	25	75	100
	II	25UE4	English IV	6	3	3	25	75	100
	III	25UAI4CC4	Database Management Systems	5	4	3	25	75	100
		25UAI4CP4	Database Management Systems Lab	3	3	3	40	60	100
		25UPH4AC4	Fundamentals of Micro Processor	4	3	3	25	75	100
		25UPH4AP2	Digital and Microprocessor Lab	3	2	3	40	60	100
	IV	25UAI4SEP1	Web Application Development Lab using Angular	2	2	3	25	75	100
		25UHW	Health and Wellness	1	1	--	--	--	100
		25UAIVA4	Value Added Course*	--	2*	3	50	50	100*
Total				30	21	-	-	-	800
V	III	25UAI3CC5	Embedded Systems and IoT	5	4	3	25	75	100
		25UAI5CC6	Operating Systems	5	4	3	25	75	100
		25UAI5CC7	Robotics	6	5	3	25	75	100
		25UAI5CP5	Robotics Lab	4	4	3	40	60	100
		25UAI5DE11 25UAI5DE12	Natural Language Processing Data Science	4	4	3	25	75	100
		25UAI5DE21 25UAI5DE22	Deep Learning Virtual Reality and Augmented Reality	4	4	3	25	75	100
	IV	25UAI5SS	Soft Skills	2	2	3	25	75	100
		25UAI5SI	Summer Internship †	--	2†	3	--	--	100†
		25UAIVA5	Value Added Course*	--	2*	3	50	50	100*
Total				30	27	-	-	-	700
VI	III	25UAI6CC8	Software Engineering	5	5	3	25	75	100
		25UAI6CC9	Data Communication Networks	5	5	3	25	75	100
		25UAI6CC10	Machine Learning Techniques	5	4	3	25	75	100
		25UAI5DE31 25UAI5DE32	Cloud Computing Cryptography	5	4	3	25	75	100
		25UAI6DE41 25UAI6DE42	AI for Intrusion Detection System AI for Smart Applications	5	4	3	25	75	100
		25UAI6PW	Project Work	4	3	3	20	80	100
	V	25UGS	Gender Studies	1	1	3	25	75	100
			Extension Activity	--	1	--	--	--	--
			Value Added Course*	--	2*	3	50	50	100*
Total				30	27	-	-	-	700
Total				30	140	-	-	-	4300

Extra Credit Course which will not be included in the total CGPA

† Summer Internship after 4th semester during summer vacation -30 Hours and 2 credits will be included in the 5th semester.

*Value Added Course (Outside Instruction Hours: 30 Hours)

1. Part-wise Credits

Part	Course details	No. of Courses	Total Credits
I	Tamil	04	12
II	English	04	12
III	Core Course Theory	10	45
	Core Practical	05	17
	Allied Course Theory	04	14
	Allied Practical	02	04
	Discipline-Specific Electives	04	16
	Project with Viva-Voce	01	03
	Gender Studies	01	01
IV	Skill Enhancement Courses	02	04
	Non-Major Elective	02	04
	Value Education	01	02
	Environmental Studies	01	02
	Health and Wealth	01	01
	Soft Skills	01	02
V	Extension Activity		01
		Total	140

2. List of Value-Added Courses

Course Code	Course Title
25UAI1VA1	Introduction to Data Science
25UAI1VA2	Ruby on Rails

3. Attendance

75% of attendance in each semester shall appear for the examination.

Attendance between 65% and 74% shall apply for **condonation** in the prescribed form with the prescribed fee.

Attendance between 50% and 64% shall apply for **condonation** in prescribed form with the prescribed fee along with the **Medical Certificate**.

Attendance below 50% are **not eligible to appear for the examination**. They shall re-do the semester(s) after completion of the Programme.

4. Question Paper Pattern of CIA I and CIA II Examinations

UG Programme		
Maximum Marks : 50		Duration: 1 ½ Hours
Section - A	i) a- (3 Questions for Multiple Choice) One question from each unit	3 x 1 = 03 Marks
	b- (5 Questions for Fill in the Blanks) One question from each unit	3 x 1 = 03 Marks
	ii) (5 short answer questions) One question from each unit	2 x 2 = 04 Marks
Section - B	4 Questions One set of questions from each unit	4 x 5 = 20 Marks
Section - C	3 Questions One question from each unit	2 x 10 = 20 Marks

Question Paper Pattern of Pre-Semester and End Semester Examinations

UG Programme		
Maximum Marks : 75		Duration: 3 Hours
Section - A	i) a- (5 Questions for Multiple Choice) One question from each unit	5 x 1 = 05 Marks
	b- (5 Questions for Fill in the Blanks) One question from each unit	5 x 1 = 05 Marks
	ii) (5 short answer questions) One question from each unit	5 x 2 = 10 Marks
Section - B	5 Questions (Internal Choice: Either or) One set of questions from each unit	5 x 5 = 25 Marks
Section - C	3 Questions (Answer any 3 out of 5 Questions) One question from each unit	3 x 10 = 30 Marks

5. The ratio of marks allotted to the continuous internal assessment and to the end semester examination

	Internal Marks	External Marks
Theory	25 Marks	75 Marks
Practical	40 Marks	60 Marks
Project	20 Marks	80 Marks

6. The Internal components of Theory course

	Maximum Marks
Maximum mark of CIA I & CIA II	Converted to 30 Marks
5 Assignments (5x5)	25 Marks
Seminar	10 Marks
Pre-Semester	Converted to 25 Marks
Library Assignment & Attendance	10 Marks
Total	100 Marks

100 marks converted to 25 marks.

7. The Internal components of Practical course

	Maximum Marks
Two Model Practical Exams	60 Marks
Record	10 Marks
Viva-Voce	10 Marks
Attendance	10 Marks
Overall Performance	10 Marks
Total	100 Marks

100 marks converted to 40 marks.

8. Passing Minimum for Theory

	Continuous Internal Assessment (CIA)	End Semester Examination (ESE)	CIA + ESE
Theory	40% out of 25 Marks [i.e. 10 Marks]	40% out of 75 Marks [i.e.30 Marks]	40 Marks
Practical	40% out of 40 Marks [i.e. 16 Marks]	40% out of 60 Marks [i.e.24 Marks]	40 Marks
Project	Viva-Voce 20 Marks 40% out of 20 Marks [i.e. 8 Marks]	Project Report 80 Marks 40% out of 80 marks [i.e. 32 marks]	40 Marks

9. UG Project Evaluation

Project Title Registration

Students must fill out the Final Year Project Title Registration Form. The Project Proposal Form should be submitted by the student to his/her supervisor before the commencement of the project. The form must include three project titles, the abstracts of the projects, objectives /aim (or goal), scope of the project, and proposed methodology. The first proposal (**Review 1**) is presented (seminar) before the project review committee for panel assessment.

Students should record project-related activity in a log. The log is a weekly record of the student's progress in meeting their objectives. Students should also record the meeting details with their supervisor in the log. Students should meet with their supervisor regularly, taking their log along to review progress. The complete log should be submitted as an appendix in the final report.

Review 1 – Project Proposal (20 Marks)

Present the abstracts of the projects, objectives /aim (or goal), scope of the project, and proposed methodology to the project review committee members.

The project review committee will assign the students a project, and the head of the department will assign them a supervisor.

- Abstract of the proposed work.
- Study of the Existing Systems. & drawbacks in the existing systems.
- Objectives and scope of the proposed work.
- Relation with current issues.
- Methodology.
- Presentation of proposed work.

Review 2 – Midterm Presentation (20 Marks)

- a. Implemented modifications suggested in Review 1.
- b. Timeframe work being followed.
- c. Defined Objectives are achieved.
- d. Individual or Team Contribution.
- e. 75% of the Project Work is completed.

Review 3 - Final Presentation(30 Marks)

At the end of the final year project, students will be required to make a brief presentation on their project (UG: 6 minutes for each student). The presentation should cover the following:

- a. Overview of the project (project objectives and scopes).
- b. Methodology.
- c. Result and discussion.
- d. Conclusion and recommendation.
- e. References.
- f. Project demonstration (Optional) .

Project Report Evaluation (10 Marks)

- a. The project report is in the specified format.
- b. Results are presented in a very appropriate manner.
- c. Project work is well summarized and concluded.
- d. Future extensions in the project are well specified.
- e. References and citations are appropriate and well-mentioned.

10. End Semester Exam Project Work Evaluation

S.No.	Register No	Name of the student	Title of the Project	PPT presentation / Demonstration (2)	Usage of the latest tools and/or methodology (3)	Result and Discussion (2)	Individual contribution (3)	Viva-Voce (10)	Total (20)

11. Guidelines for the Preparation of a Project Report

Arrangements of Contents:

The Project Report has to be organised in the following order.

1. Cover Page (Refer to Appendix 1)
2. Inside Title Page (Refer to Appendix 1)
3. Declaration Certificate (Refer to Appendix 2)
4. Bonafide Certificate (Refer to Appendix 3)
5. Acknowledgements
6. Abstract
7. Table of Contents
8. List of Figures
9. List of Tables
10. Abbreviations/ Notations/ Nomenclature (if any)
11. Report text content (Minimum 5 Chapters – Minimum 80 Pages)

Chapter 1

Chapter 2

.....

Chapter 5

12. References

13. Appendices (if any)

TITLE

A Project Report submitted <Italic>

in partial fulfillment for the award of the degree<Italic>

NAME OF THE DEGREE

Submitted By<Italic>

Name

Register Number

- 1.
- 2.
- 3.
- 4.
- 5.

under the guidance of <Italic>

NAME OF THE GUIDE



NAME OF THE DEPARTMENT

THANTHAI HANS ROEVER COLLEGE (Autonomous)

Elambalur, Perambalur – 621 220

APRIL – 2026



Thanthai Hans Roever College (Autonomous)
 (Accredited with 'A' Grade by NAAC (3rd cycle) with GPA 3.23 out of 4)
 (Affiliated to Bharathidasan University, Tiruchirapalli)
 Elambalur, Perambalur – 621 220



CERTIFICATE

<Below paragraph Font size – 14>

This is to certify that this Project entitled “**Title of the project**” is a bonafide record work done by the following members

<Following lines Font size – 12>

Name	Register Number
6.	
7.	
8.	
9.	
10.	

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in partial fulfillment of the requirement for the award of degree of Bachelor of Science in Computer Science during the year 2024-2025

Guide

Head of the Department

Date of Viva –Voce:

Examiner

1.

2.



Thanthai Hans Roever College (Autonomous)
 (Accredited with 'A' Grade by NAAC (3rd cycle) with GPA 3.23 out of 4)
 (Affiliated to Bharathidasan University, Tiruchirapalli)
 Elambalur, Perambalur – 621 220



BONAFIDE CERTIFICATE

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This is to certify that the project entitled “.....**TITLE OF THE PROJECT**.....” is the bonafide work carried out by the following students under my supervision does not form part of any other project or report based on which a degree or award was conferred on an earlier occasion on his or any other candidate.

Name

Register Number

- 1.
- 2.
- 3.
- 4.
- 5.

Guide <<Signature of Guide >>

<<Signature of guide>><>

<<Academic Designation>>

<<Department>>

Report Size

The report may contain a minimum of about **80 pages**, excluding references and appendices.

Paper Size

A4-size paper.

Paper Quality

White bond paper weighing 80 g/m² or more should be used. The same quality of paper should be used throughout. Photographs or images with dense colors may be printed on a single side on glossy paper.

Margins

A margin of 2.54 cm is to be provided on the left and right sides, whereas the top and bottom margins should be 3 cm. No printed matter should appear in the margin except the page numbers. All page numbers should be centered inside the bottom margin, 2 cm from the bottom edge of the paper.

Font

Times New Roman (**TNR**) 12-point font has to be used throughout the running text. The captions for tables and figures should have a font size of 11, and footnotes should be set at font size 10. **Line**

Spacing

The line spacing in the main text should be 1.5. Single line spacing should be given for quotations, abstracts, figure captions, table captions, figure legends, footnotes, and references. The equations, tables, figures, and quotations should be set off from the main text both before and after with a spacing of 1.5. Two consecutive paragraphs should be separated by triple line spacing

Headings

The following format has to be followed in the headings of chapters and sections.

CHAPTER 3

TITLE PAGE-CENTERED TNR 17-POINT BOLD ALL CAPS

3.1. Section Heading

Left aligned with number, TNR 16 points, bold and leading caps

3.1.1. Second level section heading

The left is aligned with the number, TNR 14 points, and bold, sentence case.

3.1.1.1. Third level section heading

The left is aligned with the number, TNR 12 points, and bold, sentence case.

Fourth-level section heading. Numbered subsections beyond the third level are not recommended. However, fourth-level subsection headings may be included without numbering. TNR 12-point font. left aligned. and italicized.

Running text should be set in 12-point TNR and fully justified. The first line of the paragraph should have an indentation of 1.5 Cm.

Page Numbering

All page numbers (**Roman or Arabic**) should be typed without punctuation at the central bottom of each page. The preliminary pages of the reports (such as Title page, Acknowledgement, Table of Contents, etc.) should be numbered in lower-case Roman numerals. The title page will be numbered as (i), but this should not be typed. The page immediately following the title page shall be numbered as (ii). Pages of the main text, starting with Chapter 1, should be consecutively numbered using Arabic numerals.

Table / Figure/equation Format

Tables, figures, and equations shall be numbered chapter-wise. For example, the second figure in Chapter 3 will be numbered Figure 3.2. The figure can be cited in the text as Fig. 3.2. The figure caption shall be located below the figure.

Tables shall be numbered similarly (Table 2 in Chapter 3 will be numbered Table 3.2) and shall be cited in the text as Table 3.2. The table number and caption shall be located above the table.

Equations aligned to the page's center with equation numbers in the text have to be given at the end of the line within brackets.

Listing of the References

References are to be listed after the last chapter. They are to be listed in alphabetical order and numbered. Within a reference, the line spacing should be single. Each reference should be separated by one blank line. The reference number should be left-aligned. The text of the reference should have an indentation of 10 mm. The reference format to be followed for journal articles, textbooks, conference proceedings, etc., is given below

References

Journals

1. Deodhar. S.V. and Patel. A .N. (1996) “Behavior of brick masonry in compression” *Journal of Structural Engineering* 22, 221-227.
2. Liu. H., Williams Burkett. and Kirk Haynes.(2005) “Improving freezing and thawing properties of fly ash bricks”, *World of coal ash conference* 11-15.
3. Prakas, K. (2011). Feedback and optimal sensitivity: Model reference transformations, multiplicative seminorms, and approximate inverses. *IEEE Transactions on Automatic Control*, 26(2): 301–320.
4. Ram, R., Krishna, S. and Peter, K. (2005a). Risk sensitive estimation and a differential game. *IEEE Transactions on Automatic Control*, 39(9): 1914– 1918.
5. Sarangapani. G., Venkatarama Reddy. B. V. and Jagadish. K. S. (2009) “Structural characteristics of bricks, mortars and masonry” *Journal of Structural Engineering* 29(2), 101-110.

Conference proceedings

1. Payne, D.B. and Gunhold, H.G. (1986). Digital sundials and broadband technology, In *Proc. IOOC-ECOC*, 1986, pp. 557-998.
2. Singh, K. and Robin, R. (2008). A linear-quadratic game approach to estimation and smoothing. In the *American Control Conference*, New York. June 20 – 25, 2008, pp. 2818–2822.

Online journals with a DOI (Digital Object Identifier)

1. Amra Bratovic, (2025). Exploring Food Waste Potential for Bio ethanol Production in Sustainable Energy and Emission Reduction, *Journal of Sustainable Bio energy Systems* 15(2): 272- 275. doi: 10.4236/jsbs.2025.152004
2. Krebs, D.L. and Denton, K. (2006). Explanatory limitations of cognitive developmental approaches to morality. *Psychological Review*, 113(3): 672- 675. doi: 10.1037/0033-295X.113.3.672

Online journals without a DOI

1. Vicki, G.T., Thomas, M., Cullen, A. and Fernandez, H. (2007). Modeling the hydrological impact on Tropical Forests. *Forest Ecology*, 13(10): 122-132. <http://www.uiowa.edu/~grpproc/crisp/crisp.html>

Online abstracts

1. Perilloux, C. and Buss, D.M. (2008). Human relationships: Costs experienced and coping strategies deployed. *Evolutionary Psychology*, 6(1): 164-181. Abstract retrieved from <http://www.epjournal.net>

Online books

1. Perfect, T.J. and Schwartz, B. L. (Eds.) (2002). *Applied metacognition*. Retrieved from <http://www.questia.com/read/107598848> (--If DOI is available, use the DOI instead of a URL)

Sem.	Course Code	Credits	Title of the Course	AC/ AP / CC / CP / DE / EVS/ GS / NME /SE / VE / VAC	Category			Exam	Max. Marks		
					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total
I	25UAIICC1	5	Programming in C and Data Structures	CC	5	1	-	3 Hrs.	25	75	100
Pre-Requisite: Basic Knowledge of Mathematics, Computer programming.											
Course Objectives: The purpose of learning this course is:											
1. Mastering the fundamentals of C											
2. Developing problem-solving skills											
3. Understanding C's role in system programming											
4. Proficiency in memory management											
5. Implementing and utilizing data structures.											
Course Outcomes:											
CO1: Summarize the basic knowledge to develop C programs											
CO2: Manipulate Looping, arrays and functions											
CO3: Apply and write programs for solving real world problems											
CO4: Create open, read, manipulate, write and close files											
CO5: Understand the basic concepts in data structures.											
Unit-I	Introduction									13 Hrs.	
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	Looping and Function									15 Hrs.	
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	Pointer and Structure									17 Hrs.	
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	File Management									14 Hrs.	
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	Data Structure									16 Hrs.	
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.											

Text Book(s):

1. E. Balagurusamy, “Programming in ANSI C”, 9th Edition, Tata McGraw Hill, New Delhi, 2024, ISBN: 978-93-5532-672-0.
2. E. Horowitz, SartajSahni and Susan Anderson Freed, “Fundamentals of Data Structures in C”, 2nd Edition, Universities Press, 2008, ISBN: 978-8173716058.
3. Ajay Mittal “Programming in C – A Practical Approach”, 1st Edition, Pearson Education, 2010, ISBN: 978-8131729342.

Reference Book(s):

1. E. Karthikeyan, “A Textbook on C Fundamentals, Data Structures and Problem Solving”, Prentice Hall India Learning Private Limited, 2008, ISBN: 978-8120334243.
2. Yashavant Kanetkar, “Let us C”, 15th Edition, BPB Publications, 2016, ISBN: 978-8183331630.
3. S. K. Srivastava and Deepali Srivastava, “Data Structure Through C in Depth”, BPB Publication, 2021.

Web Resources:

1. <https://www.tutorialspoint.com/cprogramming/index.htm>
2. <https://www.w3schools.in/data-structures/intro>
3. <https://www.geeksforgeeks.org/data-structures/>

Course Outcomes (COs)	Program Outcomes (POs)								Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	1	2	3	2	1	3	3	2	3	1
CO2	3	3	2	1	2	1	2	1	3	2	2	1	1
CO3	3	2	3	2	3	2	1	1	3	3	2	2	1
CO4	3	3	3	1	2	1	2	2	3	3	3	2	1
CO5	3	2	3	2	2	3	2	3	3	2	3	3	1
Overall CO – PO Mapping index =2.18									Overall CO – PSO Mapping index =2.24				

Prepared By

Verified By

Head

Sem.	Course Code	Credits	Title of the Course	AC/ AP / CC / CP / DE / EVS/ GS / NME / SE / VE / VAC	Category			Sem. Exam	Max. Marks		
					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total
I	25UAI1CP1	4	Programming in C and Data Structures Lab	CP	--	--	5	3 Hrs.	40	60	100
Pre-Requisite: Basic Knowledge of programming.											
Course Objectives: The purpose of learning this course is:											
1. To introduce the basic structure and syntax of the C programming language.											
2. To develop skills in writing, compiling, and executing C programs.											
3. To help students understand and apply decision-making, looping, and array handling in C.											
4. To teach how to use functions, pointers, and structures in solving problems											
5. To introduce basic data structures like arrays, stacks, and queues using C for efficient data handling											
Course Outcomes:											
CO1: To relate the ways to solve simple programs											
CO2: To understand and trace the execution of programs using arrays											
CO3: To develop programs with functions and pointers											
CO4: To solve data handling problems using files											
CO5: To implement stack and queue operations.											
List of Programs											
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.								5 Hrs		
2	Write a Program to use the switch statement to display the week days.								4 Hrs		
3	Write a Program to display first Ten Natural Numbers and their sum.								4 Hrs		
4	Write a Program to find Multiplication of Two Matrices.								5 Hrs		
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.								5 Hrs		
6	Write a Program to solve Quadratic Equation using functions.								4 Hrs		
7	Write a Program to find factorial of a number using Recursion.								4 Hrs		
8	Write a Program to show Call by Value and Call by Reference.								4 Hrs		
9	Write a Program to create a file containing Student Details.								4 Hrs		
10	Write a program to implement a stack using singly linked list, Implement Queue using Linked List.								6 Hrs		

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					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total
I	25UAIVA1	2*	Introduction to Data Science	VAC	-	-	-	3 Hrs.	25	75	100
Pre-Requisite: Familiarity with basic programming concepts.											
Course Objectives: The purpose of learning this course is:											
1. To introduce the field of Data Science, its evolution, and distinguish it from related fields such as Statistics and Machine Learning.											
2. To familiarize students with various data collection methods and essential data cleaning and preparation techniques.											
3. To develop the ability to perform Exploratory Data Analysis (EDA) using statistical measures and visualizations with tools like Matplotlib and Seaborn.											
4. To provide a foundational understanding of statistical inference and hypothesis testing for practical data analysis.											
5. To introduce the basic concepts of machine learning, including types of learning algorithms and model evaluation techniques.											
Course Outcomes:											
CO1: Understand the fundamentals and historical evolution of Data Science, and differentiate it from Statistics and Machine Learning.											
CO2: Apply various methods for data collection and perform essential data cleaning and preparation for analysis.											
CO3: Perform Exploratory Data Analysis using statistical summaries and visualize data using tools like Matplotlib and Seaborn.											
CO4: Demonstrate knowledge of statistical inference and hypothesis testing and apply these concepts to real-world problems.											
CO5: Explain the basic concepts of machine learning, distinguish between supervised and unsupervised learning, and evaluate machine learning models.											
Unit-I	Introduction									06 Hrs	
Introduction to Data Science : Overview of data science and its history_Differences between data science, statistics, and machine learning.											
Unit-II	Data Collection and Preparation									06 Hrs	
Data Collection and Preparation: Methods of data collection (surveys, web scraping, APIs)_Data cleaning and preparation techniques.											
Unit-III	Exploratory Data Analysis									06 Hrs	
Exploratory Data Analysis (EDA): Statistical methods for summarizing data_Data visualization techniques and tools Matplotlib, Seaborn.											
Unit-IV	Statistical Inference									06Hrs	
Introduction to Statistical Inference: Principles of statistical inference and hypothesis testing_PRACTICAL applications of statistical methods.											
Unit-V	Machine Learning									06 Hrs	
Machine Learning: Basics of machine learning concepts and algorithms_Overview of supervised vs. unsupervised learning and model evaluation.											

Reference Book(s):

1. Data Science for Business - Foster Provost & Tom Fawcett, 1st Edition (2013), O'Reilly Media.
2. The Data Warehouse Toolkit - Ralph Kimball & Margy Ross, 3rd Edition (2013), Wiley.
3. Statistics for Data Science - James D. Miller, 1st Edition (2015), CreateSpace Independent Publishing.

Web Reference

<https://community.ibm.com/community/user/datascience>

<https://towardsdatascience.com>

<https://www.kaggle.com/learn>

<https://scikit-learn.org/stable/documentation.html>

<https://jakevdp.github.io/PythonDataScienceHandbook/>

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					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total
II	25UAI2CC2	5	Object Oriented Programming using Java	CC	4	1	-	3 Hrs.	25	75	100
Pre-Requisite: Familiarity with basic programming concepts and problem solving logic.											
Course Objectives: The purpose of learning this course is:											
1. To provide fundamental knowledge of object-oriented programming.											
2. To equip the student with programming knowledge in Core Java from the basics up											
3. To enable the students to use AWT controls, Event Handling and Swing for GUI.											
4. To provide fundamental knowledge of object-oriented programming.											
5. To equip the student with programming knowledge in Core Java from the basics up.											
Course Outcomes:											
CO1: Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.											
CO2: Implement inheritance, packages ,interfaces and exception handling of Core Java.											
CO3: Implement multi-threading and I/O Streams of Core Java.											
CO4: Implement AWT and Event handling.											
CO5: Use Swing to create GUI Content.											
Unit-I	Introduction									12 Hrs.	
Introduction: Review of Object Oriented Concepts – History of Java – Java buzz words – JVM Architecture - Datatypes - Variables - Scope and Life Time of Variables - Arrays - Operators – Control Statements - Type Conversion and Casting - Simple Java Program - Constructors - Methods - Static Block - Static Data – Static Method – String and String Buffer Classes.											
Unit-II	Inheritance									12 Hrs.	
Inheritance :Basic concepts –Types of inheritance-Member Access Rules-Usage of this and super Keyword-Method Overloading-Method Overriding-Abstract Classes-Dynamic Method Dispatch-Usage of Final Keyword. Packages: Definition - Access Protection – Importing Packages. Interfaces: Definition – Implementation – Extending Interfaces. Exception Handling: Try– Catch - Throw- Throws–Finally–Built-in Exceptions-Creating Own Exception classes.											
Unit-III	Multithreaded Programming & I/O Stream									11 Hrs.	
Multithreaded Programming: Thread Class -Runnable Interface - Synchronization – Using Synchronized Methods – Using synchronized statement -Inter Thread Communication – Deadlock. I/OStreams: Concepts of streams –Stream classes –Byte and Character stream-Reading console Input and Writing Console output - File Handling											
Unit-IV	AWT Control & Event Handling									14 Hrs.	
AWT Controls: The AWT class hierarchy- user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class-Colour-Fonts and layout managers. Event Handling: Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events-Adapter classes- Inner classes											
Unit-V	Swing									11 Hrs.	
Swing :Introduction to Swing – Hierarchy of swing components. Containers –Top level containers-JFrame - JWindow - JDialog - JPanel - JButton – JtoggleButton - JCheckBox - JRadioButton - JLabel, JTextField - JTextArea - JList - JComboBox – JscrollPane.											

Text Book(s):

1. Herbert Schildt, “Java: The Complete Reference”, 7th Edition, McGraw Hill Education, 2010, ISBN: 978-0-07-163177-8.
2. Sachin Malhotra, SaurabhChoudary, “Programming in Java”, 2nd Edition, Oxford University Press, 2018, ISBN: 978-0199484140.
3. E. Balagurusamy, “Programming with Java”, McGraw Hill, 2023, ISBN: 978-9355325891.

Reference Book(s):

1. Barry Burd, “Java for Dummies”, 7th Edition, Wiley, 2017, ISBN: 978-8126568147.
2. YashavantKanetkar, “Let Us Java: Strong Foundation for Java Programming”, BPB Publication, 2024, ISBN: 978-9355517555.
3. R. Nageswara Rao, “Core Java: An Integrated Approach”, Dreamtech Press, 2016, ISBN: 978-9351199250.

Web Resources:

1. <https://www.geeksforgeeks.org/java/java/>
2. <https://www.w3schools.com/java/>
3. <https://www.tutorialspoint.com/java/index.htm>

Course Outcomes (COs)	Program Outcomes (POs)								Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	1	2	3	2	1	3	3	2	3	1
CO2	3	3	2	1	2	0	2	0	3	2	2	1	1
CO3	3	3	3	2	3	2	2	0	3	3	2	2	0
CO4	3	3	3	2	2	1	0	2	3	3	3	2	0
CO5	3	2	2	2	2	3	2	3	3	2	3	3	1
Overall CO – PO Mapping index =2.07									Overall CO – PSO Mapping index =2.16				

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					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total
II	25UAI2CP2	3	Object Oriented Programming using Java Lab	CC	--	--	3	3 Hrs.	40	60	100

Pre-Requisite: Fundamental programming constructs and basic program experience in HLL.

Course Objectives: The purpose of learning this course is:

1. To provide fundamental knowledge of object-oriented programming.
2. To equip the student with programming knowledge in Core Java from the basics up.
3. To enable the students to know about Event Handling.
4. To enable the students to use String Concepts.
5. To equip the student with programming knowledge into create GUI using AWT controls.

Course Outcomes:

CO1: Understand the basic Object-oriented concepts and implement the basic constructs of Core Java.

CO2: Implement inheritance, packages, interfaces and exception handling of CoreJava.

CO3: Implement multi-threading and I/O Streams of CoreJava.

CO4: Implement AWT and Event

CO5: Use Swing to create GUI.

List of Programs

1	Write a Java program that prompts the user for an integer and the prints out all the prime numbers upto that Integer	3 Hrs
2	Write a Java program to multiply two given matrices.	3 Hrs
3	Write a Java program that displays the number of characters, lines and words in a text.	3 Hrs
4	Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.	3 Hrs
5	Write a program to do String Manipulation using Character Array and perform the following string operations: a. String length. b. Finding a character at a particular position. c. Concatenating two strings.	4 Hrs
6	Write a program to perform the following string operations using String class. a. String Concatenation. b. Search a sub string c. To extract substring from given string	3 Hrs
7	Write a program to perform string operations using String Buffer class: a. Length of a string. b. Reverse a string c. Delete a substring from the given string	3 Hrs
8	Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.	3 Hrs
9	Write a threading program which uses the same method asynchronously to print the numbers 1 to 10 using Thread1 and to print 90 to 100 using Thread.	5 Hrs
10	Write a program to demonstrate the use of following exceptions: a. Arithmetic Exception. b. Number Format Exception c. Array Index Out of Bound Exception d. Negative Array Size Exception	5 Hrs
11	Write a Java program that reads on filename from the user, then displays in formation about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes	5 Hrs
12	Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls	5 Hrs

Sem.	Course Code	Credits	Title of the Course	Category			m. Exam	Max. Marks			
				AC/ AP / CC / CP / DE / EVS/ GS / NME /SE / VE / VAC	Theo. Hrs.	Tutorial Hrs.		Lab. Hrs.	CIA	ESE	Total
II	25UAI2NME1	2	Desktop Applications	NME	2	--	--	3 Hrs.	25	75	100
Pre-Requisite: Fundamental knowledge of computers.											
Course Objectives: The purpose of learning this course is:											
1. To introduce the basic structure and working of computers.											
2. To explain operating systems, user interfaces, and file management.											
3. To provide hands-on knowledge of word processing tools.											
4. To teach the use of spreadsheet applications for basic data handling											
5. To develop skills in creating and managing presentations using PowerPoint.											
Course Outcomes:											
CO1: Understand the basic components and applications of computers and ICT.											
CO2: Identify types of operating systems and manage files using GUI.											
CO3: Create, format, and manage documents using word processing software.											
CO4: Use spreadsheet software for data entry, formulas, and charts.											
CO5: Design and present effective slideshows using PowerPoint.											
Unit-I	Fundamentals of Computers									6 Hrs.	
Introduction to Computer. - Components of Computer. - Concept of Hardware and Software. - Application of Information Electronics and Communication Technology											
Unit-II	Operating Systems: Types, Interfaces, and File Management									7 Hrs.	
Introduction to various types of OS and its functions - User Interface - Various settings of GUI based OS - File and Directory Management - Various types of file extensions.											
Unit-III	Word Processing									6 Hrs.	
Objective of Word Processing - Word Processing Basics - Opening and Closing - Basic Knowledge of Word Processing - Their Usage - Details of Word Processing Screen Opening - saving and printing a document - Text Creation and Manipulation - Formatting Text Table Manipulation.											
Unit-IV	Spreadsheet Elements									6 Hrs.	
Objective of Spreadsheet - Elements of Electronics Spreadsheet - Manipulation of Cells and worksheet Function and Charts											
Unit-V	Powerpoint									5 Hrs.	
Introduction and Objective Basics of Power Point - Creation of Presentation - Basic Knowledge of presentations - Opening/saving a presentation -Printing of slides and handouts - Presentation of Slides.											
Text Book(s):											
1. Denvey Easton, "Microsoft Office 365 – Beginner's Guide 2023", 2023.											
2. Wallace Wang, "Microsoft Office 2019 for Dummies", Wiley Publication, 2018, ISBN: 978-8126578559.											
3. Lalit Mali, "Microsoft Office 2016 Word, Excel One Note Book", 2017, ISBN: 978-1947027657.											
Reference Book(s):											
1. HarjitSuman, "Microsoft Office 365 Book",2023.											
2. Linda Foulkes, "Learn Microsoft Office 2019", Kindle Edition, 2020.											
3. Kevin Wilson, "Exploring Microsoft Office", Eluminet Press, 2020.											
Web Resources:											
1. https://byjus.com/govt-exams/microsoft-office/											
2. https://unacademy.com/content/bank-exam/study-material/computer-knowledge/an-introduction-to-microsoft-office/											
3. https://subjectguides.york.ac.uk/it-essentials/office											

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					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total
II	25UAIVA2	2*	Ruby on Rails	VAC	-	--	--	3 Hrs.	25	75	100
Pre-Requisite: Basic Knowledge of Computer Science is required											
Course Objectives: The purpose of learning this course is:											
1. To introduce the basic ideas and goals of Computer.											
2. To explain how AI solves problems using search methods											
3. To help students understand AI in games.											
4. To explore logic-based reasoning.											
5. To introduce probabilistic reasoning.											
Course Outcomes:											
CO1: Understand the basic concepts of AI, intelligent agents, environments, and rationality.											
CO2: Apply different search strategies (uninformed and informed) for problem-solving.											
CO3: Analyze and implement decision-making techniques in games and constraint satisfaction problems.											
CO4: Use logic-based reasoning techniques, including propositional and first-order logic.											
CO5: Explain and apply probabilistic reasoning using Bayesian networks for uncertain environments.											
Unit-I	Introduction to Ruby									06 Hrs	
Introduction to Ruby: Data types - Simple input and output - Control statements.											
Unit-II	Ruby Programming Concepts									06 Hrs	
Fundamentals of arrays – Hashes – Methods – Classes - Code blocks and Iterations – Date and Time – File I/O -Class – Objects – Inheritance – Polymorphism..											
Unit-III	Introduction to Rails									06 Hrs	
INTRODUCTION TO RAILS: Introduction – MVC Architecture - Environmental Setup – Creating Rails Application – Database Setup – Active Records											
Unit-IV	Modules									06 Hrs	
MODULES: Migrations - Creating – Editing – Running Migrations – Controllers - Implementing the methods – Additional Methods– Routes - Views – Layouts											
Unit-V	Application Development									06 Hrs	
APPLICATION DEVELOPMENT - Validation - Scaffolding – Working with AJAX – File Uploading – Sending E-mails – Creating a Sample Application											

Reference Book(s):

1. Sam Ruby, Dave Thomas, David Heinemeier Hansson, "Agile Web Development with Rails", The Pragmatic Programmers, Fourth Edition, 2011
2. P.J.Deitel, H.M.Deitel, "Internet and World Wide Web – How to program", Pearson Education Publishers, Fifth Edition, 2009.
3. Robert. W. Sebesta, "Programming the World Wide Web", Pearson Education, Fourth Edition, 2017

WEB REFERENCE:

1. <http://guides.rubyonrails.org>
2. <http://www.tutorialspoint.com>

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