

DHANALAKSHMI SRINIVASAN INSTITUTE OF RESEARCH AND TECHNOLOGY

(Deemed to be University under section 3 of UGC Act, 1956.)

PERAMBALUR – 621 212, TAMIL NADU, INDIA.

SCHOOL OF ARTS AND SCIENCE

B.Sc. Artificial Intelligence & Machine Learning

REGULATION 2026

PROGRAMME:

Vision:

To emerge as a forward-looking center of excellence in artificial intelligence and machine learning, nurturing talented young innovators, analytical thinkers, and ethical technologists who design intelligent systems to solve complex problems and drive responsible digital transformation for societal good.

Mission:

- To offer inclusive, flexible, and interdisciplinary undergraduate programs in artificial intelligence and machine learning that integrate foundational computing, algorithms, data science, and domain applications, equipping graduates with strong technical, analytical, and problem-solving skills for diverse career paths and lifelong learning.
- To promote practical research and innovative inquiry in machine learning models, intelligent systems, data analytics, and AI applications, addressing key challenges in healthcare, agriculture, education, and industry.
- To expand access to quality AI and ML education for rural and underprivileged students by combining modern computational tools with local needs, preserving cultural knowledge through digital intelligence, and building entrepreneurial competencies for self-reliant careers.
- To cultivate ethical practices, social responsibility, and global awareness through hands-on projects, industry partnerships, community initiatives, and experiential learning that connects theoretical concepts with real-world intelligent applications.

PROGRAM OUTCOMES (POs)

PO	PROGRAM OUTCOMES
PO1	Disciplinary Knowledge Demonstrate comprehensive knowledge and understanding of the fundamental concepts, theories, principles, and applications in the chosen discipline and allied fields.
PO2	Critical Thinking and Problem Solving Identify, analyze, and solve complex academic, professional, and societal problems using logical reasoning, analytical skills, and evidence-based approaches.
PO3	Research and Inquiry Apply scientific methods, research techniques, and investigative skills to conduct studies, analyze data, interpret results, and draw meaningful conclusions.
PO4	Creativity and Innovation Develop innovative ideas, creative solutions, and entrepreneurial approaches to address contemporary challenges in academic, professional, and social contexts.
PO5	Digital and Technological Competence Utilize appropriate digital technologies, software tools, and information resources effectively and ethically for learning, research, communication, and problem-solving.
PO6	Environment and Sustainability Understand environmental issues and sustainable development goals and apply this knowledge to promote ecological balance and responsible resource utilization.
PO7	Ethics and Social Responsibility Demonstrate ethical values, integrity, inclusiveness, and social responsibility while contributing positively to society and professional environments.
PO8	Teamwork and Leadership Work effectively as an individual and as a member or leader of diverse and multidisciplinary teams, demonstrating leadership, collaboration, and interpersonal skills.

PO9	Communication Skills Communicate effectively through oral, written, visual, and digital means with diverse audiences in academic, professional, and societal settings.
------------	--

PO10	Employability and Entrepreneurship Develop professional competencies, managerial abilities, and entrepreneurial skills required for employment, higher education, and self-employment opportunities.
PO11	Lifelong Learning Recognize the need for continuous learning, adaptability, and self-development to meet evolving personal, professional, and societal demands in a dynamic global environment.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO	PROGRAM SPECIFIC OUTCOMES
PSO1	Graduates will be proficient in applying core concepts of artificial intelligence, supervised and unsupervised learning, neural networks, and data preprocessing techniques to build effective predictive and intelligent models.
PSO2	Graduates will demonstrate competence in machine learning frameworks, model evaluation, data visualization, and ethical deployment of AI systems, enabling them to contribute effectively to the technology industry, research support, and community-oriented intelligent solutions.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO	PROGRAM EDUCATIONAL OBJECTIVES
PEO1	To provide graduates with a solid foundation in programming, mathematics, data structures, machine learning algorithms, and artificial intelligence principles, preparing them for entry-level roles in IT companies, data analytics, and higher studies.
PEO2	To develop logical thinking, analytical abilities, and technical proficiency so that graduates can design, implement, train, and evaluate AI and ML models to address real-life problems.
PEO3:	To foster professional ethics, effective communication, teamwork, and responsible AI practices that enable graduates to work collaboratively in multidisciplinary teams and contribute positively to society.
PEO4:	To encourage lifelong learning and adaptability, empowering graduates to keep pace with rapid advancements in AI and ML technologies and pursue advanced education, certifications, or entrepreneurial opportunities.

BOARD OF STUDIES MEMBERS:

- 1. Name of the Expert** : Dr.U.Srinivasalu Reddy
Designation : Associate Professor
Institution/Organization : National Institute of Technology, Tiruchirappalli
Mobile Number : 8438207784
E-mail ID : usrinivasalureddy@gmail.com
- 2. Name of the Expert** : Dr.G.Devasena
Designation : Assistant Professor
Institution/Organization : Indian Institute of Information Technology, Tiruchirappalli
Mobile Number : 9042473621
E-mail ID : devasenag@iiitt.ac.in

CURRICULUM AND SYLLABUS :

SEMESTER-I

Semester	Part	Course Category	Title of the Course	Course Code	L	T	P	Credits	Marks		
									CAT	ESE	Total
I	I	AEC	Tamil/Hindi/French-I	TA26C01/ HA26C01/ FA26C01	3	0	0	3	40	60	100
	II	AEC	English-I	EN26C01	3	0	0	3	40	60	100
	III	Core	Python Programming	UAI26101	3	0	0	3	40	60	100
		Core	Python Programming Lab	UAI26102	0	0	4	2	40	60	100
		Core	Foundations of Artificial Intelligence	UAI26103	4	0	0	4	40	60	100
		MDC	Multi-Disciplinary Courses-I		3	0	0	3	40	60	100
	IV	VAC	Human Values	VAC26001	2	0	0	2	40	60	100
								20			700

SEMESTER-II

Semester	Part	Course Category	Title of the Course	Course Code	L	T	P	Credits	Marks		
									CAT	ESE	Total
II	I	AEC	Tamil/Hindi/French-II	TA26C02/ HA26C02/ FA26C02	3	0	0	3	40	60	100
	II	AEC	English-II	UEN26C02	3	0	0	3	40	60	100
	III	Core	Data Structures and Algorithms	UAI26204	4	0	0	4	40	60	100
		Core	Database Concepts with AI	UAI26205	3	0	0	3	40	60	100
		Core	Database Concepts with AI Lab	UAI26206	0	0	4	2	40	60	100
		MDC	Multi-Disciplinary Courses-II		3	0	0	3	40	60	100
	IV	VAC	Environmental studies and sustainability	VAC26002	2	0	0	2	40	60	100
								20			700

SEMESTER-III

Semester	Part	Course Category	Title of the Course	Course Code	L	T	P	Credits	Marks		
									CAT	ESE	Total
III	I	AEC	Tamil/Hindi/French-III	TA26C03/ HA26C03/ FA26C03	3	0	0	3	40	60	100
	II	AEC	English-III	EN26C03	3	0	0	3	40	60	100
	III	Core	Machine Learning Techniques	UAI26307	3	0	0	3	40	60	100
		Core	Machine Learning Techniques Lab	UAI26308	0	0	4	2	40	60	100
		MDC	Multi-Disciplinary Courses-III		3	0	0	3	40	60	100
		DEC	Data Analytics	UAI26001	3	1	0	4	40	60	100
			Web Technologies	UAI26002							
			AI/ML Techniques for Cyber Security	UAI26003							
	IV	VAC	IKS	VAC26003	3	0	0	3	40	60	100
								21			700

SEMESTER-IV

Semester	Part	Course Category	Title of the Course	Course Code	L	T	P	Credits	Marks		
									CAT	ESE	Total
IV	I	AEC	Tamil/Hindi/French-IV	TA26C04/ HA26C04/ FA26C04	3	0	0	3	40	60	100
	II	AEC	English-IV	EN26C04	3	0	0	3	40	60	100
	III	Core	Deep Learning Techniques	UAI26409	3	0	0	3	40	60	100
		Core	Deep Learning Techniques Lab	UAI26410	0	0	4	2	40	60	100
		MDC	Multi-Disciplinary Courses-IV		3	0	0	3	40	60	100
		DEC	Internet of Things	UAI26004	3	1	0	4	40	60	100
			Open-Source Systems	UAI26005							
			Reinforcement Learning	UAI26006							
	IV	VAC	Ethics in AI	VAC26004	3	0	0	3	40	60	100
	V	EAA	Extra Academic Activity (NSS, NCC, YRC....)					1*			
								21			700

SEMESTER-V

Semester	Part	Course Category	Title of the Course	Course Code	L	T	P	Credits	Marks		
									CAT	ESE	Total
V	III	Core	Natural Language Processing	UAI26511	3	0	0	3	40	60	100
		Core	Natural Language Processing Lab	UAI26512	0	0	4	2	40	60	100
		Core	Computer Vision	UAI26513	4	0	0	4	40	60	100
		DEC	Embedded Systems	UAI26007	3	0	2	4	40	60	100
			Software Engineering in AI	UAI26008							
			Cloud and Edge AI	UAI26009							
		SEC	AR/VR Technologies	UAI26S01	3	1	0	4	40	60	100
			Information Security	UAI26S02	3	1	0	4	40	60	100
		DEC	Modern Cryptography	UAI26010	3	0	2	4	40	60	100
			Intelligence Systems and its Applications	UAI26011							
			Predictive Maintenance (PdM)	UAI26012							
	IV	EE	Experiential Elective (Internship)	UAIEE01	*			2	*	*	100
								27			800

SEMESTER-VI

Semester	Part	Course Category	Title of the Course	Course Code	L	T	P	Credits	Marks		
									CAT	ESE	Total
VI	III	Core	Robotics Process Automation	UAI26614	3	0	0	3	40	60	100
		Core	Robotics Process Automation Lab	UAI26615	0	0	4	2	40	60	100
		Core	Mini Project	UAI26616	0	0	12	6	40	60	100
		DEC	Generative AI & Prompt Engineering	UAI26013	3	0	2	4	40	60	100
			Mobile Application Development	UAI26014							
			Block Chain Technology	UAI26015							
		SEC	Human Computer Interaction	UAI26S03	3	1	0	4	40	60	100
			Drone Technology and AI	UAI26S04	3	1	0	4	40	60	100

		DEC	Web Development using AI	UAI26016	3	0	2	4	40	60	100
			Federated Learning	UAI26017							
			Intelligent Autonomous Systems	UAI26018							
	IV	VAC	Gender Studies	VAC26005	2	0	0	2	40	60	100
								29			800

Semester-wise Categorization of Courses

COURSE CATEGORY	Semester						No of Courses	Total Credits
	I	II	III	IV	V	VI		
Ability Enhancement Course (Core Language Foundation)	2	2	2	2	-	-	8	24
Core Courses (Theory & Practicals)	3	3	2	2	3	3	16	48
MDC–Multi Disciplinary Course	1	1	1	1	-	-	4	12
DEC–Disciplinary Elective Course	-	-	1	1	2	2	6	24
SEC–Skill Enhancement Course	-	-	-	-	2	2	4	16
VAC– Value Added Course	1	1	1	1	-	1	5	12
EE–Experiential Elective	-	-	-	-	1	-	1	2
EAA–Extra Academic Activity	-	-	-	1	-	-	1	
Total Courses Per Semester	7	7	7	8	8	8	45(Courses)	
Total Credits	20	20	21	21	27	29	138(Credits)	

MDC Offered By The Department (UG)

UAI26901- Artificial Intelligence and IoT
UAI26902 – AI in Healthcare
UAI26903 – Digital Skills with Artificial Intelligence
UAI26904 – Responsible AI

MDC Offered By The Department (PG)

PAI26901- Generative Artificial Intelligence and Applications
PAI26902 – AI Tools for Research and Professional Practice
PAI26903 – Data Analytics and Artificial Intelligence
PAI26904 – Emerging Trends in Artificial Intelligence

DEC Offered By The Department

UAI26001	Data Analytics
UAI26002	Web Technologies
UAI26003	AI/ML Techniques for Cyber Security
UAI26004	Internet of Things
UAI26005	Open-Source Systems
UAI26006	Reinforcement Learning
UAI26007	Embedded Systems
UAI26008	Software Engineering in AI
UAI26009	Cloud and Edge AI
UAI26010	Modern Cryptography
UAI26011	Intelligence Systems and its Applications
UAI26012	Predictive Maintenance (PdM)
UAI26013	Generative AI & Prompt Engineering
UAI26014	Mobile Application Development
UAI26015	Block Chain Technology
UAI26016	Web Development using AI
UAI26017	Federated Learning
UAI26018	Intelligent Autonomous Systems

Sem	Course Code	Title of the Course	Course Category	L	T	P	Credits
I	UAI26101	Python Programming	Core	3	0	0	3
Pre-Requisite: Basic Computer Knowledge, Programming Fundamentals							
Co- Requisite: Problem Solving, Logical Reasoning							
Progressive Course: Data Structures							
Course Objectives:							
1. To introduce the fundamental concepts, syntax, and semantics of Python programming.							
2. To teach the implementation of control structures, functions, and modular programming in Python.							
3. To provide in-depth knowledge of built-in data structures and file handling mechanisms.							
4. To explain the principles of Object-Oriented Programming (OOP) and their application in Python.							
5. To familiarize students with advanced Python concepts, standard libraries, and basic GUI/Database connectivity.							
Course Outcomes:							
CO1: Understand the basic syntax, data types, operators, and environment setup required for Python programming. (K2)							
CO2: Design and develop logical programs using control structures, functions, and modular programming techniques. (K3)							
CO3: Apply built-in data structures (Lists, Tuples, Sets, Dictionaries) and handle files and exceptions effectively. (K3)							
CO4: Develop object-oriented applications utilizing classes, objects, inheritance, polymorphism, and encapsulation. (K3)							
CO5: Utilize advanced Python libraries and modules for regular expressions, database connectivity, and basic GUI development. (K3)							
Unit-I	Fundamentals of Python Programming						9 Hrs.
Introduction to Python - Features and Applications of Python - Installation and Python Environment - Tokens, Keywords, Identifiers and Variables - Data Types - Operators and Expressions - Input and Output Statements - Type Conversion - Control Statements - Conditional and Looping Statements.							
Unit-II	Functions, Modules and Built-in Data Structures						9 Hrs.

Functions - Types of Functions - Function Arguments - Recursive Functions - Modules and Packages - Strings and String Operations - Lists and List Methods - Tuples - Sets - Dictionaries - List Comprehensions.		
Unit-III	File Processing and Object-Oriented Programming	9 Hrs.
File Handling - Reading and Writing Files - Exception Handling - Classes and Objects - Constructors - Inheritance - Polymorphism - Encapsulation - Method Overriding - Operator Overloading.		
Unit-IV	Scientific Computing and Data Visualization using Python	9 Hrs.
Introduction to NumPy - Arrays and Array Operations - Matrix Manipulations - Introduction to Pandas - Series and DataFrames - Data Cleaning and Data Manipulation - Data Visualization using Matplotlib - Plotting Techniques - Statistical Functions.		
Unit-V	Advanced Python Concepts and Emerging Applications	9 Hrs.
Regular Expressions - Iterators and Generators - Lambda Functions - Map, Filter and Reduce Functions - Introduction to Multithreading - Introduction to Web Scraping - GUI Programming - Python Applications in Data Science, Machine Learning and Artificial Intelligence.		

Text Book(s):

1. Python Crash Course – Eric Matthes, 3rd Edition, No Starch Press, 2023.
2. Python for Everybody – Charles R. Severance, 2nd Edition, 2023.
3. Python Programming: An Introduction to Computer Science – John Zelle, Franklin, Beedle & Associates, 2024.
4. Learning Python – Mark Lutz, O'Reilly Media. (Still one of the most comprehensive Python references.)
5. Python Data Science Handbook – Jake VanderPlas, O'Reilly Media, 2023.

Reference Book(s):

1. Kenneth A. Lambert, Fundamentals of Python: First Programs, Cengage Learning, 2018.
2. John V. Guttag, Introduction to Computation and Programming Using Python, MIT Press, 3rd Edition, 2021.
3. Wes McKinney, Python for Data Analysis, O'Reilly Media, 3rd Edition, 2022.
4. Luciano Ramalho, Fluent Python, O'Reilly Media, 2nd Edition, 2022.

e Resources:

1. Python Official Documentation – <https://docs.python.org/3/>
2. NPTEL Course: The Joy of Computing Using Python.
3. W3Schools Python Tutorial – <https://www.w3schools.com/python/>
4. NumPy Documentation – <https://numpy.org/doc/>
5. Pandas Documentation – <https://pandas.pydata.org/docs/>

Relationship Matrix for COs, POs and PSOs

Semester	Course code	Title of the course										Hours	Credit
I	UAI26101	Python Programming										3	3
Course Outcomes (COs)	Programme Outcomes(POs)										Programme Specific Outcomes (PSOs)		Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
CO1	3	2	1	1	2	1	1	1	1	1	3	2	1.6
CO2	3	3	2	2	3	1	1	1	1	1	3	2	2.0
CO3	3	3	3	2	3	1	1	1	1	1	3	3	2.2
CO4	3	3	2	3	3	1	1	1	1	2	3	3	2.3
CO5	3	3	3	3	3	2	2	1	1	2	3	3	2.7
Mean	3.0	2.8	2.2	2.2	2.8	1.2	1.2	1.0	1.0	1.4	3.0	2.6	2.1

Sem	Course Code	Title of the Course	Course Category	L	T	P	Credits
I	UAI26102	Python Programming Lab	Core	0	0	4	2
Pre-Requisite: Basic Computer Knowledge							
Co- Requisite: Python Programming Theory							
Progressive Course: Data Structures Lab, Data Science Lab							
Course Objectives:							
1.To provide hands-on experience in Python programming fundamentals, including control structures, functions, and built-in data structures for solving computational problems.							
2. To develop programming skills using modular programming concepts, file handling techniques, and exception handling mechanisms for robust software development.							
3. To impart practical knowledge of object-oriented programming concepts such as classes, objects, inheritance, polymorphism, and encapsulation.							
4. To familiarize students with scientific computing, data analysis, and data visualization using Python libraries including NumPy, Pandas, and Matplotlib.							
5. To enable students to design and implement Python applications involving databases, web technologies, and Artificial Intelligence, Machine Learning, and Data Science applications.							
Course Outcomes:							
CO1: Apply Python programming constructs and data structures to solve computational problems. (K3)							
CO2: Develop modular and object-oriented applications using Python. (K3)							
CO3: Implement file handling, exception handling, and advanced programming concepts. (K3)							
CO4: Analyze and visualize data using NumPy, Pandas, and Matplotlib libraries.(K4)							
CO5: Design Python applications for databases, web technologies, and Artificial Intelligence domains. (K5)							
PROGRAMS							60 Hrs.
List of Experiments :							
1. Python Basics and Decision Making Develop programs using variables, operators, input/output, and control statements.							
2. Payroll Management System Calculate employee salary, tax, overtime, and net pay using functions.							
3. Student Result Management System Store student details, calculate grades, and generate mark sheets using lists and dictionaries.							
4. Bank Account Management System							

Implement deposit, withdrawal, balance inquiry, and transaction history using OOP.

5. Inventory Management System

Manage products, stock updates, billing, and inventory reports.

6. Employee Management System

Perform CRUD (Create, Read, Update, Delete) operations using file handling.

7. Library Management System

Issue/return books, maintain member records, and calculate fines.

8. File Processing and Log Analyzer

Read log files, count errors, generate summaries, and handle exceptions.

9. Data Analysis using NumPy

Perform array operations, matrix computations, and statistical analysis.

10. Sales Data Analysis using Pandas

Import CSV files, clean data, generate summaries, and analyze sales performance.

11. Business Dashboard using Matplotlib

Visualize monthly sales, profits, customer trends, and product performance.

12. Customer Data Validation using Regular Expressions

Validate email IDs, phone numbers, passwords, and identification numbers.

13. Web Scraping for Product Price Analysis

Extract product information from websites and generate price comparison reports.

14. GUI-Based Billing System

Develop a billing application using Tkinter with invoice generation.

15. Mini AI-Based Application

Develop a simple Python application using basic Machine Learning (e.g., house price prediction, spam detection, or iris flower classification using Scikit-learn).

Relationship Matrix for COs, POs and PSOs

Semester	Course code			Title of the course							Hours		Credit
I	UAI26102			Python Programming Lab							4		2
Course Outcomes (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)		Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
CO1	3	2	1	1	3	1	1	1	1	1	3	2	1.9
CO2	3	3	2	2	3	1	1	1	1	1	3	3	2.2
CO3	3	3	3	2	3	1	1	1	1	1	3	3	2.3
CO4	3	3	2	3	3	1	1	1	1	2	3	3	2.4
CO5	3	3	3	3	3	2	2	1	1	2	3	3	2.7
Mean	3.0	2.8	2.2	2.2	3.0	1.2	1.2	1.0	1.0	1.4	3.0	2.8	2.1

Sem	Course Code	Title of the Course	Course Category	L	T	P	Credits
I	UAI26103	Foundations of Artificial Intelligence	Core	4	0	0	4
Pre-Requisite: Programming Fundamentals							
Co- Requisite: Problem solving Techniques							
Progressive Course: Machine Learning, Deep Learning							
Course Objectives:							
1. To introduce the fundamental concepts of Artificial Intelligence, intelligent agents, problem-solving approaches, search strategies, and optimization techniques used in AI systems.							
2. To develop an understanding of logical reasoning, knowledge representation, first-order predicate logic, Prolog programming, and inference mechanisms for solving complex problems.							
3. To familiarize students with intelligent agent architectures, multi-agent systems, communication and negotiation mechanisms, and applications of AI in natural language processing, information retrieval, and robotics.							
4. To impart knowledge of propositional logic, planning, semantic networks, conceptual graphs, and knowledge-based reasoning techniques for representing and processing knowledge.							
5. To enable students to apply various search and optimization techniques, including genetic algorithms, neural networks, ant colony optimization, and heuristic search methods, to solve real-world AI problems.							
Course Outcomes:							
CO1: Evaluate the characteristics and advantages of different intelligent agents. (K5)							
CO2: Identify the different search strategies in AI. (K1)							
CO3: Apply to solve AI problems. (K3)							
CO4: Creating in different ways of designing software agents. (K5)							
CO5: Develop the applications of AI & solve the problems. (K5)							
Unit-I	Introduction						12 Hrs.
Definition - Future of Artificial Intelligence - Characteristics -Typical Intelligent agents - Problem solving approach - Problem Solving methods - Search strategies - Uniformed and informed - Heuristics - Local search - Algorithm and optimization problems - Searching with partial observations - Constraint satisfactory problems - Constraint propagation - Back tracking search - Game playing - Optimal decision.							
Unit-II	Logical Reasoning						12 Hrs.
Alpha beta pruning - Stochastic games - First order predicate logic - Prolog programming – Unification - Forward Chaining - Backward chaining – Resolution - Knowledge Representation - Ontological Engineering - Categories – Objects - Events - Mental Events - Mental Objects -Reasoning Systems -							

Reasoning with default information -Typical AI Problems.		
Unit-III	Agent Systems	12 Hrs.
Architecture for intelligent agents- Agent communication – Negotiation - Bargaining - Argumentation - Agents - Trust - Reputation - Multi agent systems - AI applications - Language Models - Information Retrieval- Information extraction -Natural language processing - Machine translation - Speech recognition - Robot Hardware -Perception.		
Unit-IV	Proportional Logic	12 Hrs.
Planning – Moving – Frames - Semantic Net Scripts – Goals - Plans - Inheritance in Taxonomies - Description logics - Formal concept analysis - Conceptual graphs - Hierarchies in domain - Knowledge based reasoning – Agents - Facts of knowledge - Logic and inference - Formal logic - Propositional logic.		
Unit-V	Searching and Optimization Techniques	12 Hrs.
Resolution method - First order logic - Second order logic - Genetic algorithms - Travelling sales man problem - Neural networks - Emergent systems - Ant colony optimization - Generate and search - Depth first search - Breadth first search - Comparison of BFS and DFS - Quality of Solution - Depth bounded DFS - DF Iterative deepening - Hill climbing - Beam search - Peak to peak methods.		

Text Book(s):

1. Artificial Intelligence: A Modern Approach – Stuart Russell and Peter Norvig, Pearson, 2022.
2. Artificial Intelligence: Foundations of Computational Agents – David L. Poole and Alan K. Mackworth, Cambridge University Press, 2023.
3. Artificial Intelligence – Kevin Knight, Elaine Rich and B. Nair, McGraw-Hill Education, 2023.
4. Nils J. Nilsson, Artificial Intelligence: A New Synthesis, 1st Edition, Morgan Kaufmann Publishers, 1998.
5. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, 6th Edition, Pearson Education, 2009.

Reference Book(s):

1. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow – Aurélien Géron, O'Reilly Media, 2022.
2. Deep Learning – Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press (Reprint), 2023.
3. Artificial Intelligence for Humans – Jeff Heaton, Heaton Research, 2023.
4. Natural Language Processing with Transformers – Lewis Tunstall, Leandro von Werra and Thomas Wolf, O'Reilly Media, 2024.

e Resources:

1. NPTEL: Artificial Intelligence by Prof. Deepak Khemani, IIT Madras.
2. NPTEL: Introduction to Artificial Intelligence by Prof. P. Dasgupta, IIT Kharagpur.
3. MIT Open Courseware: Introduction to Artificial Intelligence.
4. Stanford University CS221: Artificial Intelligence – Principles and Techniques.
5. Coursera: AI for Everyone by Andrew Ng.

Relationship Matrix for COs, POs and PSOs

Semester	Course code		Title of the course								Hours		Credit
I	UAI26103		Foundation of Artificial Intelligence								4		4
Course Outcomes (COs)	Programme Outcomes(POs)										Programme Specific Outcomes (PSOs)		Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
CO1	3	2	1	1	2	1	1	1	1	1	3	2	1.8
CO2	3	3	2	2	3	1	1	1	1	1	3	3	2.2
CO3	3	3	3	2	3	1	1	1	1	2	3	3	2.4
CO4	3	3	2	3	3	1	1	1	1	2	3	3	2.4
CO5	3	3	3	3	3	2	2	1	1	2	3	3	2.7
Mean	3.0	2.8	2.2	2.2	2.8	1.2	1.2	1.0	1.0	1.6	3.0	2.8	2.1

Sem	Course Code	Title of the Course	Course Category	L	T	P	Credits
II	UAI26204	Data Structures and Algorithms	Core	3	1	0	4
Pre-Requisite: Programming Fundamentals							
Co- Requisite: Object-Oriented Programming							
Progressive Course: Database Management Systems							
Course Objectives:							
1. Understand the fundamentals of data structures and algorithm design							
2. Learn linear and non-linear data structures and their applications							
3. Analyze the efficiency of algorithms using asymptotic notations.							
4. Implement searching, sorting, and graph algorithms.							
5. Apply appropriate data structures and algorithms to solve real-world computational problems							
Course Outcomes:							
CO1: Explain the concepts of data structures, algorithms, and complexity analysis. (K2)							
CO2: Apply linear data structures to solve computational problems. (K3)							
CO3: Implement non-linear data structures and graph algorithms. (K3)							
CO4: Analyze the efficiency of searching and sorting algorithms. (K4)							
CO5: Design efficient algorithmic solutions using appropriate data structures. (K6)							
Unit-I	Fundamentals of Data Structures and Algorithms						12 Hrs.
Introduction to Data Structures – Abstract Data Types – Algorithm Design – Performance Analysis – Time and Space Complexity – Asymptotic Notations (Big O, Omega, Theta) – Arrays – Operations on Arrays – Applications of Arrays – Recursion and Recurrence Relations.							
Unit-II	Linear Data Structures						12 Hrs.
Stacks – Operations – Applications – Queue – Circular Queue – Priority Queue – Deque – Linked Lists – Singly Linked List – Doubly Linked List – Circular Linked List – Applications.							
Unit-III	Trees and Graphs						12 Hrs.
Tree Terminologies – Binary Trees – Binary Search Trees – AVL Trees – Heap – Heap Operations – Graph Representation – Breadth First Search (BFS) – Depth First Search (DFS) – Minimum Spanning Tree – Shortest Path Algorithms.							

Unit- IV	Searching and Sorting Techniques	12 Hrs.
Linear Search – Binary Search – Bubble Sort – Selection Sort – Insertion Sort – Merge Sort – Quick Sort – Heap Sort – Comparison of Sorting Algorithms – Hashing – Collision Resolution Techniques.		
Unit-V	Advanced Algorithms and Applications	12 Hrs.
Greedy Method – Dynamic Programming – Divide and Conquer – Backtracking – Branch and Bound – String Matching Algorithms – Algorithmic Problem Solving – Applications in Artificial Intelligence, Data Science, and Big Data.		

Text Book(s):

1. Data Structures and Algorithms in Python – Michael T. Goodrich, Roberto Tamassia and Michael H. Goldwasser, Wiley, 2024.
2. Data Structures and Algorithms Made Easy – Narasimha Karumanchi, CareerMonk Publications, 2023.
3. Introduction to Algorithms – Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, MIT Press, 2022.
4. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 4th Edition, Pearson Education, 2014.
5. Ellis Horowitz, Sartaj Sahni & Susan Anderson-Freed, Fundamentals of Data Structures in C++, 2nd Edition, Universities Press, 2008.

Reference Book(s):

1. Algorithms – Robert Sedgewick and Kevin Wayne, Addison-Wesley.
2. The Algorithm Design Manual – Steven S. Skiena, Springer, 2020.
3. Problem Solving with Algorithms and Data Structures Using Python – Brad Miller and David Ranum, 2023.

e Resources:

1. NPTEL – Data Structures and Algorithms
2. GeeksforGeeks – Data Structures and Algorithms
3. VisuAlgo
4. Programiz – Data Structures and Algorithms
5. OpenDSA

Relationship Matrix for COs, POs and PSOs

Semester	Course code			Title of the course							Hours		Credit
II	UAI26204			Data Structures and Algorithms							4		4
Course Outcome s (COs)	Programme Outcomes(POs)										Programme Specific Outcomes (PSOs)		Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
CO1	3	2	1	2	2	1	1	1	1	1	3	2	1.7
CO2	3	3	2	2	3	1	1	1	1	1	3	3	2.1
CO3	3	3	3	3	3	1	1	1	1	1	3	3	2.3
CO4	3	3	3	3	3	1	1	1	1	2	3	3	2.4
CO5	3	3	3	3	3	2	2	2	2	2	3	3	2.6
Mean	3.0	2.8	2.4	2.6	2.8	1.2	1.2	1.2	1.2	1.4	3.0	2.8	2.3

Sem	Course Code	Title of the Course	Course Category	L	T	P	Credits
II	UAI26205	Database Concepts with AI	Core	3	0	0	3
Pre-Requisite: Basics of Programming (Python/C)							
Co- Requisite: Data Structures and Algorithms							
Progressive Course: Machine Learning, Data Mining							
Course Objectives:							
1. To understand the fundamentals of database management systems and data models.							
2. To design and implement relational databases using SQL.							
3. To learn database normalization and transaction management.							
4. To explore NoSQL databases and big data storage techniques.							
5. To understand the role of databases in Artificial Intelligence and Machine Learning applications.							
Course Outcomes:							
CO1: Explain the architecture, services, and process management techniques of operating systems, including scheduling and multithreading concepts. (K2)							
CO2: Design relational databases and implement SQL queries for data manipulation and retrieval. (K3)							
CO3: Apply normalization and transaction management techniques to develop efficient databases. (K3)							
CO4: Analyze NoSQL databases and big data storage solutions for AI applications. (K4)							
CO5: Develop database-driven AI applications using structured and unstructured data. (K5)							
Unit-I	Introduction to Database Management Systems						12 Hrs.
Database Concepts – Database Systems – File System vs DBMS – Database Architecture – Data Models – Entity Relationship Model – ER Diagram – Relational Model – Keys – Constraints – Database Design Process.							
Unit-II	Relational Database and SQL						12 Hrs.
Structured Query Language (SQL) – DDL – DML – DCL – TCL – Data Types – Creating Tables – Constraints – Insert, Update, Delete – Select Queries – Joins – Aggregate Functions – Subqueries – Views – Indexes.							

Unit-III	Database Design and Transaction Management	12 Hrs.
Functional Dependencies – Normalization (1NF, 2NF, 3NF, BCNF) – Transactions – ACID Properties – Concurrency Control – Locking – Deadlocks – Recovery Techniques – Backup and Restore.		
Unit-IV	NoSQL Databases and AI Data Management	12 Hrs.
Introduction to NoSQL – Key-Value Databases – Document Databases – Column Family Databases – Graph Databases – MongoDB Fundamentals – JSON Documents – Data Warehousing – Big Data Storage – Data Lakes.		
Unit-V	Database Applications in Artificial Intelligence	12 Hrs.
Data Collection for AI – Data Preprocessing – Feature Storage – AI Data Pipelines – Database Connectivity using Python – SQL with Python – Databases for Machine Learning – Real-Time Databases – Cloud Databases – AI Applications in Healthcare, Finance, and Smart Cities.		

Text Book(s):

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 8th Edition, McGraw-Hill, 2023.
2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 8th Edition, Pearson, 2021.
3. Carlos Coronel & Steven Morris, Database Systems: Design, Implementation, & Management, 14th Edition, Cengage Learning, 2023.
4. Pramod J. Sadalage & Martin Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, 1st Edition, Addison-Wesley Professional, 2012.
5. Alice Zheng & Amanda Casari, Feature Engineering for Machine Learning: Principles and Techniques for Data Scientists, 1st Edition, O'Reilly Media, 2018.

Reference Book(s):

1. Carlos Coronel, Steven Morris, Database Systems: Design, Implementation and Management, 14th Edition, Cengage Learning, 2024.
2. Pramod J. Sadalage, Martin Fowler, NoSQL Distilled, Addison-Wesley.
3. Martin Kleppmann, Designing Data-Intensive Applications, O'Reilly.
4. Joel Murach, Murach's MySQL, Murach Publications.

e Resources:

NPTEL – Database Management Systems (IIT lectures)

Oracle Live SQL – SQL practice environment

MongoDB University – MongoDB and NoSQL courses

PostgreSQL Documentation – SQL and database reference

MySQL Documentation – MySQL reference and tutorials

Relationship Matrix for COs, POs and PSOs

Semester	Course code			Title of the course							Hours		Credit
II	UAI26205			Database Concepts with AI							3		3
Course Outcomes (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)		Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
CO1	3	2	1	2	2	1	1	1	1	1	3	2	1.7
CO2	3	3	2	2	3	1	1	1	1	1	3	3	2.1
CO3	3	3	3	3	3	1	1	1	1	2	3	3	2.3
CO4	3	3	3	3	3	2	2	1	1	2	3	3	2.4
CO5	3	3	3	3	3	2	2	2	2	2	3	3	2.6
Mean	3.0	2.8	2.4	2.6	2.8	1.4	1.4	1.2	1.2	1.6	3.0	2.8	2.3

Sem	Course Code	Title of the Course	Course Category	L	T	P	Credits
II	UAI26206	Database concepts with AI Lab	Core	0	0	4	2
Pre-Requisite: Basics of SQL							
Co- Requisite: Database Concepts with AI, Data Analytics using Python							
Progressive Course: Machine Learning							
Course Objectives:							
1. Explain the fundamentals of relational databases, SQL, and database design concepts.							
2. To develop skills in database design, normalization, transaction management, and the implementation of stored procedures, triggers, and views.							
3. To familiarize students with NoSQL database technologies, including document-oriented, key-value, and graph databases, and their applications.							
4. To impart hands-on experience in querying, indexing, aggregation, replication, and distributed data management techniques using modern NoSQL databases.							
5. To enable students to design and implement integrated database solutions using RDBMS and NoSQL technologies for real-world applications in domains such as e-commerce, social media, healthcare, and IoT.							
Course Outcomes:							
CO1: Explain the concepts of relational databases, SQL, and database design. (K2)							
CO2: Create and manipulate databases using SQL queries, constraints, joins, and transactions. (K3)							
CO3: Apply normalization, stored procedures, triggers, and security techniques in database applications. (K3)							
CO4: Implement NoSQL databases and integrate Python with SQL/NoSQL databases for AI applications. (K4)							
CO5: Develop a real-world database-driven AI application using SQL, NoSQL, and Python. (K5)							
Programs							60 Hrs.
List of Experiments							
1. Database Design for an AI Application							
Design an ER diagram and relational schema for an AI-based application (Healthcare, Banking, E-commerce).							
2. Creating and Managing Databases							
Create databases and tables using SQL DDL commands with constraints.							

3. Customer Data Management System

Perform CRUD operations using SQL DML commands.

4. E-Commerce Sales Analysis

Retrieve and analyze sales data using SQL queries, aggregate functions, GROUP BY, and HAVING.

5. Student Performance Analytics

Use SQL Joins (INNER, LEFT, RIGHT, FULL) to integrate academic datasets.

6. AI Dataset Management

Import and manage AI datasets using CSV files and SQL databases.

7. Data Cleaning using SQL

Handle NULL values, duplicates, missing records, and data inconsistencies.

8. Database Normalization

Convert unnormalized data into 1NF, 2NF, 3NF, and BCNF.

9. Transaction Processing System

Implement COMMIT, ROLLBACK, SAVEPOINT, and ACID transaction properties.

10. Database Security and User Management

Create users, assign roles, and implement database privileges.

11. NoSQL Database using MongoDB

Create collections, insert JSON documents, and perform CRUD operations.

12. Python–SQL Database Connectivity

Connect Python with MySQL/PostgreSQL and execute SQL queries.

13. AI Data Pipeline

Extract data from a database, preprocess it using Python (Pandas), and prepare it for machine learning.

14. Mini Project – AI Database Management System

Develop a database-driven application (e.g., Hospital Management, Inventory Management, Employee Management, Smart Agriculture, or Online Retail) with SQL and Python integration.

Relationship Matrix for COs, POs and PSOs

Semester	Course code			Title of the course							Hours		Credit
II	UAI26206			Database Concepts using AI Lab							4		2
Course Outcome s (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)		Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
CO1	3	2	2	2	3	1	1	1	1	1	3	3	2.0
CO2	3	3	2	2	3	1	1	1	1	1	3	3	2.1
CO3	3	3	3	3	3	1	1	1	1	2	3	3	2.3
CO4	3	3	3	3	3	2	2	1	1	2	3	3	2.5
CO5	3	3	3	3	3	2	2	2	2	2	3	3	2.7
Mean	3.0	2.8	2.6	2.6	3.0	1.4	1.4	1.2	1.2	1.6	3.0	3.0	2.3

Sem	Course Code	Title of the Course	Course Category	L	T	P	Credits
I	UAI26901	Artificial Intelligence and IoT	MDC	3	0	0	3
Pre-Requisite: Nil							
Co- Requisite: Basic Computer Literacy and Internet Usage							
Progressive Course: AI in Healthcare, Responsible AI							
Course Objectives:							
1. To understand the fundamentals of Artificial Intelligence and Internet of Things (IoT).							
2. To learn IoT architecture, sensors, communication protocols, and cloud platforms.							
3. To apply AI techniques for processing IoT data and intelligent decision-making.							
4. To develop AI-enabled IoT applications using modern tools and technologies.							
5. To explore real-world a IoT applications in smart industries and healthcare.							
Course Outcomes:							
CO1: Explain the fundamental concepts, history, applications, and problem-solving approaches of Artificial Intelligence. (K2)							
CO2: Apply uninformed and informed search techniques to solve AI problems and analyze their performance. (K3)							
CO3: Illustrate knowledge representation methods and logical reasoning techniques for intelligent systems. (K3)							
CO4: Develop simple intelligent agents and apply machine learning concepts for decision-making and problem-solving. (K4)							
CO5: Analyze real-world applications of AI and evaluate ethical, societal, and future challenges associated with intelligent systems. (K5)							
Unit-I	Introduction to Artificial Intelligence						9 Hrs.
Introduction to Artificial Intelligence – History and Evolution of AI – Characteristics of AI – Types of AI – Intelligent Agents – Problem Solving in AI – Knowledge Representation – Search Techniques – Applications of AI – Introduction to Generative AI.							
Unit-II	Fundamentals of Internet of Things						9 Hrs.
Introduction to IoT – Characteristics of IoT – IoT Architecture – Sensors and Actuators – Embedded Systems – IoT Communication Technologies – Cloud Computing – Edge Computing – IoT Platforms – Data Collection and Processing.							

Unit-III	Artificial Intelligence for IoT	9 Hrs.
Machine Learning Basics – AI Models for IoT – Data Analytics – Predictive Analytics – Intelligent Decision Making – AI-Based Automation – Computer Vision – Natural Language Processing – Edge AI.		
Unit-IV	Applications of AI and IoT	9 Hrs.
Smart Homes – Smart Cities – Smart Healthcare – Smart Agriculture – Industrial Internet of Things (IIoT) – Smart Transportation – Environmental Monitoring – Smart Energy Management – Real-world Case Studies.		
Unit-V	Ethics, Security and Future Trend	9 Hrs.
Responsible AI – AI Ethics – Privacy and Data Protection – IoT Security – Cybersecurity Challenges – Explainable AI – Sustainable AI – Emerging Trends – Future Scope of AI and IoT.		

Text Book(s):

1. Arshdeep Bahga & Vijay Madisetti, Internet of Things – A Hands-on Approach, 2nd Edition. Herbert Schildt, Java: The Complete Reference, 13th Edition, McGraw-Hill Education, 2024.
2. Stuart Russell & Peter Norvig, Artificial Intelligence: A Modern Approach, 4th Edition, Pearson, 2022.
3. David Hanes et al., IoT Fundamentals, Cisco Press.
4. Fundamentals of Artificial Intelligence, Deepak Khemani, McGraw Hill Education.
5. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, Pearson Education, 4th Edition, 2022.

Reference Book(s):

1. Artificial Intelligence – Elaine Rich and Kevin Knight, McGraw-Hill.
2. Learning Internet of Things – Peter Waher, Packt Publishing..
3. Building the Internet of Things – Maciej Kranz, Wiley.
4. Machine Learning with Python – Sebastian Raschka, Packt Publishing.

e Resources:

1. NPTEL – Internet of Things
2. NPTEL – Artificial Intelligence
3. Cisco Networking Academy – IoT
4. Arduino Documentation
5. Raspberry Pi Documentation
6. AWS IoT Documentation
7. Microsoft Learn – Azure IoT
8. TensorFlow Lite Documentation
9. IBM SkillsBuild ion.

Relationship Matrix for COs, POs and PSOs

Semester	Course code	Title of the course										Hours	Credit
I	UAI26901	Artificial Intelligence and IoT										3	3
Course Outcomes (COs)	Programme Outcomes(POs)										Programme Specific Outcomes (PSOs)		Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
CO1	3	2	1	-	-	-	-	-	-	2	3	2	1.33
CO2	3	3	2	2	1	-	-	-	-	2	3	3	1.80
CO3	3	3	3	2	2	-	-	-	1	2	3	3	1.90
CO4	3	3	2	3	2	-	-	-	1	2	3	3	1.90
CO5	3	3	3	3	2	-	-	-	1	2	3	3	2.10
Mean	3.0	2.8	2.2	2.5	1.7	-	-	-	1.0	2.0	3.0	2.8	2.1

Sem	Course Code	Title of the Course	Course Category	L	T	P	Credits
II	UAI26902	AI in Healthcare	MDC	3	0	0	3
Pre-Requisite: Foundation of Artificial Intelligence							
Co- Requisite: Digital Literacy							
Progressive Course: Health Informatics, Bioinformatics							
Course Objectives:							
1. To understand the role of Artificial Intelligence in healthcare and scientific research.							
2. To learn AI techniques for medical data analysis and scientific problem-solving							
3. To apply machine learning and deep learning in healthcare applications.							
4. To explore AI tools for diagnostics, drug discovery, and precision medicine.							
5. To understand ethical, legal, and security issues in AI-enabled healthcare systems.							
Course Outcomes:							
CO1: Explain the fundamentals of AI and its applications in healthcare and scientific research. (K2)							
CO2: Apply AI techniques to analyze healthcare and scientific datasets. (K3)							
CO3 Develop AI models for disease prediction, diagnosis, and scientific analysis. (K3)							
CO4: Analyze medical imaging, bioinformatics, and precision medicine applications using AI. (K4)							
CO5: Design AI-enabled healthcare solutions while considering ethical, legal, and societal issues. (K5)							
Unit-I	Introduction to AI in Health and Science						9 Hrs.
Introduction to Artificial Intelligence – Evolution of AI in Healthcare – Healthcare Information Systems – Electronic Health Records (EHR) – Digital Health – Healthcare Data – Intelligent Clinical Decision Support Systems – AI Applications in Healthcare – Future of AI in Medicine							
Unit-II	Healthcare Data and AI Techniques						9 Hrs.
Healthcare Data Sources – Data Collection and Pre-processing – Machine Learning Fundamentals – Supervised, Unsupervised and Reinforcement Learning – Deep Learning Basics – Natural Language Processing – Medical Data Analytics – Explainable AI.							
Unit-III	AI Applications in Clinical Practice						9 Hrs.
AI in Disease Diagnosis – Medical Imaging (X-ray, CT, MRI) – Predictive Analytics – Clinical Decision Support Systems – Personalized Medicine – Drug Discovery – Patient Risk Prediction – Intelligent Patient Monitoring							

Unit-IV	Digital Health Technologies	9 Hrs.
Telemedicine – Wearable Health Devices – Remote Patient Monitoring – Internet of Medical Things (IoMT) – Smart Hospitals – Robotic Surgery – Virtual Health Assistants – AI in Public Health – Case Studies.		
Unit-V	Ethics, Security and Future Trends	9 Hrs.
Ethics in AI – Responsible AI – Privacy and Security of Healthcare Data – Healthcare Regulations – Bias and Fairness in AI – Explainable AI – Sustainable Healthcare AI – Emerging Trends – Future Scope of AI in Healthcare.		

Text Book(s):

1. Introduction to Medical Applications of Artificial Intelligence – Arvin Agah, CRC Press.
2. Artificial Intelligence: A Modern Approach – Stuart Russell and Peter Norvig, Pearson, 2022.
3. Healthcare Data Analytics – Chandan K. Reddy and Charu C. Aggarwal, CRC Press.
4. Arjun Panesar, Machine Learning and AI for Healthcare: Big Data for Improved Health Outcomes, 1st Edition, A press, 2019.
5. Sergios Theodoridis, Artificial Intelligence: A Modern Approach to Healthcare and Medical Applications, Academic Press (Elsevier), 2023.

Reference Book(s):

1. Medical Informatics: Computer Applications in Health Care and Biomedicine – Edward H. Shortliffe and James J. Cimino.
2. Computational Intelligence in Biomedical Engineering – Rezaul Begg.
3. Neural Networks and Artificial Intelligence for Biomedical Engineering – Donna L. Hudson and Maurice E. Cohen.

e Resources:

1. Stanford Online Machine Learning and AI Resources <https://online.stanford.edu>
2. Journals on Neural Networks, Artificial Life, and Evolutionary Systems
<https://www.sciencedirect.com>
3. Coursera – AI for Medicine
4. Stanford Online – AI in Healthcare
5. World Health Organization (WHO) – AI and Digital Health Resources
6. Kaggle Learn – Healthcare Data Science
7. Google AI
8. Microsoft Learn – AI

Relationship Matrix for COs, POs and PSOs

Semester	Course code	Title of the course										Hours	Credit
II	UAI26902	AI in Healthcare										3	3
Course Outcome s (COs)	Programme Outcomes(POs)										Programme Specific Outcomes (PSOs)		Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
CO1	3	2	2	1	2	-	-	-	-	-	3	2	1.3
CO2	3	3	3	2	2	-	-	-	-	-	3	3	1.4
CO3	3	3	3	3	2	-	-	-	-	-	3	3	1.7
CO4	3	3	3	3	2	-	-	-	-	-	3	3	1.4
CO5	3	3	3	3	3	1	1	1	2	1	3	3	2.0
Mean	3.0	2.8	2.8	2.4	2.2	1.0	1.0	1.0	2.0	1.0	3.0	2.8	2.0

MDC OFFERED BY THE DEPARTMENT (PG)

Sem	Course Code	Title of the Course	Course Category	L	T	P	Credits
I	PAI26901	Generative Artificial Intelligence and Applications	MDC	3	0	0	3
Pre-Requisite: Basic computer knowledge and familiarity with Internet and digital tools.							
Co- Requisite: Students are encouraged to use AI-enabled digital platforms and cloud-based applications for hands-on learning and practical activities during the course.							
Progressive Course: Responsible and Explainable AI, AI Agents and Autonomous Systems							
Course Objectives:							
1. Understand the concepts, architectures, and evolution of Generative AI.							
2. Learn the working principles of Large Language Models (LLMs) and foundation models.							
3. Apply prompt engineering techniques and Generative AI tools to solve real-world problems.							
4. Explore applications of Generative AI in various domains.							
5. Analyze ethical, legal, and societal issues related to Generative AI.							
Course Outcomes:							
CO1: Explain the concepts, evolution, and applications of Generative Artificial Intelligence. (K2)							
CO2: Describe the architecture and working of Large Language Models and Foundation Models. (K2)							
CO3: Apply prompt engineering techniques and Generative AI tools to develop AI-assisted solutions. (K3)							
CO4: Analyze Generative AI applications across diverse domains and evaluate their impact. (K4)							
CO5: Assess ethical, legal, and societal challenges associated with Generative AI and recommend responsible AI practices. (K5)							
Unit-I	Fundamentals of Generative Artificial Intelligence						9 Hrs.
Introduction to Artificial Intelligence – Evolution of AI – Machine Learning and Deep Learning – Introduction to Generative AI – Traditional AI vs. Generative AI – Types of Generative Models – Foundation Models – Applications of Generative AI – Current Trends.							
Unit-II	Large Language Models and Foundation Models						9 Hrs.
Neural Networks Review – Transformer Architecture – Attention Mechanism – Large Language Models (LLMs) – Foundation Models – Text Generation – Image Generation – Audio and Video Generation – Code Generation. Stream Ciphers - Block Cipher Principles.							

Unit-III	Prompt Engineering and AI Tools	9 Hrs.
Introduction to Prompt Engineering – Zero-shot, One-shot and Few-shot Prompting – Chain-of-Thought Prompting – Prompt Design Strategies – Retrieval-Augmented Generation (RAG) – AI Agents – Fine-tuning Concepts – AI Productivity Tools.		
Unit-IV	Applications of Generative AI	9 Hrs.
Generative AI in Education – Healthcare – Finance – Business Analytics – Agriculture – Software Development – Manufacturing – Scientific Research – Content Creation – Case Studies.		
Unit-V	Responsible AI and Future Trends	9 Hrs.
Explainable AI – Responsible AI – AI Ethics – Bias and Fairness – Privacy and Security – Intellectual Property Rights – AI Governance – Future Trends of Generative AI – Career Opportunities.		

Text Book(s):

1. David Foster, Generative Deep Learning, 2nd Edition, O'Reilly Media, 2023.
2. Tom Taulli, Generative AI: How ChatGPT and Other AI Tools Will Revolutionize Business, Apress, 2023.
3. Amit Bahree, Abhinav Kimothi, and Vishal Punwani, Generative AI in Action, Manning Publications, 1st Edition, 2024.
4. Ben Auffarth, Generative AI with LangChain, Packt Publishing, 1st Edition, 2024.
5. Pam Baker, Generative AI for Dummies, John Wiley & Sons, 1st Edition, 2024.

Reference Book(s):

1. Bernard Marr, Generative AI in Practice, Wiley, 2024.
2. Andreas C. Müller and Sarah Guido, Introduction to Machine Learning with Python, O'Reilly Media, 2nd Edition, 2025.
3. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, Deep Learning, MIT Press, 2016.
4. Chip Huyen, AI Engineering: Building Applications with Foundation Models, O'Reilly Media, 2025.

e-Resources:

DeepLearning.AI – <https://www.deeplearning.ai/>

OpenAI Developer Documentation – <https://platform.openai.com/docs>

Google AI – <https://ai.google>

Google Cloud Skills Boost (Generative AI) – <https://www.cloudskillsboost.google>

Microsoft Learn – AI – <https://learn.microsoft.com/training/browse/?products=ai>

NVIDIA Deep Learning Institute – <https://www.nvidia.com/en-us/training/>

Coursera – Generative AI Courses – <https://www.coursera.org>

Relationship Matrix for COs, POs and PSOs

Semester	Course code	Title of the course										Hours	Credit
I	PAI26901	Generative Artificial Intelligence and Applications										3	3
Course Outcomes (COs)	Programme Outcomes(POs)										Programme Specific Outcomes (PSOs)		Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
CO1	3	2	2	-	-	-	1	2	-	-	2	-	2.0
CO2	2	3	1	-	2	-	-	2	-	-	3	2	2.5
CO3	2	3	1	-	-	2	-	2	-	-	3	2	2.5
CO4	2	2	2	3	2	2	2	2	-	-	2	3	2.5
CO5	1	2	-	2	-	3	3	3	2	2	1	2	2.4
Mean	2.0	2.4	1.5	2.5	2.0	2.5	2.0	2.2	2.0	2.0	2.2	2.3	2.3

Sem	Course Code	Title of the Course	Course Category	L	T	P	Credits
II	PAI26902	AI Tools for Research and Professional Practice	MDC	3	0	0	3
Pre-Requisite: Nil							
Co- Requisite: Basic Computer Literacy							
Progressive Course: Full Stack Web Development, Generative AI Applications							
Course Objectives:							
1. Introduce Artificial Intelligence tools used in academic research and professional practice							
2. Develop skills for AI-assisted literature review, academic writing, data analysis, and research communication.							
3. Familiarize learners with AI-powered productivity tools for documentation, coding, presentations, and collaboration.							
4. Promote responsible, ethical, and transparent use of AI in academic and professional environments.							
5. Enable learners to integrate AI tools effectively into research workflows while maintaining academic integrity.							
Course Outcomes:							
CO1: Explain the concepts of Artificial Intelligence and AI tools used in research and professional practice. (K2)							
CO2: Apply AI tools for literature review, academic writing, citation management and research documentation. (K3)							
CO3: Utilize AI-assisted tools for data analysis, visualization and programming tasks. (K3)							
CO4: Develop professional presentations, reports and communication materials using AI productivity tools. (K4)							
CO5: Evaluate ethical, legal and responsible practices in the use of AI for research and professional applications. (K5)							
Unit-I	Introduction to AI in Research and Professional Practice						9 Hrs.
Introduction to Artificial Intelligence – Evolution of AI – AI in Higher Education and Research – Generative AI and Large Language Models – AI-assisted Research Workflow – Categories of AI Tools – Applications in Education, Business, Healthcare and Engineering – Advantages, Limitations and Challenges – Responsible AI.							

Unit-II	AI Tools for Literature Review and Academic Writing	9 Hrs.
Research Problem Identification – AI-assisted Literature Search – Academic Search Engines – Research Paper Discovery – Research Gap Identification – Reference Management – Citation Styles – AI-assisted Academic Writing – Grammar and Language Enhancement – Plagiarism Awareness – Research Integrity.		
Unit-III	AI Tools for Data Analysis and Programming	9 Hrs.
AI-assisted Data Collection – Data Cleaning and Preparation – Spreadsheet Automation – Data Visualization – AI-assisted Statistical Analysis – AI-assisted Programming – Python Code Generation – Debugging using AI – Documentation Generation – Research Data Interpretation.		
Unit-IV	AI Tools for Professional Communication and Productivity	9 Hrs.
AI-powered Presentation Design – Infographics and Poster Creation – Image Generation – Video Generation – Meeting Transcription and Summarization – Email Writing – Resume and Portfolio Development – Project Planning – Task Automation – AI Collaboration Platforms.		
Unit-V	Responsible AI in Web Development	9 Hrs.
Prompt Engineering Fundamentals – Effective Prompt Design – AI Bias and Fairness – Copyright and Intellectual Property – Data Privacy – Responsible AI Practices – AI Governance – Human-AI Collaboration – Emerging AI Tools – Future Trends in AI-enabled Research and Professional Practice.		

Text Book(s):

1. Russell, S. J., & Norvig, P., Artificial Intelligence: A Modern Approach, 4th Edition, Pearson, 2021.
2. Mollick, Ethan, Co-Intelligence: Living and Working with AI, Portfolio, 2024.
3. Generative AI for Dummies – Pam Baker, Wiley, 2024.
4. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches – John W. Creswell & J. David Creswell, SAGE Publications, 2023.

Reference Book(s):

- 1 Wooldridge, Michael, A Brief History of Artificial Intelligence, Flatiron Books, 2021.
2. Knafllic, Cole Nussbaumer, Storytelling with Data, Wiley, 2015.
3. UNESCO, Recommendation on the Ethics of Artificial Intelligence, UNESCO Publishing, 2021.
4. OECD, OECD Principles on Artificial Intelligence, OECD Publishing.
5. Goodfellow, Ian, Bengio, Yoshua, & Courville, Aaron, Deep Learning, MIT Press, 2016.

e Resources:

1. OpenAI Documentation
2. Google AI Learning Resources
3. Microsoft Learn – AI Fundamentals
4. Hugging Face Documentation
5. Kaggle Learn
6. Semantic Scholar

Relationship Matrix for COs, POs and PSOs

Semester	Course code	Title of the course										Hours	Credit
II	PAI26902	AI Tools for Research and Professional Practice										3	3
Course Outcomes (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)		Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
CO1	3	2	-	1	-	-	-	-	-	-	2	2	2.1
CO2	3	3	1	1	-	-	-	-	-	-	2	2	2.2
CO3	2	3	3	2	-	-	-	-	-	-	3	3	2.0
CO4	2	2	2	1	1	-	-	-	-	-	2	2	2.1
CO5	1	2	3	2	3	-	-	-	-	-	3	3	2.3
Mean	2.2	2.4	2.3	1.4	2.0	-	-	-	-	-	2.4	2.4	2.3