Holy Cross College (Autonomous), Nagercoil

Accredited with A^{++} by NAAC - V cycle – CGPA 3.53

Nagercoil, Kanyakumari District, Tamil Nadu.

Affiliated to

Manonmaniam Sundaranar University, Tirunelveli

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

SYLLABUS FOR UNDERGRADUATE PROGRAMME

TEACHING PLAN
ODD SEMESTER
2025-2026

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Vision

To establish a centre of excellence in Artificial Intelligence and Data Science that promotes innovation, sustainability, and social transformation by developing professionals and leaders with strong ethical values to tackle global issues for a balanced and sustainable future.

Mission

To provide quality education through the use of advanced tools, promote a culture of collaboration, and encourage customer-oriented innovations that bridge academia and industry, making a significant contribution to societal improvement.

Programme Educational Objectives (PEOs)

PEOs	Upon completion of B.A/B.Sc. degree programme, the graduates will be able to	Mission addressed
PEO 1	apply appropriate theory and scientific knowledge to participate in activities that support humanity and economic development nationally and globally, developing as leaders in their fields of expertise.	**M1 & M2**
PEO 2	inculcate practical knowledge for developing professional empowerment and entrepreneurship and societal services.	**M2, M3, M4 & M5**
PEO 3	pursue lifelong learning and continuous improvement of the knowledge and skills with the highest professional and ethical standards.	**M3, M4, M5 & M6**

Programme Outcomes (POs)

POs	Upon completion of B.Sc. Degree Programme, the graduates will be able to:	PEOs addressed
PO 1	obtain comprehensive knowledge and skills to pursue higher studies in the relevant field of science.	**PEO 1**
PO 2	create innovative ideas to enhance entrepreneurial skills for economic independence.	**PEO 2**
PO 3	reflect upon green initiatives and take responsible steps to build a sustainable environment.	**PEO 2**
PO 4	enhance leadership qualities, team spirit and communication skills to face challenging competitive examinations for a better developmental career.	**PEO 1 & PEO 3**
PO 5	communicate effectively and collaborate successfully with peers to become competent professionals.	**PEO 2 & PEO 3**
PO 6	absorb ethical, moral and social values in personal and social life leading to highly cultured and civilized personality	**PEO 2 & PEO 3**
PO 7	participate in learning activities throughout life, through self-paced and self-directed learning to develop knowledge and skills.	**PEO 1 & PEO 3**

Programme Specific Outcomes (PSOs)

PSOs	Upon completion of the B.Sc Artificial Intelligence and Data Science, the graduates will be able to:	Mapping with POs
PSO – 1	evolve AI and Data Science based domain knowledge and skills to pursue advanced studies in the field and integrate these techniques with emerging technologies.	**PO 1**
PSO - 2	develop innovative ideas in AI and data science to enhance entrepreneurial and employability skills for real-world challenges.	**PO 2**
PSO – 3	cultivate versatile skills for problem-solving, technical proficiency, effective communication, and community engagement through self-directed activities.	**PO 4 & PO 7**
PSO - 4	communicate and collaborate proficiently to become competent AI professionals, while addressing biases, and upholding data privacy regulations.	**PO 5 & PO 6**
PSO - 5	reflect on green initiatives and leverage AI to address economic challenges while promoting sustainable development.	**PO 3**

Teaching Plan

Department : Artificial Intelligence and Data Science
Class : I B. Sc Artificial Intelligence and Data Science
Title of the Course : Core Course I : Programming for Problem Solving
Semester : I
Course Code : IU241CC1

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU241CC1	4	1	-	-	5	5	75	25	75	100

Objectives

1. To recognize the importance of programming languages, recall memory management and identify bugs in C programs.
2. To apply problem-solving techniques, implement memory-efficient modularization and develop C programs with varied data types.

Course Outcomes

CO	Upon completion of this course, the students will be able to:	Cognitive level
1.	remember the fundamentals of C programming and describe the program development process.	**K1&K2**
2.	prepare solutions for problems using branching and looping statements.	**K3**
3.	decompose a problem into functions and synthesize a complete program using divide and conquer approach.	**K3**
4.	formulate algorithms and programs using arrays, pointers and structures	**K3**
5.	analyze various programming constructs and structures.	**K4**

K1 - Remember; **K2** - Understand; **K3**- Apply; **K4** - Analyze

Teaching plan

Total Contact hours: 75 (Including lectures, assignments and tests)

Unit	Module	Topic	Teaching Hours	Assessment Hours	Cognitive level	Pedagogy	Student Centric Methods	E Resources	Assessment/ Evaluation Methods
I	**Introduction To Computing**								
	1.	Introduction - Art of Programming through Algorithms and Flowcharts.	2	1	K1(R)	Introductory session Flow Chart Creation sessions for real-world applications.	Inquiry-Based Learning, Algorithm Sketching	Video Lectures, Notes/Slides	Word Cloud on Algorithms, CIA I
	2.	Overview of C: History and importance of C- Basic structure of C program	2		K1(R)	Lecture using Chalk and talk	Software Demonstration Gamified Quiz	Interactive PPT	Quiz using Slido, CIA I
	3.	Executing a C program. Constants, Variables and Data Types	2		K2(U)	Concept Explanations	Concept-based discussion , Problem-solving sessions using real-world applications.	Turbo C Compiler	Slip Test on Datatypes, CIA I
	4.	Character Set- C Tokens	2	1	K2(U)	Interactive PPT	Mind mapping- Infographics	Interactive PPT	Quiz using Slido, CIA I
	5.	Declaration of Variables- Assigning Values to Variables	2		K2(U)	Syntax Explanations	Peer Code Review	Turbo C Compiler	Exercises using variables, CIA I

	6.	Defining Symbolic Constants. Managing Input and Output Operations	1	1	K3(A)	Demonstration , Code Walkthrough	Syntax based learning	PPT & Turbo C Compiler	Write the syntax for I/O operations, CIA I
	7.	Operators and Expressions.	1		K2(U), K3(A)	Logical Thinking	Think-Pair-Share Mind Mapping	Interactive PPT	Problem solving questions, CIA I
II	**Control Structures**								
	1.	Decision Making and Branching: Introduction	2	1	K1(R)	Lecture using Chalk and talk	Scenario Based Learning	Classpoint PPT	Evaluation through short test, CIA I
	2.	Decision Making with IF Statement- Simple IF Statement- IF-ELSE Statement	2		K2(U)	Lecture with examples	Bug Hunt Activities	Turbo C, Notes	List some applications of decision-making ideas, CIA I
	3.	Nesting of IF-ELSE Statements- ELSE IF Ladder	2	1	K2(U)	Lecture using videos	Case based Learning	Turbo C, Notes	Write the syntax and semantics for nested if else, CIA I
	4.	Switch statement- The Conditional Operator- goto statement	2	1	K3(A)	Syntax Explanations with examples	Code Completion Activities	Interactive ppt	Create a program using conditional operator, CIA I
	5.	Decision Making and Looping: Introduction- while Statement- do statement- for	2		K3(A)	Syntax Explanations	Code Completion Activities	PPT	Create programs using loops, CIA I

		statement							
	6.	Nested control structures- break statement- continue statement.	2		K2(U)	Syntax Explanations	Code Tracing Exercises	Classpoint	Debug the given snippets, CIA I
III	**Arrays and Strings**								
	1.	Defining an array	1	1	K2(U)	PPT	Concept Based Learning	PPT using Nearpod	Slip Test, CIA I
	2.	Processing an array - Multidimensional arrays	3		K1(R)	Syntax Explanations	Concept Based Learning	PPT	Create programs using arrays, CIA I
	3.	Searching algorithm - Linear search	3		K4(An)	Flipped Classroom	Scenario Based Learning	Presentations using NearPod	Practice Exercises, CIA I
	4.	Sorting algorithm - Bubble sort algorithm	3	1	K4(An)	Lecture using videos, Code Tracing	Project Based Learning	PPT Using Gamma	Practice Exercises, CIA II
	5.	Strings - Defining a string - Initialization of strings- Reading and writing a string	2	1	K3(A)	Blended Learning	Code Puzzle Solving	Interactive PPT	MCQ Using Nearpod, CIA II
	6.	Processing the strings	2		K3(A)	Syntax Explanations, Visual Simulations	Project Based Learning	Classpoint PPT	Create programs using string manipulation functions, CIA II
IV		**Functions and Pointers**							
	1.	Functions- Overview- Defining a function	2	1	K2(U)	Constructivist Learning	Concept Mapping, Code Development	Self-made Videos, PPT	Short summary, CIA II
	2.	Accessing a function- Function	2		K3(A)	Contextual Learning	Live Coding Practice	Self-made Videos, PPT	Create a snippet using

		prototypes							function, CIA II
	3.	Passing arguments to a function- Passing arrays to functions	2	1	K3(A)	Computational Learning	Error Spotting Exercises	Classpoint PPT	Evaluation through short test, CIA II
	4.	Recursion	2		K4(An)	PPT, Programming Demo	Pair Programming Trace Worksheets	PPT	Find the factorial of a given number using recursion, CIA II
	5.	Pointers: Introduction- Declaring Pointer Variables- Initialization of Pointer variables	2	1	K3(A)	Guided Discovery, Hands-on Lab Sessions	Real Life Analogies, Debugging Sessions	Interactive PPT, Notes	Exercises to create programs using pointers, CIA II
	6.	Accessing a Variable through its Pointers- Dynamic memory allocation	2		K4(An)	Analytical Study	Mini Projects	Self-made videos	Evaluation through short test, CIA II
V	**Structures and File Management**								
	1.	Defining a structure- Declaring structure variables	2	1	K1(R)	Case-Based Teaching, Experiential Learning	Real Life Modeling, Coding with a twist	Classpoint PPT	True/False Assessment, CIA II
	2.	Accessing structure members- Array of structures	2		K3(A)	Contextual Learning	Code Debugging Activity	PPT	Evaluation through exercises, CIA II
	3.	Structures and pointers	2	1	K3(A)	Live Debugging, Error Spotting Activities	Pointer Matching Puzzles	Online Tutorials and Notes	Evaluation through short test, CIA II
	4.	File Management in	2		K4(An)	Syntax	Code	Interactive	MCQ, CIA II

		C: Introduction				Explanations	Refactoring Challenge	PPT	
	5.	Defining and opening a file-closing a file	2	1	K3(A)	Experiential Learning	Employee Database Simulation	YouTube Lecture Videos	Develop a simple file program, CIA II
	6.	Input/output and Error Handling on Files.	2		K2(U)	Interactive ppt, Analogical Pedagogy	Debugging	PPT Using Nearpod	Quiz Using Slido, CIA II

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Skill Development

Activities (Em/ En/SD): 1. Implement basic C Programs using loops.
2. Text Processing Exercises

Course Focussing on Cross Cutting Issues (Professional Ethics/ Human Values/Environment Sustainability/ Gender Equity): Professional Ethics

Activities related to Cross Cutting Issues: Nil

Assignment: 1. Recursion

2. Bubble Sort Algorithm (Last Date for Submission: 12-08-2025)

Seminar Topic: Linear Search

Sample questions (minimum one question from each unit)

Part A (1 Mark)

1. _____refers to the names of variables, functions and arrays.
2. 'switch' is a multi-way branching statement. Say True or False.
3. Sequence of characters is called as_____.
   a. a) array b) string c) nibble d) word
4. Recursion is a process in which a function calls____.
   a. a) itself b) another function c) main function d) None of these

5. Select a function which is used to read a single character from a file at a time?
   a) fscanf() b) getch() c) fgetc() d) fgets()

Part B (6 Marks)

6. Write an algorithm and develop a C program that reads N integer numbers and arrange them in ascending order using selection Sort.
7. Explain formatted input and output statement with examples.
8. Write a C program using functions to generate the Fibonacci series.
9. What is the difference between the function malloc () and calloc ()?
10. How do we declare a file in a C program? Explain the opening modes of file.

Part C (12 Marks)

11. What is a token? What are the different types of tokens available in C? Explain.
12. Explain the different types of loops in C with syntax.
13. Explain with example the following string functions.
    i. (i) strlen( ) (ii) strcpy( )
    ii. (iii) strcat( ) (iv) strcmp( )
    iii. (v) strstr
14. What is a pointer? Explain how the pointer variable declared and initialized.
15. Elaborate File Management Concepts in C.

Dr. S. Immaculate Shyla
Head of the Department

Dr. S. Immaculate Shyla
Course Instructor

Teaching Plan

Department : **Artificial Intelligence and Data Science**
Class : **I B. Sc Artificial Intelligence and Data Science**
Title of the Course : **Core Lab Course I: Problem Solving Using C Lab**
Semester **I**
Course Code : **IU241CP1**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU241CP1	-	1	4	-	5	5	75	25	75	100

Objectives

1. To develop proficiency in fundamental programming concepts and structures using C.
2. To apply advanced programming techniques to solve complex problems.

Course Outcomes

CO	Upon completion of this course, the students will be able to:	Cognitive level
1.	translate given algorithms to a working and correct program.	**K2&K3**
2.	identify and correct logical errors encountered at run time.	**K2&K3**
3.	create iterative as well as recursive programs.	**K6**
4.	represent data in arrays, strings and structures and manipulate them through a program.	**K2&K3**
5.	declare pointers of different types and use them in defining self-referential structures.	**K2&K3**

K2 - Understand; **K3**- Apply; **K6** - Create

Teaching plan

Total Contact hours: 75 (Including lectures, assignments and tests)

Unit	Topic	Teaching Hours	Assessment Hours	Cognitive level	Pedagogy	Student Centric Methods	E Resources	Assessment/ Evaluation Methods
1	Implementation of Basic C programs.	6	7	K2(U)	Case based Learning	Software Demonstration	Turbo C Compiler	Performance
2	Simple computational problems using arithmetic expressions and operators.	6		K2(U)	Lecture using Chalk and talk	Syntax based learning	Interactive PPT, Turbo C Compiler	Observation
3	Problem solving using branching and logical expressions.	6		K2(U)	Concept Explanations	Code Tracing	Turbo C Compiler	Viva voce
4	Iterative problems using Loops, while and for loops.	8	8	K3(A)	Demonstration	Peer Code Review	Turbo C Compiler	Identify and fix bugs
5	Implementation of linear searching, bubble sort, and Matrix Manipulation using Arrays.	8		K3(A)	Visualization	Peer Code Review	Turbo C Compiler	Short Coding snippets
6	Implementation of Text Processing using Strings.	6	8	K3(A)	Demonstration & Code Walkthrough	Syntax based learning	PPT & Turbo C Compiler	Performance

7	Find roots of a quadratic equation using functions and recursion.	6		K2(U),K3 (A)	Logical Thinking	Think-Pair-Share	PPT & Turbo C Compiler	Model test
8	Implementation of basic file operations.	6		K6(C)	Demonstration	Scenario Based Learning	Turbo C Compiler	Evaluation through short exercises.

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Skill Development

Activities (Em/ En/SD): 1. Implement basic C Programs for patterns using loops.
2. Text Processing Exercises
3. Mini Projects

Course Focussing on Cross Cutting Issues (Professional Ethics/ Human Values/Environment Sustainability/ Gender Equity): Nil

Activities related to Cross Cutting Issues: Nil

Assignment:1. Recursion- Exercises

2. Bubble Sort Algorithm (Last Date for Submission: (14-08-2025)

Sample questions

1. Create a simple calculator application.
2. Develop a two-player game using arrays and simple logic.
3. Implement a system to add, delete, and display student records using structures and file I/O.
4. Keep track of stock items, quantities, and prices using structures and files.
5. Create a Sudoku puzzle solver using backtracking.

Dr. S. Immaculate Shyla
Head of the Department

Dr. S. Immaculate Shyla
Course Instructor

Teaching Plan

Department : Artificial Intelligence and Data Science
Class : I B.Sc. Artificial Intelligence and Data Science
Title of the Course : Elective Course I: Mathematical Foundations for Artificial Intelligence
Course Code : IU241EC1

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU241EC1	3	1	-	-	4	3	60	25	75	100

Learning Objectives:

1. To utilize logical connectives to form and evaluate complex logical statements.
2. To apply basic Boolean algebra laws to simplify logical expressions.
3. To solve linear systems using the Gauss Elimination Method.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	understand the basics of computers and the number conversions	**K1 & K2**
2.	analyse and evaluate logical arguments and statements using formal logical principles.	**K4 & K5**
3.	acquire knowledge of lattice structures and Boolean algebra, including the application of Boolean algebra laws and the principle of duality to solve logical problems.	**K2 & K3**
4.	understand the basic concepts of set theory and relations including inclusion-exclusion principles, types of relations and demonstrate the ability to apply these concepts in problem-solving.	**K2 & K3**
5.	To learn various methods to solve algebraic and transcendental equations.	**K1 & K2**

K1- Remember; K2-Understand; K3- Apply; K4 - Analyse; K5- Evaluate

Teaching plan

Total Contact hours: 60 (Including lectures, assignments and tests)

Unit	Module	Topic	Teaching Hours	Assessment Hours	Cognitive level	Pedagogy	Student Centric Method	E-Resources	Assessment/ Evaluation Methods
I	**INTRODUCTION TO PROGRAMMING**								
	1	Introduction to Computers - Computer characteristics - Hardware vs software	2	1	K1 (R), K2 (U)	Lecturing using interactive PPT, Blended Learning	Think-Pair-Share	Interactive PPT, Notes	Word cloud, Google Forms
	2	Types of Computers- System Software and Application Software	3		K2(U)	Flipped Classroom	In-class discussions	You tube videos, Interactive PPT, Notes	Formative Quiz using Quizizz, Short answer type class test
	3	Types of programming languages	1		K3(Ap)	Lecturing using interactive PPT, Blended Learning	In-class discussions	Interactive PPT, Notes	Oral Questions, Quiz
	4	Number Systems and Base Conversions	3	1	K1 (R), K2 (U)	Blended Learning, Problem-based learning	Collaborative problem solving	You tube videos, Interactive PPT, Notes	Conceptual Questions, Problem-solving worksheets
	5	1's and 2's complement of a Binary Number-	3	1	K1 (R),	Blended Learning, Problem-based	Collaborative problem solving	You tube videos, Interactive PPT,	Problem solving assignments, Oral Questions,

		Binary Coded Decimal			K2 (U)	learning		Notes	CIA I
II	**PROPOSITIONAL LOGIC IN AI**								
	1	Statement (Propositions) – Laws of Formal Logic	2	1	K1 (R), K2 (U)	Lecture with demonstration	Concept based discussion	PPT using Gamma	Oral Questions, CIA I
	2	Basic Set of Logical Operators / Operations – Conjunction – Disjunction – Negation – Prepositions and Truth Tables	3		K4 (An)	Blended Learning	Explaining concepts, answering questions from peers	Video Lectures, Quizizz	Quiz via Quizizz, CIA I
	3	Connectives – Compound Propositions –Conditional Statement – Converse, Contrapositive and Inverse – Biconditional Statement	3	1	K4 (An)	Inquiry-based learning	Formulating questions and in class discussions to answer the questions	YouTube videos, e notes	Problem Solving Assignments, CIA I
	4	Algebra of Propositions– Propositional Functions– Tautologies and Contradictions	2	1	K4 (An)	Active Learning	Peer Instruction, Co-operative activities involving pairs and small groups	E notes, Google classroom	Quiz through Google classroom, CIA I
	5	System Specifications– Principle of Substitution	2		K4(An)	Lecturing	Small group activities	E notes	Problem solving assignments, CIA I

III	**LATTICES THEORY AND BOOLEAN ALGEBRA**								
	1	Introduction- Definition (Partially Ordered Set-Poset)	1	1	K1 (R), K2 (U)	Lecture with examples	Concept based discussion	Online course materials	Short test with MCQs, CIA II
	2	Lattice, Hasse Diagram	2		K1 (R), K2 (U)	Blended Learning	Co-operative activities involving pairs and small groups	E notes	Oral questions, CIA II
	3	Distributive Lattice- Complemented Lattice-	2	1	K1 (R), K2 (U)	Lecture with demonstration	Group tasks on 'Analysing and checking whether the given lattice is distributive, complemented'	Referring mathematical concepts through websites like Byju, GeeksforGeeks	Quick Quizes for checking understanding of concepts, CIA II
	4	Definition of Boolean Algebra- Basic Boolean Algebra Laws-	3	1	K1 (R), K2 (U)	Active Learning	Brainstorming, Think-Pair-Share	PPT using Gamma	Slip test, CIA II
	5	Definition (Principle of Duality).	4		K1 (R), K2 (U)	Lecture with illustration	In-class discussions	Interactive PPT	Conceptual Questions, CIA II
IV	**SET THEORY AND RELATIONS**								
	1	Introduction- Set-Finite Set-Cardinality -	2	1	K1 (R), K2 (U)	Inquiry-Based Learning	Think-Pair-Share	YouTube videos	Concept check polls during class, Problem Solving assignments,

									CIA II
	2	Operations on Sets- Union- Intersection- Disjoint Sets- Difference Set-Complement Set	2		K1 (R), K2 (U)	Lecture with illustration, Brainstorming	In-class discussions	Referring mathematical concepts through websites like GeeksforGeeks	Quiz through Google classroom, CIA II
	3	Principle of Inclusion and Exclusion - Ordered Pair - Binary Relation-	3		K2 (U)	Inquiry-Based Learning	Think-Pair-Share	Online course materials	Conceptual quiz, CIA II
	4	Types of Relations- Symmetric Relation-Anti-Symmetric Relation- Reflexive Relation- Transitive Relation	3	1	K4 (An)	Blended Learning	Explaining concepts, answering questions from peers	You Tube videos	Short answer type class test, Written assignment; problems solving, CIA II
	5	Equivalence Relation- Partially Ordering Relation	2	1	K3 (Ap)	Active Learning	Peer Instruction	PPT using Gamma	Slip test, CIA II
V	**BASIC NUMERICAL METHODS IN AI**								
	1	Solution of Algebraic and Transcendental Equations -	1		K2 (U), K3 (Ap)	Conceptual Pedagogy	In-class discussion	Interactive PPT	Class test with MCQ, CIA II
	2	Bisection Method	2	1	K2 (U), K3 (Ap)	Problem-Based Learning	Problem solving in groups	You Tube videos	Problem solving assignments, CIA II
	3	Fixed Point Iteration	3	1	K2 (U),	Collaborative	Peer instruction,	You Tube	Peer Review,

		Method			K3 (Ap)	Learning, Problem-Based Learning	Problem solving in groups	videos	Problem solving assignments, CIA II
	4	Newton Raphson Method	3		K2 (U), K3 (Ap)	Problem-Based Learning	Guided problem solving sessions	You Tube videos	Problem solving assignments, CIA II
	5	Linear System of Equations - Gauss Elimination Method	3	1	K2 (U), K3 (Ap)	Problem-Based Learning	Guided problem solving sessions	You Tube videos	Solving exercise problems, CIA II

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Skill Development

Activities (Em/ En/SD): Quiz on Logical Operations, Group Discussion on equivalence relation

Course Focussing on Cross Cutting Issues (Professional Ethics/ Human Values/Environment Sustainability/ Gender Equity): Nil

Activities related to Cross Cutting Issues: Nil

Assignment: Types of Relations – Last date to submit -09-09-2025

Seminar - Nil

Sample questions

Part A (1 Mark)

1. Which of the following is a type of system software?
a) Microsoft Word b) Operating System c) Adobe Photoshop d) Google Chrome

2. Give the negation of the statement: Today is Saturday.

3. When will you say that a lattice is bounded?

4. Say true or false: A set having exactly one element is called singleton set.

5. Write Newton Raphson's formula.

Part B (6 Marks)

1. Explain the difference between system software and application software.
2. Write the following statements in symbolic form. (i) If Avinash is not in a good mood or he is not busy, then he will go to Kharagpur.
   (ii) If Sayantan knows object-oriented programming and oracle, then he will get a job.
3. Let 'A' be a non-empty subset of real numbers. Define a relation r on A by $x\ r\ y$ if x divides $y\ \forall\ x,\ \ y\ \in A$. Show that A is a poset with respect to r.
4. In a class of 50 students, 20 students play football and 16 students play hockey. It is found that 10 students play both the games. Use the algebra of sets to find out the number of students who play neither.

5. Solve the following system of equations using Gaussian elimination method.

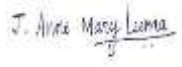
$$x + y + z = 9, \qquad 2x - 3y + 4z = 13, \qquad 3x + 4y + 5z = 40$$

Part C (12 Marks)

1. Explain the process of converting a number from binary to Binary Coded Decimal (BCD) and demonstrate with an example.
2. Find the truth set of each of the following propositional function P(x) defined on the set N of positive integers: (i) $P(x)$: $x + 3 < 7$ (ii) $P(x)$: $x + 5 > 8$ (iii) $P(x)$: $x + 4 < 1$
3. Show that every chain is a distributive lattice.
4. Give an example of a relation which is
   (i) not reflexive, not symmetric and not transitive
   (ii) transitive but neither reflexive nor symmetric
   (iii) symmetric, transitive but not reflexive
   (iv) symmetric, transitive and reflexive

5. Find the positive root of $x\ \log_{10} x = 1.2$ using the bisection method in four iterations.

Dr. S. Immaculate Shyla
Head of the Department



Dr. J. Anne Mary Leema
Course Instructor

Teaching Plan

Department : Artificial Intelligence and Data Science
Class : I B. Sc /BA/B. Com
Title of the Course : NME I: Cyber Forensics
Semester : I
Course Code : IU241NM1

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU241NM1	**4**	1	-	-	**5**	**5**	**30**	**25**	**75**	**100**

Objectives

1. Understand the definition and core principles of computer forensics fundamentals
2. To study the various types of computer forensics evidence and their significance in investigations

Course Outcomes

CO	Upon completion of this course, the students will be able to:	Cognitive level
1	recall and describe the definition of computer forensics fundamentals	**K1(R) & K2 (U)**
2	apply and analyze the different types of computer forensics technology	**K3(A)**
3	analyse various computer forensics systems	**K4(An)**
4	apply the methods for data recovery, evidence collection and data seizure	**K5(E)**
5	gain knowledge of duplication and preservation of digital evidence	**K6(C)**

K1 - Remember; **K2** - Understand; **K3**- Apply; **K4** – Analyze; **K5** – Evaluate; **K6**- Create

Teaching plan
Total Contact hours: 30 (Including lectures, assignments and tests)

Unit	Module	Topic	Teaching Hours	Assessment hours	Cognitive level	Pedagogy	Student Centric Methods	E Resources	Assessment/ Evaluation Methods
I	**Overview of Computer Forensics Technology**								
	1.	Overview of Computer Forensics Technology: Computer Forensics Fundamentals, Use of Computer Forensics in Law Enforcement	1	1	K1(R)	Introductory session	Fundamentals Through Exploration	Online Notes	Overview
	2.	Computer Forensics Assistance to Human Resources/Employment Proceedings	1		K3(A)	Lecture using Chalk and talk	Reflection & Extension	PPT	Simple definitions CIA I
	3.	Computer Forensics Services - Benefits of professional Forensics Methodology	1		K1(R)	Lecture using Chalk and talk	Fundamentals Through Exploration	Presentations using Nearpod	Example with representation CIA I
	4.	Steps taken by Computer Forensics Specialists, Forensics Technology, Types of Law Enforcement	1		K1(R)	PPT	Inquiry-Based Introduction	YouTube videos	Steps recall CIA I
	5.	Forensics Technology, Types of Law Enforcement, Forensics Technology, Types of Law Enforcement	1		K3(A)	Lecture using Chalk and talk	Collaborative Simulation	Online tutorials and videos	Different technologies recall CIA I

II	**Computer Forensics Evidence and capture**								
	1.	Computer Forensics Evidence and capture: Data Recovery: Data Recovery Defined	1	1	K2(U)	Lecture using Chalk and talk	Flipped or Discovery-Based Learning	videos	Evaluation through short test CIA I
	2.	Data Backup and Recovery - The Role of Backup in Data Recovery - The Data Recovery Solution	1		K2(U)	Demonstration	Wrap-Up Reflection	PPT	Map knowledge CIA I
	3.	Evidence Collection and Data Seizure	1		K2(U)	Lecture using videos	Collaborative Simulation	Online videos	Differentiate between various ideas CIA I
	4.	Collection Options, Obstacles, Types of Evidence - The Rules of Evidence, Controlling Contamination: The chain of custody	1		K4(An)	PPT	Flipped or Discovery-Based Learning	Notes	Seminar CIA I
	5	Controlling Contamination: The chain of custody	1		K2(U)	Lecture using Chalk and talk	Flipped or Discovery-Based Learning	videos	Evaluation through short test CIA I
III	**Duplication and Preservation of Digital Evidence**								
	1.	Duplication and Preservation of Digital Evidence : Processing steps	1	1	K1(R)	PPT	Evidence Handling Relay	Online videos	Recall steps CIA I
	2.	Legal Aspects of collecting and Preserving Computer	1		K1(R)	Lecture using Chalk and talk	Collaborative Simulation	Notes	MCQ CIA I

		forensic Evidence							
	3.	Computer image Verification and Authentication	1		K2(U)	Demonstration	Flipped or Discovery-Based Learning	YouTube videos	Recall steps CIA I
	4.	Special needs of Evidential Authentication	1		K4(An)	Lecture using videos	Problem-Based Scenario	Class point	Short Summary CIA II
	5.	Pratical consideration	1		K4(An)	Demonstration	Problem-Based Scenario	Online videos	Hand on implementation CIA II
IV	**Computer Forensics Analysis**								
	1.	Computer Forensics Analysis	1	1	K2(U)	Lecture using Chalk and talk	Computational learning	Notes	Short summary CIA II
	2.	Discovery of Electronic Evidence	1		K1(R)	Lecture using videos	Contextual learning	YouTube videos	Concept explanation CIA II
	3.	Electronic Document Discovery	1		K3(A)	Demonstration	Constructivist learning	PPT	Recall Steps CIA II
	4.	A Powerful New Litigation Tool	1		K2(U)	Lecture using Chalk and talk	Experimental tools	Online videos	Concept explanation CIA II
	5.	Identification of Data: Time Travel, Forensic Identification and Analysis of Technical Surveillance Devices	1		K1(R)	PPT	Evidence Handling Relay	PPT using Nearpod	Evaluation through short test CIA II
V	**Reconstructing Past Events**								
	1.	Reconstructing Past Events	1		K2(U)	Lecture using Chalk and talk	Create a Forensics Storyboard	Online Notes	True/False CIA II
	2.	How to Become a	1		K2(U)	Demonstration	Inspired	PPT	Evaluation

		Digital Detective		1			Simulation		through problems CIA II
	3.	Useable and Unusable File Formats, Converting Files	1		K2(U)	PPT	Evidence Handling Relay	Presentations using Nearpod	Recall Steps CIA II
	4.	Networks: Network Forensics Scenario - a technical approach	1		K4(An)	Demonstration	Collaborative Simulation	Class point	MCQ CIA II
	5.	Destruction of E–Mail - Damaging Computer Evidence, Documenting the Intrusion on Destruction of Data - System Testing	1		K3(A)	PPT	Computational learning	Online videos	Short essays CIA II

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Skill Development

Activities (Em/ En/SD):

1. The Role of Backup in Data Recovery and show an implementation of data recovery solution in real world.

2. Role of Surveillance Devices in cyber forensics.

Course Focussing on Cross Cutting Issues (Professional Ethics/ Human Values/Environment Sustainability/ Gender Equity): Nil

Activities related to Cross Cutting Issues: Nil

Assignment:

1. Legal aspects of collecting and preserving cyber forensic evidences.

2. Forensic Identification and Analysis of Technical Surveillance Devices.-Last date to submit 05-09-2025

Seminar Topic:

1. How to become a digital detective?
2. Computer image verification and authentication

Sample questions (minimum one question from each unit)

Part A **(2 Marks)**

1. ____ is the application of investigative and analytical techniques to gather and preserve evidence from digital devices, networks, and data storage media.(K1-R,C0-1)
2. Controlling contamination through the chain of custody involves maintaining a _____and secure process that tracks the handling, transfer, and storage of evidence from its initial collection through its presentation in court.(K2-U,C0-2)
3. The proper collection and preservation of computer forensic evidences should be within the bounds of _____requirements and ethical standards.(K3-A,CO-3)
4. _____is a powerful tool in litigation.(K2-U,CO-4)
5. Digital detectives use _____to identify file formats that are usable for extracting information.(K1-R,CO-5)

Part B **(4 Marks)**

1. Explain the fundamental role of computer forensics in law enforcement. ? (K1-R, CO-1)
2. Discuss the challenges and options available for evidence collection and data seizure in digital investigations. (K2-U, C0-2)
3. What are the legal aspects of collecting and preserving computer forensic evidence? ? (K2-U, CO-3)
4. Describe the process of time travel in computer forensics. ? (K1-R, CO-4)
5. Discuss the methodologies of investigating network-related incidents in cyber forensics. (K4-An, CO-5)

Part C **(9 Marks)**

1. Explain the steps taken by computer forensics specialists during investigations and highlight the types of law enforcement agencies that utilize forensic technology effectively.(K2-U,CO-1)
2. Explain the concept of the chain of custody in preserving digital evidence.(K4-An,CO-2)
3. What are the practical considerations in computer image verification and authentication?(K3-A,C0-3)
4. Discuss the significance of electronic document discovery (EDD) as a powerful tool in litigation.(K4-An,C0-4)
5. Discuss the importance of identifying usable and unusable file formats in forensic investigations.K5-E,C0-5)

Dr. S. Immaculate Shyla
Head of the Department

Dr. Sruthy B S
Course Instructor

Teaching Plan

Department : Artificial Intelligence and Data Science
Class : I B. Sc Artificial Intelligence and Data Science
Title of the Course : Foundation Course FC: Web Designing

Semester : I
Course Code : IU241FC1

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU241FC1	**4**	1	-	-	**5**	**5**	30	**25**	**75**	**100**

Objectives

1. To understand the design rules in constructing web pages and sites
2. To enable the students to learn the basic working scheme of the Internet and World Wide Web.

Course Outcomes

CO	Upon completion of this course, the students will be able to:	Cognitive level
1	understand and identify the elements and attributes in a web page	**K1(R) & K2 (U)**
2	design webpages using DHTML and Cascading Style Sheets	**K3(A)**
3	design and construct websites using tables	**K4(An)**
4	apply the attributes in designing webpages	**K5(E)**
5	analyze a webpage and identify its elements and attributes	**K6(C)**

K1 - Remember; **K2** - Understand; **K3**- Apply; **K4** – Analyze; **K5** – Evaluate; **K6**- Create

Teaching plan

Total Contact hours: 30 (Including lectures, assignments and tests)

Unit	Module	Topic	Teaching Hours	Assessment hours	Cognitive level	Pedagogy	Student Centric Methods	E Resources	Assessment/ Evaluation Methods
I	**Introduction to HTML**								
	1.	HTML Introduction, Designing a Home page	1	1	K1(R)	Introductory session	Responsive Design Exploration	Online videos	Overview CIA I
	2.	History of HTML	1		K2(U)	Lecture using Chalk and talk	Reflective Journaling	PPT	Simple definitions CIA I
	3.	HTML generations, HTML Documents	1		K2(U)	Lecture using Chalk and talk	Roleplay	YouTube videos	Example with representation CIA I
	4.	Anchor Tag, Hyperlinks	1		K2(U)	Lecture using Chalk and talk	Inquiry based learning	Videos/lectures/notes	Simple programs CIA I
	5.	Sample HTML documents, Anchor Tag, Hyperlinks	1		K2(U)	Demonstration	Problematic analysis	Presentations using Nearpod	Concept definitions CIA I
II	**Head and Body Section**								
	1.	Head and Body section: Header Section, Title Prologue, Links	1	1	K2(U)	Lecture using Chalk and talk	Build-a-Page Challenge	YouTube lecture videos	Evaluation through short test CIA I
	2.	Colourful web page, Comments lines,	1		K2(U)	Lecture using videos	Code & Comment, Pair Activity	PPT using Nearpod	Differentiate between various ideas

		designing the body							CIA I
	3.	Heading printing, Aligning the headings	1		K4(An)	PPT	Tag Sorting & Styling Game	PPT	Seminar CIA I
	4.	Horizontal rule, paragraph, tab settings,	1		K1(R)	Demonstration	Tab Simulation with CSS	videos	Recall steps CIA I
	5	Image and pictures, Embedding PNG format Images	1		K2(U)	Lecture using videos	Code & Comment, Pair Activity	PPT using Nearpod	Differentiate between various ideas CIA I
III	**Ordered and unordered lists**								
	1.	Ordered and unordered lists: List-Unordered lists	1	1	K1(R)	PPT	Active Exploration	Interactive notes	Map Knowledge CIA I
	2.	Headings in a list, ordered lists, Nested lists, Table handling	1		K1(R)	Lecture using Chalk and talk	Assess Understanding	Online tutorials and notes	MCQ C A1
	3.	Tables- table creation in HTML	1		K1(R)	Lecture using videos	Collaborative Learning	YouTube videos	Short Summary CIA I
	4.	Width of the Tables and cells	1		K3(A)	Demonstration	Active Exploration	Online videos	MCQ CIA II
	5.	Cells spanning multiple rows/Columns- Coloring cells – Column specification	1		K2(U)	PPT	Inquiry-Based Learning	Lecture notes	Concept explanations CIA II
IV	**Frames**								
	1.	Frames, frame set, definition,	1		K2(U)	Lecture using Chalk and talk	Project-Based Learning	YouTube lecture videos	Short summary CIA II
	2.	Nested frames web	1		K1(R)	Lecture using	Active	Online notes	Concept

		page design				videos	Exploration		explanations CIA II
	3.	Project: Frame set definition – Animals, Birds, Fish	1	1	K3(A)	Demonstration	Assess Understanding	PPT using Nearpod	Recall Steps CIA II
	4.	Forms: Action 15 attributes, Method Attributes, Enctype attributes,	1		K2(U)	Lecture using Chalk and talk	Flipped Classroom	PPT	Concept explanations CIA II
	5.	Drop down list, sample forms	1		K1(R) & K4(An)	Lecture using Chalk and talk	Problem-solving methodologies	Classpoint PPT	Explanation and Short summary CIA II
V	**DHTML and Style sheets**								
	1.	DHTML and Style sheets: Defining styles	1	1	K2(U)	Lecture using Chalk and talk	Collaborative Learning	YouTube lecture videos	True/False CIA II
	2.	Elements of styles	1		K2(U)	Demonstration	Real-World Integration	Online notes	Evaluation through problems CIA II
	3.	Linking a style sheet to an HTML document	1		K2(U)	PPT	Gamified Learning	PPT	Recall Steps CIA II
	4.	Inline styles, Internal style sheets,	1		K4(An)	Demonstration	Assess Understanding	PPT	MCQ CIA II
	5.	External style sheets, Multiple styles	1		K2(U)	Lecture using Chalk and talk	Collaborative Learning	YouTube lecture videos	True/False CIA II

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Skill Development

Activities (Em/ En/SD): 1. Implement the basic tags in HML and create a webpage.

2. Creating interactive web pages using forms.

Course Focusing on Cross Cutting Issues(Professional Ethics/ Human Values/Environment Sustainability/ Gender Equity): Nil

Activities related to Cross Cutting Issues: Nil

Assignment:

1. HTML history and features.
2. Design a web page embedding a video from YouTube using the <iframe> tag. -Last date to submit 04-09-2025

Seminar Topic:

3. Different HTML tags (any 5)
4. Inserting images using the <img> tag with src attribute for image source, alt attribute for alternative text, and optionally width and height attributes for dimensions.

Sample questions (minimum one question from each unit)

Part A (2 Marks)

1. The _____tag is used to create hyperlinks in HTML documents, allowing navigation between different web pages.(K1-R,CO-1)
2. Paragraphs (<p>) in HTML are used to _____, organizing textual content into logical units.(K1-R,CO-2)
3. Ordered lists in HTML are created using the <ol> tag and are used when a sequence or _____order is important.(K2-U,CO-3)
4. Frames in HTML allow for dividing a web page into multiple _____, each containing a separate HTML document.(K3-A,CO-4)
5. Linking a style sheet to an HTML document can be achieved using _____methods. (K4-An,CO-5)

Part B (4 Marks)

1. Describe the role of the anchor tag in HTML and provide a example(K1-R,CO-1)
2. Explain the purpose of the <title> tag in the <head> section of an HTML document.(K3-An,CO-2)
3. Describe the purpose of unordered and ordered lists in HTML.(K2-U,CO-3)
4. Discuss two attributes of the <form> tag and their roles in processing form data.(K1-R,CO-4)
5. Explain the difference between inline styles, internal style sheets, and external style sheets in HTML.(K2-U,CO-5)

Part C (9 Marks)

1. Explain the evolution of HTML generations with examples of HTML elements .(K1-R,CO-1)
2. Explain the importance of the <head> section in an HTML document, detailing its key components such as <title>, <meta>, and <link>.(K2-U,CO-2)
3. Explain the differences between unordered and ordered lists in HTML.(K3-An,CO-3)
4. Explain the concept of frames in HTML.(K2-U,CO-4)
5. Explain the concept of Dynamic HTML (DHTML).(K4-An,CO-5)

Dr. S. Immaculate Shyla
Head of the Department

Dr. Sruthy B S
Course Instructor

Teaching Plan

Department : Artificial Intelligence and Data Science
Class : II B. Sc Artificial Intelligence and Data Science
Title of the Course : Core Course III : Artificial Intelligence and its Applications
Semester : III
Course Code : IU243CC1

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU243CC1	**4**	1	-	-	**5**	**5**	**75**	**25**	**75**	**100**

Objectives

1. To introduce the basic principles, techniques and principles and applications of Artificial Intelligence.
2. To develop applications in real-type scenarios.

Course Outcomes

CO	Upon completion of this course, the students will be able to:	Cognitive level
1	understand AI fundamentals	**K1(R) & K2 (U)**
2	learn problem solving techniques in AI	**K3(A)**
3	utilize knowledge representation and reasoning	**K4(An)**
4	implement and evaluate AI models	**K5(E)**
5	apply AI techniques to solve real world problems	**K6(C)**

K1 - Remember; **K2** - Understand; **K3**- Apply; **K4** – Analyze; **K5**- Evaluate; **K6**- Create

Teaching plan

Total Contact hours: 75 (Including lectures, assignments and tests)

Unit	Module	Topic	Teaching Hours	Assessment hours	Cognitive level	Pedagogy	Student Centric Methods	E Resources	Assessment/ Evaluation Methods
I	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**								
	1.	Introduction, History, Definition of AI	1		K2(U)	Introductory session Historical Narrative Technique, Visual and Interactive Methods	Flipped Classroom Approach Inquiry Based Learning.	Video Lectures, Notes/Slides	Evaluation Through Questions. CIA I
	2.	Evolution of AI Applications of AI in various fields	2	1	K3(A)	Case Based Learning	Interactive Timelines & Digital Storytelling	Interactive PPT	Quiz using Slides CIA I
	3.	Types of AI: Narrow and General AI	2		K1(R)	Concrete-to-Abstract Progression	Skit or Roleplay	Video Lectures, Notes/Slides	Quiz CIA I
	4.	Super AI	2	1	K1(R)	Thought Experiments, Student Reflections & Future casting	Structured Debates,	Online notes	Experiments CIA I
	5.	Machine learning Vs Deep learning	2		K3(A)	Comparative Methodology, Active & Experiential Learning	Interactive Comparison Challenge, Peer Teaching	Interactive PPT.	Hands on Mini Projects. CIA I
	6.	AI techniques: Search, Knowledge,	3	1	K4(AN)	Concept Focus, Algorithm Races	Learning by Solving Puzzles,	PPT	Hands-on Real-World Applications.

		representation, Learning					Mini Challenges		CIA I
II	**PROBLEM SOLVING AND SEARCH STRATEGIES**								
	1.	Problem solving as state space search	1		K2(U)	Lecture using Chalk and talk	Scenario Based Learning	Class point	Evaluation through short test CIA I
	2.	Uninformed search strategies	2	1	K3(A)	Lecture with examples	Algorithm Races, Visual Simulation Tools	PPT, Python IDE	List some examples of searching making ideas CIA I
	3.	Uniform cost search	2		K3(A)	Lecture using videos	Case based Learning	PPT, Python IDE	List some examples of searching making ideas CIA I
	4.	Informed search strategies: A* Algorithm	2		K6(C)	Logic Explanations with examples.	Algorithm Races, Visual Simulation Tools	Interactive PPT	Create real time application examples using search techniques CIA I
	5.	Greedy best first search, Heuristic Functions	2	1	K6(C)	Logic Explanations with examples.	Code Completion Activities	PPT	Create real time application examples using search techniques CIA I
	6.	Constraint satisfaction problems	1		K3(A)	Lecture using Chalk and talk	Conceptual Understanding, Algorithmic Reasoning	Class point	Evaluation through raising questions CIA I

	7.	Practical consideration	1		K6(C)	Logic Explanations.	Code Tracing Exercises	Python IDE	Hand on Implementation CIA I
	8.	Practical implementation	1	1	K6(C)	Logic Explanations.	Code Tracing Exercises	Python IDE	Hand on Implementation CIA I
III	**KNOWLEDGE REPRESENTATION AND REASONING**								
	1.	Introduction to knowledge representation, Logical reasoning	1		K2(U)	PPT	Concept Based Learning	PPT using Nearpod	Slip Test CIA I
	2.	Propositional Logic, First order Logic	2	1	K1(R)	Logic Explanations	Concept Based Learning	PPT	Create programs using arrays. CIA I
	3.	Rule based systems and Expert systems	3		K4(An)	Flipped Classroom	Scenario Based Learning	Presentations using Nearpod	Practice Exercises CIA I
	4.	Semantic Networks & Frames	2	1	K4(An)	Lecture using videos, Code Tracing	Project Based Learning	PPT Using Gamma	Practice Exercises CIA II
	5.	Probabilistic Reasoning: Bayesian Networks	3		K3(A)	Blended Learning, Code Tracing	Code Puzzle Solving	Interactive PPT	MCQ Using Nearpod CIA II
	6.	Practical Implementation	1	1	K6(C)	Logic Explanations.	Code Tracing Exercises	Class point	Hand on Implementation CIA II
IV	**MACHINE LEARNING AND AI APPLICATIONS**								
	1.	Supervised Learning: classification & Regression	2		K2(U)	Group Work & Inquiry-Based Tasks	Ethics & Interpretation	PPT	Interactive Sessions. CIA II
	2.	Unsupervised Learning:	2	1	K3(A)	Error Analysis & Feedback	Principal Component	IDLE Environment.	Demonstration of real-world

		Clustering & dimensionality reduction				Loops	Analysis		Applications. CIA II
	3.	Reinforcement Learning basics	2		K3(A)	Reflective Discussions, Visual Diagrams & Flow Models	Build-Your-Own RL Environment	IDLE Environment.	Evaluation through short test CIA II
	4.	AI in image processing & computer vision	2		K5(E)	Tool-Focused Learning, Ethical Thinking & Real-World Application	DIY Object Detection Challenge	Class Point	Practical CIA II
	5.	AI in Natural Language Processing	2		K2(U)	Critical Media & Ethics Discussions, Roleplay & Simulation	Data Labelling & Sentiment Sleuths	Interactive PPT, Notes	Practical CIA II
	6.	AI in Robotics	2		K4(An)	Simulation & Virtual Labs, Interdisciplinary Integration	Simulation-Based Learning	Interactive PPT	Evaluation through short test CIA II
	7.	Program Implementation	1	1	K6(C)	Logic Explanations.	Code Tracing Exercises	Class point	Hand on Implementation CIA II
V	**AI ETHICS, CHALLENGES AND FUTURE TRENDS**								
	1.	Ethical Consideration in AI	2		K2(U)	Socratic Seminars & Debates	Design with Ethics Challenge	Classpoint PPT	True/False Assessment CIA II
	2.	Bias and fairness in AI	2	1	K3(A)	Design Thinking with Fairness Constraints	Bias Detective Workshops	PPT	Evaluation through exercises CIA II

	3.	AI and Privacy Concerns, Expansible AI	2		K3(A)	Data Awareness Activities	Data Awareness Scavenger Hunt	Online Tutorials and Notes	Evaluation through short test CIA II
	4.	Future of AI, Autonomous systems	2		K4(An)	Simulation & Design Challenges	Future Scenario Design	Interactive PPT	MCQ CIA II
	5.	Quantum AI, AGI	2	1	K4(An)	Conceptual Analogies	Simulation & Sandbox Exploration	YouTube Lecture Videos	GD. CIA II
	6.	Practical Consideration Practical Implementation	2	1	K6(C)	Logic Explanations.	Code Tracing Exercises	Class point	Hand on Implementation CIA II

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Skill Development

Activities (Em/ En/SD): 1. To know about the basic of Artificial intelligence and its applications using different methodologies.
2. To implement real world applications

Course Focussing on Cross Cutting Issues (Professional Ethics/ Human Values/Environment Sustainability/ Gender Equity): Nil

Activities related to Cross Cutting Issues: Nil

Assignment: 1. Constraint Satisfaction Problems

2. AI and Primary Concerns -Last date to submit 03-09-2025

Seminar Topic:

1. Heuristic functions
2. AI in Robotics

Sample questions (minimum one question from each unit)

Part A (1 Mark)

1. Which of the following is a subfield of AI? (K1-R, CO-1)

   (a) Cybersecurity, (b) Machine Learning, (c) Web Development, (d) Database Management

2. Which of the following is an example of an uninformed search strategy? (K2-U, C0-2)

   (a) A* Search (b) Best-First Search (c) Breadth-First Search (d) Hill Climbing

3. Which of the following is NOT a common knowledge representation technique? (K2-U, CO-3)

   (a) Semantic networks, (b) Frames, (c) Decision trees (d) Relational databases.

4. Which of the following is a major ethical concern in AI applications? (K5-E, CO-4)

   (a) Fast processing (b) Bias in decision-making systems (c) Use of colours in graphs (d) Multiple programming languages

5. What kind of problems is Quantum AI especially suited for? (K4-An, CO-5)

   (a) Simple arithmetic (b) Linear regression, (c) Complex optimization and high-dimensional search, (d) Drawing bar graphs.

Part B (6 Marks)

1. Write about the evolution of artificial intelligence? (K1-R, CO-1)
2. Explain uninformed search in AI with e.g.? (K2-U, CO-2)
3. Write about Machine learning with e.g. (K2-U, CO-3)
4. What is the difference between classification & regression? (K5-E, CO-4)
5. How do we use privacy concerns in AI? (K4-An, CO-5)

Part C (12 Marks)

1. Write about Artificial Intelligence techniques in detail. (K2-U, CO-1)
2. Explain Greedy search Algorithm with example? (K4-An, CO-2)
3. Explain with example about the concept of Reinforcement learning? (K5-E, CO-3)
4. What do you mean by Probabilistic Reasoning in terms of Bayesian Networks? (K6-C, CO-4)
5. Explain about Quantum AI? (K2-U, CO-5).

Dr. S. Immaculate Shyla
Head of the Department

Dr. Sruthy B S
Course Instructor

Teaching Plan

Department : Artificial Intelligence and Data Science
Class : II B. Sc Artificial Intelligence and Data Science
Title of the Course : Core Lab Course III: Artificial Intelligence Applications Lab
Semester III
Course Code : IU243CP1

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU243CP1	-	1	4	-	5	5	75	25	75	100

Objectives

1. To develop AI-based problem-solving skills by applying mathematical operations and machine learning techniques.
2. To design and implement AI applications in natural language processing and to enhance decision-making and automation.

Course Outcomes

CO	Upon completion of this course, the students will be able to:	Cognitive level
1.	apply fundamental AI concepts, including search algorithms, mathematical operations, and constraint satisfaction problems.	**K3**
2.	implement machine learning models such as linear regression for predictive analysis and evaluate their performance.	**K5**
3.	develop AI applications in natural language processing.	**K6**
4.	implement and analyze computer vision techniques, including image processing and face detection.	**K4**
5.	design and implement heuristic-based algorithms (A*) for optimization and decision-making in AI applications.	**K6**

K2 - Understand; **K3**- Apply; **K4-**Evaluate; **K5**-Analyze **K6** – Create

Teaching plan
Total Contact hours: 75 (Including lectures, assignments and tests)

Unit	Topic	Teaching Hours	Assessment Hours	Cognitive level	Pedagogy	Student Centric Methods	E Resources	Assessment/ Evaluation Methods
1	Basic mathematical operations for AI- Implement a simple search algorithm	7	6	K2(U)	Case based Learning	Software Demonstration	IDLE Environment	Performance
2	Implement Sentiment Analysis using NLTK	6		K2(U)	Lecture using Chalk and talk	Syntax based learning	Interactive PPT	Observation
3	Implement Image Processing with OpenCV	6		K2(U)	Concept Explanations	Code Tracing	Python IDE	Viva voce
4	Predict house prices using linear regression	7	5	K5(An)	Demonstration	Peer Code Review	YouTube videos	Identify and fix bugs
5	Implement a Constraint Satisfaction Problem	5		K3(A)	Visualization	Peer Code Review	Online videos, PPT	Short Coding snippets
6	Implement A* algorithm	5	8	K3(A)	Demonstration& Code Walkthrough	Syntax based learning	PPT & online packages	Performance
7	Design an AI Chatbot	5		K2(U), K6(E)	Logical Thinking	Demonstration	PPT	Model test
8	Implement Speech Recognition	5		K6(C)	Demonstration	Scenario Based Learning	Nltk online tool packages	Evaluation through short exercises.
9	Implement Face Detection and Recognition.	5	5	K3(A)	Conceptual learning	Code tracing	Online videos	Performance

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Skill Development

Activities (Em/ En/SD): 1. Analyze and implement the concepts using Artificial intelligence.
2. Machine Learning Exercises
3. Mini Projects

Course Focussing on Cross Cutting Issues (Professional Ethics/ Human Values/Environment Sustainability/ Gender Equity): Nil

Activities related to Cross Cutting Issues: Nil

Assignment: 1. Satisfaction problem- Exercises

2. NLTK (Last Date for Submission: (17-08-2025)

Dr. S. Immaculate Shyla
Head of the Department

Dr. Sruthy B S
Course Instructor

Teaching Plan

Department : **Artificial Intelligence and Data Science**
Class : **II B. Sc Artificial Intelligence and Data Science**
Title of the Course : **Elective Course III : Data Structures**
Semester **III**
Course Code : **IU243EC1**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU243EC1	3	1	-	-	3	4	**60**	**25**	**75**	**100**

Objectives

1. To enhance the problem solving and critical thinking skills.
2. To understand the data structure techniques.

Course Outcomes

CO	Upon completion of this course, the students will be able to:	Cognitive level
1	remember the concepts of basic data structures.	**K1**
2	understand the operations of data structures.	**K2**
3	apply data structures to solve problems.	**K3**
4	analyze network structures using trees and graphs.	**K4**
5	evaluate and create various algorithmic techniques and its applications.	**K5 & K6**

K1 - Remember; **K2** - Understand; **K3**- Apply; **K4** – Analyze; **K5**- Evaluate; **K6**- Create

Teaching plan

Total Contact hours: 60 (Including lectures, assignments and tests)

Unit	Module	Topic	Teaching Hours	Assessment Hours	Cognitive level	Pedagogy	Student Centric Methods	E Resources	Assessment/ Evaluation Methods
I	**Overview of Data Structures**								
	1.	Introduction and Overview: Concept of data Structures	1	1	K1(U)	Introductory session about Data Structures, Real Time applications	Inquiry-Based Learning, Case Studies	Video Lectures, Notes/Slides	Mentimeter-WordCloud, CIA I
	2.	Python Specific Data Structures	2		K2(R)	Flipped Classroom	Gamified Quiz	Interactive PPT	Quiz using Slido, CIA I
	3.	Performance Analysis- Data structure operations	2		K2(U)	Concept Explanations	Concept-based discussion	Notes/Slides	Slip Test, CIA I
	4.	Arrays- Linear arrays- Representation of Linear arrays in Memory	2		K2(U)	Syntax Explanations	Mind mapping- Infographics	Interactive PPT	Quiz using Slido, CIA I
	5.	Traversing Linear Arrays- Inserting and Deleting	2		K2(U)	Simulation Tasks	Peer Code Review	PPT, Python IDE	Exercises using Arrays, CIA I
	6.	Representation of Multidimensional Arrays	2		K3(A)	Demonstration, Code Walkthrough	Syntax based learning	PPT &Python IDE	Create programs using Arrays, CIA I
II	**Stacks and Queues**								
	1.	Stacks – An Introduction	1	1	K1(R)	Lecture using Chalk and talk	Scenario Based	Classpoint PPT	Evaluation through short

							Learning		test, CIA I
	2.	Operations on stack- Insert, Delete, Update	2		K2(U)	Lecture with examples	Code Development for Push, Pop Operations	Python IDE, Notes	List some applications of Stack, CIA I
	3.	Arithmetic Expressions: Evaluation of a postfix expression	2		K3(A)	Lecture Method	Mathematical Equations-Solve	Python IDE, Notes	Exercises – Arithmetic Expressions, CIA I
	4.	Transforming infix expression into postfix	2		K3(A)	Lecture Method	Mathematical Equations-Solve	Python IDE, Notes	Exercises – Arithmetic Expressions to Postfix, CIA I
	5.	Queues: An Introduction	1	1	K1(R)	Concept Explanations	Scenario Based Learning	PPT	List some applications of Queue, CIA I
	6.	Operations on queues, Insert, Delete, and Update	2		K2(U)	Syntax Explanations	Code Development for Queue operations	Classpoint	Debug the given snippets, CIA I
III	**Linked List**								
	1.	Linked List: Introduction	1	1	K2(U)	PPT	Concept Based Learning	PPT using Nearpod	Slip Test, CIA I
	2.	Representation of Linked list in memory	1		K1(R)	Syntax Explanations	Concept Based Learning	PPT	Create programs using arrays, CIA I
	3.	Traversing a linked list-Searching	2		K4(An)	Flipped Classroom	Scenario Based Learning	Presentations using NearPod	Searching Exercises CIA I
	4.	Insertion into a linked list- Insertion Algorithm	2		K4(An)	Lecture using videos, Code Tracing	Project Based Learning	PPT	Sorting Exercises, II CIA

	5.	Deletion from a Linked List- Deletion Algorithms	2	1	K3(A)	Blended Learning	Code Puzzle Solving	Interactive PPT	MCQ Using Nearpod, II CIA
	6.	Doubly Linked List- Insertion-Deletion	1		K3(A)	Syntax Explanations, Visual Simulations	Project Based Learning	Classpoint PPT	Create programs using Linked List, II CIA
	7.	Applications of Linked List	1		K5(E)	Lecture Method	Scenario Based Learning	Classpoint	List out the real time applications of Linked List,II CIA
IV	**Trees and Graphs**								
	1.	Tree Data Structure: Tree Terminologies	1	1	K2(U)	Constructivist Learning	Concept Mapping, Code Development	Self made Videos, PPT	Short summary, II CIA
	2.	Binary Trees- Representation of binary trees in memory	1		K3(A)	Contextual Learning	Live Coding Practice	Self made Videos, PPT	Create a snippet for Binary Tree,II CIA
	3.	Traversing Binary Trees- Pre order- In-order- Post order	1		K3(A)	Computational Learning	Error Spotting Exercises	Classpoint PPT	Evaluation through short test,II CIA
	4.	Graphs- Graph Terminologies	1	1	K4(An)	PPT, Programming Demo	Pair Programming Trace Worksheets	PPT	Construct a graph for the given criteria,II CIA
	5.	Types of graphs- Topological Sort	2		K3(A)	Guided Discovery, Hands-on Lab Sessions	Real Life Analogies, Debugging Sessions	Interactive PPT, Notes	Quiz Using Slido,II CIA
	6.	Euler Circuit	2		K4(An)	Demonstration	Mini Projects	Notes/Slides	Evaluation through short test,II CIA

	7.	Breadth first search- Depth first search	2		K6(C)	Analytical Study	Comparative Study	Interactive PPT	Create code for BFS, DFS,II CIA
V	**Sorting and Hashing**								
	1.	**Sorting:** Sorting Techniques	1	1	K1(R)	Case-Based Teaching, Experiential Learning	Real Life Modeling, Coding with a twist	Classpoint PPT	Quiz
	2.	Insertion sort	2		K3(A)	Contextual Learning	Code Development Activity	PPT	Evaluation throughsorting exercises
	3.	Selection sort, Quick sort,	2		K3(A)	Hands on Practice		Simulation using VisuAlgo	Evaluation through short test
	4.	Merge sort	1		K4(An)	Syntax Explanations	Draw merging process of sub arrays	Interactive PPT	MCQ
	5.	Searching- Searching Techniques- Linear search, Binary search	2	1	K3(A)	Experiential Learning	Employee Database Simulation	Youtube Lecture Videos	Develop a simple program for linear search
	6.	Hashing: Static Hashing, Hash table, Hash functions	2		K2(U)	Interactive ppt, Analogical Pedagogy	Simulate storing keys in a hash table	PPT Using Nearpod	Quiz Using Slido

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Skill Development

Activities (Em/ En/SD): 1. List out the applications of Linked List
2. Hashing Techniques

Course Focussing onCross Cutting Issues(Professional Ethics/ Human Values/Environment Sustainability/ Gender Equity): Nil

Activities related to Cross Cutting Issues: Nil

Assignment:1. Queue and its applications

2. Operations of Linked List (Last Date for Submission: 12-08-2025)

Seminar Topic: Linear Search

Sample questions (minimum one question from each unit)

Part A (1 Mark)

1. Which of the following best describes the time complexity of accessing an element in a linear array by index?
   a) O(n) b) O(log n) c) O(1) d) $O(n^2)$
2. Which data structure is used in evaluating postfix expressions?
   a) Queue b) Stack c) Linked List d) Tree
3. In a singly linked list, what happens when the first node is deleted
   a) All nodes get deleted b)The list becomes circular
   c) The head pointer is updated to the next node d) Memory leak occurs
4. Which traversal technique is used in Breadth-First Search (BFS) for graphs?
   a) Stack-basedb) Recursionc) Queue-based d) Hashing
5. Which sorting technique generally performs best on small datasets and is easy to implement?
   a) Quick Sort b) Merge Sort c) Selection Sort d) Insertion Sort

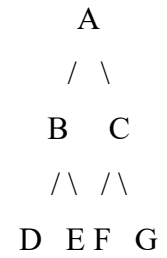
Part B (6 Marks)

6. Explain the different types of data structures with suitable examples.
7. Describe the operations of a stack with proper diagrams.
8. Differentiate between a singly linked list and a doubly linked list. List two applications of linked lists.

9. Explain in-order, pre-order, and post-order traversals of a binary tree with an example.
10. What is hashing? Explain different types of hash functions with examples.

Part C (12 Marks)

11. Write the algorithm for inserting an element into a linear array and explain with an example.
12. Write a Python program to convert an infix expression to a postfix expression. Explain each step with a stack simulation.
13. Design and implement a singly linked list in Python. Include insert, delete, and traverse functions.
14. Given the following binary tree, perform in-order, pre-order, and post-order traversals. Show all steps clearly.



15. Compare Quick Sort and Merge Sort in terms of time complexity, space usage, and performance.

Dr. S. Immaculate Shyla
Head of the Department

Dr. S. Immaculate Shyla
Course Instructor

Teaching Plan

Department : Artificial Intelligence and Data Science
Class : II B. Sc Artificial Intelligence and Data Science
Title of the Course : Core Course III: Skill Enhancement Course: Principles of Computer Architecture
Semester : III
Course Code : IU243SEC1

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU243SEC1	1	1	-	-	2	2	**30**	**25**	**75**	**100**

Objectives

1. To understand the core principles of computer architecture and organization.
2. To analyze instruction sets and control unit operations in modern processors.

Course Outcomes

CO	Upon completion of this course, the students will be able to:	Cognitive level
1	understand the basic structure and functionality of computer systems.	**K1(R) & K2 (U)**
2	analyze the performance of different instruction set architectures and identify their impact on processing efficiency.	**K3(A)**
3	applying pipelining and parallel processing techniques to improve computational performance.	**K4(An)**
4	evaluate memory hierarchy strategies and propose solutions for optimizing data access.	**K5(E)**
5	design simple processor architecture and simulate their functionality.	**K6(C)**

K1 - Remember; **K2** - Understand; **K3**- Apply; **K4** – Analyze; **K5**- Evaluate; **K6**- Crea

Teaching plan
Total Contact hours: 30 (Including lectures, assignments and tests)

Unit	Module	Topic	Teaching Hours	Assessment hours	Cognitive level	Pedagogy	Student Centric Methods	E Resources	Assessment/ Evaluation Methods
I	**Introduction to Computer Architecture**								
	1.	Introduction Computer registers, Computer Instruction codes	1	1	K2(U)	Introductory session	Analogy Based Learning	YouTube lecture videos	Evaluation Through Questions. CIA I
	2.	Timing and control, Instruction Cycle	1		K3(A)	Real-World Analogy Discussions	Problem-Solving & Reflection	Online notes	Quiz using Slides CIA I
	3.	Memory Reference Instruction	1		K1(R)	Lecture using Chalk and talk	Conceptual Foundation	PPT using Nearpod	Quiz CIA I
	4.	Input Output Interrupt, Complete computer description	1		K1(R)	PPT	Interrupt Roleplay Simulation	Interactive Notes	Experiments CIA I
	5.	Design of basic computer	1		K4(AN)	Demonstration	Build a Flowchart	videos	Hands-on Real-World Applications. CIA I
II	**Central Processing Unit**								
	1.	Introduction-General register organization	1	1	K2(U)	Lecture using Chalk and talk	Scenario Based Learning	Class point PPT	Evaluation through short test CIA I
	2.	Stack organization	1		K3(A)	Lecture with examples	Algorithm Races	PPT	List some examples of searching making ideas CIA I

	3.	Instruction formats	1		K3(A)	Lecture using videos	Case based Learning	YouTube videos	List some examples of searching making ideas CIA I
	4.	Addressing Modes	1		K6(C)	Logic Explanations with examples.	Algorithm Races,	Interactive ppt	Create real time application examples using search techniques CIA I
	5.	Data transfer and manipulation, Program control	1		K6(C)	Logic Explanations with examples.	Code Completion Activities	PPT	Create real time application examples using search techniques CIA I
III	**Combinational Circuits**								
	1.	Half Adder and Full Adder Flip Flops-SR flip flop	1	1	K2(U)	PPT	Concept Based Learning	PPT using Nearpod	Slip Test CIA I
	2.	*D Flip*-Flop- J-K Flip-Flop- T Flip-Flop	1		K1(R)	Logic Explanations	Concept Based Learning	PPT	Create programs using flipflops CIA I
	3.	Sequential Circuits-Flip-Flop input equations, State Table-State Diagram and problems.	1		K4(An)	Flipped Classroom	Concept Based Learning	Presentations using Nearpod	Practice Exercises CIA I
	4.	Digital Components: Integrated Circuits-Decoders-3-to-8-line decoder	1		K3(A)	Blended Learning, Code Tracing	Code Puzzle Solving	Interactive PPT	MCQ Using Nearpod CIA II

	5.	Multiplexers: 4-to-1 line Multiplexer-Demultiplexer	1		K6(C)	Logic Explanations.	Code Tracing Exercises	Class point	Hand on Implementation CIA II
IV	**Memory Hierarchy and Storage Systems**								
	1.	Cache Memory-Mapping Techniques	1	1	K2(U)	Group Work & Inquiry-Based Tasks	Ethics & Interpretation	Interactive PPT Videos	Interactive Sessions. CIA II
	2.	Replacement Policies-	1		K3(A)	Error Analysis & Feedback Loops	Principal Component Analysis	PPT	Demonstration of real-world Applications. CIA II
	3.	Virtual Memory and Paging	1		K3(A)	Reflective Discussions, Visual Diagrams & Flow Models	Build-Your-Own RL Environment	YouTube videos	Evaluation through short test CIA II
	4.	Main Memory Organization Secondary Storage	1		K5(E)	Tool-Focused Learning, Ethical Thinking & Real-World Application	DIY Object Detection Challenge	Notes	Practical CIA II
	5.	RAID Levels- Memory Access Optimization Techniques.	1		K2(U)	Critical Media & Ethics Discussions, Roleplay & Simulation	Data Labelling & Sentiment Sleuths	Interactive PPT	Practical CIA II
V	**Input/Output Systems and Interfacing**								
	1.	Input/Output Systems and Interfacing	1		K2(U)	Socratic Seminars & Debates	Design with Ethics Challenge	Classpoint PPT	True/False Assessment CIA II
	2.	Interrupt Handling and Direct Memory Access	1		K3(A)	Design Thinking with Fairness	Bias Detective Workshops	PPT	Evaluation through

		(DMA)-				Constraints			exercises CIA II
	3.	Buses: Structure, Types, and Arbitration	1	1	K3(A)	Data Awareness Activities	Data Awareness Scavenger Hunt	Online Tutorials and Notes	Evaluation through short test CIA II
	4.	Peripheral Communication (PCI, USB, SATA	1		K4(An)	Simulation & Design Challenges	Future Scenario Design	Interactive PPT	MCQ CIA II
	5.	Modern Trends in Computer Architecture (GPUs, TPUs, Quantum Computing)	1		K4(An)	Conceptual Analogies	Simulation & Sandbox Exploration	YouTube Lecture Videos	GD. CIA II

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Skill Development

Activities (Em/ En/SD): 1. To know about the computer architecture and its combinational circuit.
2. To understand about the various registers and flip flops.

Course Focussing on Cross Cutting Issues (Professional Ethics/ Human Values/Environment Sustainability/ Gender Equity): Nil

Activities related to Cross Cutting Issues: Nil

Assignment: 1. Addressing Modes

2. Input/Output Systems and Interfacing -Last date to submit 2-9-2025

Seminar Topics 1: Stack organization

2. Main Memory Organization Secondary Storage

Sample questions (minimum one question from each unit)

Part A (1 Mark)

1. What is the purpose of cache memory? (K1-R, CO-1)

2. In which addressing mode is the operand specified directly in the instruction? (K2-U, C0-2)
   (a) Register (b)Immediate (c) Indirect (d) Indexed
3. If the current output of a T flip-flop is 0 and T = 1, what will be the output after 3 clock pulses? (K2-U, CO-3)
   (a)0 (b) 1 (c) undetermined (d) cannot be changed
4. In associative mapping, how is a memory block located in the cache? (K5-E, CO-4)
   (a) By index (b) By tag comparison with all cache lines (c) By hashing (d) By offset
5. Which type of bus allows multiple processors to share communication lines? (K4-An, CO-5)
   (a) Serial bus (b) Shared bus (c) Hybrid bus (d) Dedicated bus

Part B (6 Marks)

6. Write about the instruction registers? (K1-R, CO-1)
7. Explain addressing modes? (K2-U, CO-2)
8. Differentiate full adder and half adder. (K2-U, CO-3)
9. What is virtual memory with example? (K5-E, CO-4)
10. Write about the structure of bus? (K4-An, CO-5)

Part C (12 Marks)

11. Write about Input Output interrupt in detail with example. (K2-U, CO-1)
12. Explain stack organization with example? (K4-An, CO-2)
13. Explain with example about SR Flip flop and T Flip flop? (K5-E, CO-3)
14. What do you mean by virtual memory and paging? (K6-C, CO-4)
15. Explain about modern trends in computer architecture? (K2-U, CO-5).

Dr. S. Immaculate Shyla
Head of the Department

Dr. Sruthy B S
Course Instructor