KUMARAGURU COLLEGE OF TECHNOLOGY,

An autonomous Institution affiliated to Anna University, Chennai

COIMBATORE – 641 049.

B.TECH. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

REGULATION 2024

I Semester (2026 Batch Onwards)

Department of Artificial Intelligence and Data Science

Signature of the BOS Chairman, AI&DS

VISION

To embark as a school of innovation in the stream of data science for enabling global education, research and entrepreneurship.

MISSION

- Hone students to excel in the traits of data science technology and professionalism
- Empower students to develop solutions for mutated technological problems of the society
- Inculcate industrial and entrepreneurial culture for their professional furtherance

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The graduates of this program shall have:

1. A successful professional career in industry, government, and academia with capabilities to build innovative solutions using technology as a tool to solve real-world problems.
2. Research capabilities in advanced technologies and shall contribute to a new body of knowledge.
3. A learning mindset to continuously improve their knowledge, through on the job, formal and informal learning opportunities.
4. An ethical attitude and shall exhibit effective skills in communication, management, teamwork and leadership.
5. Engineering, problem-solving and critical thinking skills to create social, economical and sustainable impact.

PROGRAM OUTCOMES (POs)

Graduates of the Artificial Intelligence and Data Science Undergraduate Program should have the ability to:

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization to develop to the solution of complex engineering problems.

Signature of the BOS Chairman, AI&DS

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.

PO5: Engineering Tool Usage: Create, select, and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture, and environment.

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws.

PO8: Individual and Collaborative Teamwork: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The Program Specific Outcomes of Artificial Intelligence and Data Science Undergraduate Program are:

PSO 1: Apply the principles of Artificial Intelligence and Data Science, to develop sustainable, data driven decisions for domain-specific applications using standard practices.

PSO 2: Demonstrate the ability to develop innovative solutions and address complex industry challenges utilizing emerging AI trends, tools, and technologies.

Signature of the BOS Chairman, AI&DS

KUMARAGURU COLLEGE OF TECHNOLOGY

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

REGULATION 2024

B.Tech. Artificial Intelligence and Data Science – Curriculum

2026 Batch Structure

Semester I

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24HSI108	Essential English for Everyday Communication	Embedded	HS	1	0	2	0	2
	24HSI109	Professional Communication for Academic and Workplace	Embedded		1	0	2	0	
	24HSJ110	Project-Based English for Fluency and Impact	Project		0	0	0	4	
2	24MAI118	Linear Algebra and Calculus for Computing	Embedded	BS	3	0	2	0	4
3	24PHI108	Physics of Computing and Emerging Technologies	Embedded	BS	3	0	2	0	4
4	24CSI022	Programming in C	Embedded	ES	1	0	4	0	3
5	24CSI023	Digital Logic Circuits	Embedded	ES	3	0	2	0	4
6	24HST101	Heritage of Tamils	Theory	HS	1	0	0	0	1
7	24INP102	Innovation Practicum - 1	Practical	ES	0	0	2	0	1
8	24HSP111	Holistic Wellness - 1	Practical	HS	0	0	2	0	1
9	24INO101	FCLF- General Stack-1	Practical	OE	0	0	2	0	1
								Total Credits	**21**
								Total Contact Hours/week	**30**

Semester II

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24HSP011	Strategic Conversation Skills	Practical	HS	0	0	2	0	1
2	24MAI128	Multivariate Calculus and Statistical Forecasting	Embedded	BS	3	0	2	0	4
3	24CSI007	Python for Computational Problem Solving	Embedded	ES	1	0	4	0	3
4	24CSI024	Data Structures and Algorithms	Embedded	PC	2	0	4	0	4
5	24ADI018	Data Science and Visualization	Embedded	PC	2	0	0	2	3
6	24HST102	Tamils and Technology	Theory	HS	1	0	0	0	1
7	24INP103	Innovation Practicum- 2	Practical	ES	0	0	2	0	1
8	24HSP112	Holistic Wellness-2	Practical	HS	0	0	2	0	1
9	24INO102	FCLF- General Stack-2	Practical	OE	0	0	2	0	1
10	24CST028	Disruptive and Emerging Technologies	Theory	HS	1	0	0	0	1

Signature of the BOS Chairman, AI&DS

								Total Credits	**20**
								Total Contact Hours/week	**30**
Semester III									
S.No	**Course code**	**Course Title**	**Course Mode**	**Course Type**	**L**	**T**	**P**	**J**	**C**
1	24MAI234	Computational Probability and Statistics	Embedded	BS	3	0	2	0	4
2	24HSP012	Developing Collaborative Discussion and Presentation Skills	Practical	HS	0	0	2	0	1
3	24CSI025	Object Oriented Programming	Embedded	ES	1	0	4	0	3
4	24CSI030	Foundations of Web Development and UI/UX	Embedded	ES	1	0	4	0	3
5	24CSI014	Design and Analysis of Algorithms	Embedded	PC	3	0	2	0	4
6	24CSI009	Database Management Systems	Embedded	PC	3	0	2	0	4
7	24ADI016	Foundations of Artificial Intelligence	Embedded	PC	3	0	2	0	4
8	24INP201	Innovation Practicum- 3	Practical	ES	0	0	2	0	1
9	24INOXYY	FCLF- General Stack-3	Practical	OE	0	0	2	0	1
10	24INM201	Universal Human Values-II	Theory	HS	1	0	0	0	1
								Total Credits	**26**
								Total Contact Hours/week	**32**
Semester IV									
S.No	**Course code**	**Course Title**	**Course Mode**	**Course Type**	**L**	**T**	**P**	**J**	**C**
1	24MAT244	Random Process and Optimization	Theory	BS	3	0	0	0	3
2	24HSP013	Mastering Career Readiness	Practical	HS	0	0	2	0	1
3	24CSI029	Full Stack Web Development	Embedded	PC	2	0	4	0	4
4	24CSI011	Computer Networks and Security	Embedded	PC	3	0	2	0	4
5	24ADI003	Machine Learning	Embedded	PC	3	0	2	0	4
6	24CSI015	Software Engineering and Agile Practices	Embedded	PC	3	0	0	2	4
7	24INM202	Environmental Science and Sustainability	Embedded	HS	1	0	2	0	2
8	24INP202	Innovation Practicum - 4	Practical	ES	0	0	2	0	1
								Total Credits	**23**
								Total Contact Hours/week	**29**
Semester V									
S.No	**Course code**	**Course Title**	**Course Mode**	**Course Type**	**L**	**T**	**P**	**J**	**C**
1	24ADI006	Deep Learning	Embedded	PC	3	0	2	0	4
2	24ADI007	Cloud Data Analytics	Embedded	PC	2	0	2	0	3

Signature of the BOS Chairman, AI&DS

3	24ADI009	Computer Vision	Theory	PC	2	0	0	2	3
4	24HSP014/ 24HSP015/ 24HSP016/ 24HSP017	Hindi Level 1/ French Level 1/ German Level 1/ Japanese Level 1	Practical	HS	0	0	4	0	2
5	24------	Professional Elective I	Embedded/ Theory	PE	2	0	2	0	3
6	24------	Professional Elective II	Embedded/ Theory	PE	2	0	2	0	3
7	24------	OE2	Theory	OE	3	0	0	0	3
8	24INM002	Disaster Management and Preparedness*	Theory	HS	2	0	0	0	2
								Total Credits	**23**
								Total Contact Hours/week	**30**

*** Non CGPA Course**

Semester VI

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24ADI010	Natural Language Processing	Embedded	PC	3	0	2	0	4
2	24------	Generative AI Application Development and Agentic AI	Embedded	PC	3	0	2	0	4
3	24------	Professional Elective III	Embedded/ Theory	PE	2	0	2	0	3
4	24------	Professional Elective IV	Embedded/ Theory	PE	2	0	2	0	3
5	24------	Professional Elective V	Embedded/ Theory	PE	3	0	0	0	3
6	24------	Professional Elective VI	Embedded/ Theory	PE	2	0	2	0	3
7	24------	OE3	Theory	OE	3	0	0	0	3
8	24INM302	Constitution of India	Theory	HS	1	0	0	0	0
								Total Credits	**23**
								Total Contact Hours/week	**29**

Semester VII

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24------	Professional Elective VII	Theory	PE	2	0	2	0	3
2	24------	Professional Elective VIII	Theory	PE	0	0	6	0	3
3	24------	OE4	Theory	OE	3	0	0	0	3
4	24INM102	Indian Knowledge System in Science and Engineering	Theory	HS	1	0	0	0	1
5	24ADJ411	Project Phase-I	Project	PRJ	0	0	0	6	3
6	24ADJ412	Professional Internship/Certification	Project	PRJ	0	0	0	6	3

Signature of the BOS Chairman, AI&DS

								Total Credits	**16**
								Total Contact Hours/week	**20**
Semester VIII									
S.No	**Course code**	**Course Title**	**Course Mode**	**Course Type**	**L**	**T**	**P**	**J**	**C**
1	24ADJ413	Project Phase-II	Project	PRJ	0	0	0	24	12
								Total Credits	**12**
								Total Contact Hours/week	**24**
								Grand Total Credits	**164**

Signature of the BOS Chairman, AI&DS

SEMESTER I

Signature of the BOS Chairman, AI&DS

24CSI022	PROGRAMMING IN C	L	T	P	J	C
		1	0	4	0	3
ES		SDG	9			

Pre-requisite courses	Nil	Data Book / Codes / Standards (If any)	Nil

Course Objectives:	The purpose of taking this course is to:
1	Gain proficiency in logical reasoning and problem-solving using algorithms and flowcharts.
2	Acquire knowledge of fundamental programming constructs in C, including data types, variables, control structures, and input/output operations.
3	Attain the capability to address real-world problems by utilizing arrays, strings, and modular programming with functions.
4	Introduce concepts of pointers, storage classes, and structures as tools for effective data representation and management.
5	Provide hands-on experience in building C-based applications that incorporate file operations, debugging strategies, and best coding practices.

Course Outcomes:	After successful completion of this course, the students shall be able to	Bloom's Taxonomy Level (BTL)
CO 1	Illustrate the algorithmic problem-solving techniques using flowcharts and pseudocode.	U
CO 2	Solve computational problems by applying decision-making constructs and iterative controls using basic C programming.	Ap
CO 3	Apply arrays, strings, and functions to solve programming challenges using modular programming.	Ap
CO 4	Utilize pointers, storage classes, and structures for efficient data manipulation and memory management, incorporating file operations in problem-solving scenarios.	Ap
CO 5	Apply debugging techniques and tools to identify, trace, and correct syntax, logical, and runtime errors in C programs.	Ap

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)
	1	2	3	4	5	6	7	8	9	10	11	

Signature of the BOS Chairman, AI&DS

Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Investigations of Complex	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2
1	2				2							3	
2	3	2										3	
3	3		2									3	
4	3		2									3	
5		3			2							3	

Course Content

INTRODUCTION TO PROBLEM SOLVING AND C BASICS Introduction to computer problem-solving – The problem-solving aspect- Top-down design -Building blocks, pseudocode notation, flowcharts – Implementation of algorithms –Simple algorithmic problem-solving scenarios – C programming: data types, variables, operators and expressions, input and output operations, control flow using if and switch statements. **Practical Component** Drawing flowcharts, writing pseudocode for algorithmic problem scenarios, Programs using arithmetic, logical, and relational operators, Simple logic-based programs using conditionals	**3 Hours** **12 Hours**
ARRAYS AND STRINGS Looping and Control Statements: for, while, break, continue -Nested Loops - Defining an array - Processing an array - Multidimensional Arrays-Character Arithmetic - Defining a string - NULL character - Initialization of Strings - Reading and Writing Strings - Processing Strings -Searching and Sorting of Strings. **Practical Component** Pattern printing using loops - Programs for defining and processing 1D and 2D arrays, Searching (linear and binary search), Sorting (bubble sort, selection sort), Matrix operations (addition, subtraction, transpose), String handling with/without standard functions	**3 Hours** **12 Hours**

Signature of the BOS Chairman, AI&DS

FUNCTIONS AND STORAGE CLASSES Defining a function - Accessing a function - Function prototypes -User defined Function – Actual and Formal parameters - Passing arrays to functions - Function with string - Recursion - Storage classes **Practical Component** Programs using functions with arguments and return values, Recursive functions (e.g., factorial, Fibonacci, sum of numbers), Passing arrays and strings to functions, Programs demonstrating storage classes: auto, static, extern, register	**3 Hours** **12 Hours**
POINTERS, STRUCTURES AND UNIONS Pointer Fundamentals - Pointer Declaration - Passing Pointers to a Function, call by value, call by reference- Pointers and arrays - Operations on pointers - Dynamic memory allocation- Structures and Unions: Defining a Structure - Processing a Structure - User defined data types (Typedef) -Unions **Practical Component** Using Pointers - operations and arithmetic, swapping values using pointers, array manipulation- searching. Dynamic memory allocation using malloc, calloc, and free, Programs using structures and unions, Accessing structure members using pointers	**3 Hours** **12 Hours**
FILES AND DEBUGGING File Operations -Open,close, read,write- Processing a data file -Unformatted data files - Concept of binary files - Accessing a file randomly using fseek- Types of errors: Syntax, Logical, Runtime – Debugging techniques: Tracing with printf(), setting breakpoints, step-by-step execution – Introduction to debugging tools: gcc -g, GDB- Integrated Development Environment – Best practices in debugging C programs. **Practical Component** Text and Binary File read/write operations with Structures and Union – Search and Replace using fseek, Debugging C programs using printf() tracing and GDB, Identifying and fixing errors- integer division, incorrect loop condition, reading a non-existing file, Divide by zero, Accessing array out of bounds.	**3 Hours** **12 Hours**

Theory Hours: 15	**Tutorial Hours:**	**Practical Hours: 60**	**Project Hours:**	**Total Hours: 75**

Learning Resources

Textbooks

1. Yashavant Kanetkar, Let Us C – Authentic Guide to C Programming Language, 20th Edition, BPB Publications, 2024.
2. Byron S Gottfried and Jitendar Kumar Chhabra, “Programming with C”, Tata McGraw Hill Publishing

Signature of the BOS Chairman, AI&DS

Company, Third Edition, New Delhi, 2018.
3. E. Balagurusamy, Programming in ANSI C, 8th Edition, McGraw-Hill Education, 2019.

Reference books/ Web Links

1. R. G. Dromey, How to Solve It by Computer, Pearson Education, First Edition, New Delhi, 2008.
2. Pradip Dey and Manas Ghosh, Programming in C, 2nd Edition, Oxford University Press, 2011.
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd Edition, Pearson Education, 2006.
4. Ashok N. Kamthane, Computer Programming, Pearson Education, 2018.
5. Reema Thareja, Programming in C, 2nd Edition, Oxford University Press, 2011.

Online Resources

1. https://www.geeksforgeeks.org/c-programming-language/
2. https://www.w3schools.com/c/
3. https://www.programiz.com/c-programming
4. https://www.coursera.org/learn/c-for-everyone
5. https://www.codingninjas.com/studio/library/c-programming
6. https://www.w3schools.com/c/c_debugging.php
7. https://www.onlinegdb.com/

Assessment (Embedded course)

MCQ, Experimental Cycle tests and End Semester Examination (Lab)

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert
-	-	Ms. R. Nivetha Department of Computer Science and Engineering
Recommended by BoS on	06.06.2026	
Academic Council Approval	No: 30	**Date** 19.06.2026

Signature of the BOS Chairman, AI&DS

24CSI023	DIGITAL LOGIC CIRUCITS	L	T	P	J	C
		3	0	2	0	4
ES		SDG	9			

Pre-requisite courses	Nil	Data Book / Codes / Standards (If any)	

Course Objectives:	The purpose of taking this course is to:
1	Provide a strong foundation in digital systems, number systems, binary codes, and Boolean algebra.
2	Develop the ability to represent and simplify Boolean functions using Karnaugh map techniques and universal gates.
3	Enable students to analyze and design combinational logic circuits for arithmetic and data processing applications.
4	Equip students with the knowledge of sequential logic circuits, including flip-flops, counters, and registers.
5	Introduce digital logic families, programmable logic devices, and hardware description languages for digital system implementation.

Course Outcomes:	After successful completion of this course, the students shall be able to	Bloom's Taxonomy Level (BTL)
CO 1	Apply the concepts of digital systems, number systems, binary codes, and Boolean algebra to solve problems in digital logic representation.	Ap
CO 2	Apply Boolean function representation and minimization techniques to obtain optimized logic expressions for digital circuit implementation.	Ap
CO 3	Design combinational logic circuits for arithmetic and data processing applications based on given specifications.	Ap
CO 4	Demonstrate sequential logic circuit concepts including flip-flops, counters, and registers in digital system operations.	Ap
CO 5	Illustrate digital system realization using logic families, programmable logic devices, and basic VHDL modeling techniques.	Ap

Signature of the BOS Chairman, AI&DS

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)	
	1	2	3	4	5	6	7	8	9	10	11		
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2
1	3												
2	3	3											
3	3	2	3									3	
4	3	2										3	
5	3		3										

Course Content

DIGITAL SYSTEMS AND BOOLEAN ALGEBRA Introduction to Digital Systems, Analog and Digital Signals, Number Systems, Number Base Conversions, Complements-Signed Binary Numbers, Binary Codes, Boolean Algebra and its Properties, Boolean Functions, Simplification of Boolean Functions using Boolean Algebra. **Practical Component:** 1. Study of logic gates. 2. Verify Boolean algebra properties such as commutative, associative, distributive, and De Morgan's theorems using logic gates and truth tables.	**9 Hours** **4 Hours**
BOOLEAN FUNCTION REPRESENATTION AND MINIMIZATION Canonical Forms-Standard Forms of Boolean Function-Karnaugh Maps (2, 3 and 4 Variables), Don't care condition-Simplification of Boolean Functions using K-Maps, Universal Gates, Realization of Logic Gates using NAND and NOR Gates. **Practical Component:** 1. Implement Boolean functions using logic gates and validate the outputs with truth tables. 2. Design logic circuits for simple real-world problem statements by deriving Boolean expressions, simplifying them using Karnaugh maps, and verifying the outputs.	**9 Hours** **4 Hours**
COMBINATIONAL LOGIC CIRCUITS Combinational Circuit-Analysis of Combinational Logic Circuits, Design of Combinational Logic Circuits.Half Adder, Full Adder,Half Subtractor, Full	**9 Hours**

Signature of the BOS Chairman, AI&DS

Subtractor- Magnitude Comparator,Code Converters, Decoders, Encoders, Multiplexers, Demultiplexers-Parity checker and Generator-Applications of Combinational Logic Circuits. **Practical Component:** 1. Design and construct half adders, full adders, half subtractors, and full subtractors. 2. Develop a code converter circuit using logic gates. 3. Design and implement decoder and encoder circuits. 4. Construct multiplexers and demultiplexers and incorporate them into circuit designs. 5. Design and implement a circuit for a parity generator and parity checker using logic gates.	**12 Hours**
SEQUENTIAL LOGIC CIRCUITS Introduction to Sequential Logic Circuits, Latches and Flip-Flops, SR Flip-Flop, JK Flip-Flop, D Flip-Flop, T Flip-Flop, Edge Triggering and Level Triggering, Flip-Flop Conversions, Asynchronous Counters, Synchronous Counters, Decade Counter, Ring Counter, Registers, Shift Registers (SISO, SIPO, PISO, PIPO), Applications of Sequential Logic Circuits. **Practical Component:** 1. Implement and test various types of shift registers. 2. Design and build a synchronous and asynchronous counter.	**9 Hours** **6 Hours**
LOGIC FAMILIES AND PROGRAMMABLE DEVICES Digital Logic Families, RTL, DTL, TTL, ECL and CMOS Logic Families, Characteristics and Comparison of Logic Families, Programmable Logic Devices, Programmable Logic Array (PLA), Programmable Array Logic (PAL), Complex Programmable Logic Devices (CPLD), Field Programmable Gate Arrays (FPGA), Implementation of Combinational Logic Circuits using PLA and PAL, Introduction to Hardware Description Languages, Basics of VHDL Modeling and Simulation for Arithmetic Circuits. **Practical Component:** 1. Implement and simulate arithmetic circuits using VHDL models.	**9 Hours** **4 Hours**

Theory Hours:45	Tutorial Hours:	Practical Hours:30	Project Hours:	Total Hours:75

Learning Resources*
Textbooks
1. M. Morris R. Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", 6th Edition, Pearson, 2018.
Reference Books

Signature of the BOS Chairman, AI&DS

1. C. H. Roth Jr., Larry L. Kinney “Fundamentals of Logic Design”, 8th Edition, Cengage Learning, 2018. 2. John F. Wakerly, “Digital Design: Principles and Practices”, 5th Edition, Pearson, 2018.
Online Resources
1. https://www.coursera.org/learn/digital-systems 2. https://nptel.ac.in/courses/108105113
Weblinks:
1. https://www.nesoacademy.org/ee/05-digital-electronics

Assessment (Embedded course)
SA-I, SA-II, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE) Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated By			
Expert(s) from Industry	**Expert(s) from Higher Education Institutions**	**Internal Expert(s)**	
		Ms.P.Anitha Assistant Professor Dept of CSE	
Recommended by BoS on	06.06.2026		
Academic Council Approval	No: 30	**Date**	19.06.2026

Signature of the BOS Chairman, AI&DS