

KONGUNADU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
COIMBATORE - 641029



DEPARTMENT OF
ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

CURRICULUM AND SCHEME OF EXAMINATIONS
(2025-2026 onwards)

**KONGUNADU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
COIMBATORE-641029**

**DEPARTMENT OF
ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**

Vision

- To produce world class leaders in Artificial Intelligence and Machine Learning through Excellence in education and research and build an ecosystem to contribute significantly to the society.

Mission

The Department of Artificial Intelligence and Machine Learning is committed to:

- Impart rigorous training to generate knowledge through the state-of-the-art concepts and technologies in Artificial Intelligence and Machine Learning.
- Initiate, sustain and nourish research groups in Artificial Intelligence.
- Establish centers of excellence in leading areas of computing and Artificial Intelligence.
- Transform the Department of Artificial Intelligence and Machine Learning as a leader in imparting Artificial Intelligence and Machine Learning education and research.
- To motivate the learner community for exploiting the potential of start-ups and innovations in this area and connecting them with the real-life problems of industry.

Programme Outcomes(POs)	
On successful completion of the B.Sc. Artificial Intelligence and Machine Learning	
PO1	Exhibit good domain knowledge and completes the assigned responsibilities effectively and efficiently in par with the expected quality standards.
PO2	Apply analytical and critical thinking to identify, formulate, analyze, and solve complex problems in order to reach authenticated conclusions.
PO3	Design and develop research based solutions for complex problems with specified needs through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.
PO4	Establish the ability to listen, read, proficiently communicate and articulate complex ideas with respect to the needs and abilities of diverse audiences.
PO5	Deliver innovative ideas to instigate new business ventures and possess the qualities of a good entrepreneur.
PO6	Acquire the qualities of a good leader and engage in efficient decision making.
PO7	Graduates will be able to undertake any responsibility as an individual / member of multi-disciplinary teams and have an understanding of team leadership.
PO8	Function as a socially responsible individual with ethical values and accountable to ethically validate any actions or decisions before proceeding and actively contribute to the societal concerns.
PO9	Identify and address own educational needs in a changing world in ways sufficient to maintain the competence and to allow them to contribute to the advancement of knowledge.
PO10	Demonstrate knowledge and understanding of management principles and apply to one's own work to manage projects and in multidisciplinary environment.

Programme Specific Outcomes (PSOs)	
After the successful completion of B.Sc. Artificial Intelligence and Machine Learning program, the students are expected to	
PSO1	Provide innovative ideas to instigate new business ventures in AI industry.
PSO2	Apply the technical and critical thinking skills in the discipline of artificial intelligence and machine learning to find solutions for complex problems.
PSO3	Design and develop research-based solutions for complex problems in artificial intelligence and machine learning industry through appropriate consideration for the public health, safety, cultural, societal and environmental concerns.
PSO4	Establish the ability to listen, read, proficiently communicate and articulate complex ideas with respect to the needs and abilities of diverse audiences.
PSO5	Exhibit good domain knowledge and completes the assigned responsibilities effectively and efficiently in par with the expected quality standards for Artificial Intelligence and Machine Learning professional.

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KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)
 COIMBATORE – 641 029
 Programme Name : **B.Sc. Artificial Intelligence and Machine Learning**
 Curriculum and Scheme of Examination under CBCS
 (Applicable to the students admitted during the Academic Year 2025-2026)

Semester	Part	Subject Code	Title of the Paper	Instruction hours/ cycle	Exam. Marks			Duration of Exam (hours)	Credits
					CIA	ESE	TOTAL		
I	I	25TML101	Language I@	6	25	75	100	3	3
	II	25ENG101	English -I	6	25	75	100	3	3
	III	25 UAI101	Core Paper 1 - C and C++ Programming	5	25	75	100	3	4
	III	25UAI1CL	Core Practical 1 - C and C++ Programming Lab	5	40	60	100	3	2
	III	25UAI1A1	Allied Paper 1 - Discrete Mathematics and Statistics	6	25	75	100	3	5
	IV	25EVS101	Environmental Studies **	2	-	50	50	3	2
	Total			30	-	-	550	-	19
II	I	25 TML202	Language II@	6	25	75	100	3	3
	II	25ENG202	English –II	6	25	75	100	3	3
	III	25UAI202	Core Paper 2 - Java Programming	5	25	75	100	3	4
	III	25UAI2CM	Core Practical 2 - Java Programming Lab	5	40	60	100	3	2
	III	25UAI2A2	Allied Paper 2 - Optimization Techniques and Linear Algebra	6	25	75	100	3	5
	IV	25VED201	Value Education- Moral and Ethics**	2	-	50	50	3	2
	Total			30	-	-	550	-	19
III	I	25TML303	Language III@	6	25	75	100	3	3
	II	25ENG303	English –III	6	25	75	100	3	3
	III	25UAI303	Core Paper 3 - Python Programming for Machine Learning	4	25	75	100	3	4
	III	25UAI3CN	Core Practical 3 - Python Programming for Machine Learning Lab	4	40	60	100	3	4
	III	25UAI 3A3	Allied Paper 3 - Foundations of Robotics	6	25	75	100	3	5
	IV	25UGC3S1	Skill Based Subject 1- Cyber Security	2	100	-	100	3	3
	IV	25TBT301/ 25TAT301/ 25UHR3N1	Basic Tamil* / Advanced Tamil**/ Non-major elective- I**	2	-	75	75	3	2
	Total			30	-	-	675	-	24

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IV	I	25 TML404	Language IV@	6	25	75	100	3	3
	II	25ENG404	English –IV	6	25	75	100	3	3
	III	25UAI404	Core Paper 4 - R Programming	4	25	75	100	3	4
	III	25UAI4CO	Core Practical 4 - R Programming Lab	4	40	60	100	3	3
	III	24U AI4A4	Allied Paper 4 - Design and Analysis of Algorithms	6	25	75	100	3	5
	IV	25UAI4S2	Skill Based Subject 2 - MongoDB Lab	2	25	75	100	3	3
	IV	25TBT402/ 25TAT402/ 25UWR4N2	Basic Tamil* / Advanced Tamil**/ Non-major elective- II**	2	-	75	75	3	2
Total				30	-	-	675	-	23
V	III	25UAI505	Core Paper 5 -Machine Learning Techniques	6	25	75	100	3	5
	III	25UAI506	Core Paper 6 - Introduction to Artificial Intelligence	5	25	75	100	3	4
	III	25UAI5CP	Core Practical 5 - Machine Learning Techniques Lab	6	25	75	100	3	4
	III	25UAI5CQ	Core Practical 6 - Data Analytics and Visualization Lab	6	40	60	100	3	4
	III	25UAI5E1	Major Elective Paper 1	5	25	75	100	3	5
	IV	-	EDC	2	100	-	100	3	3
	-	25UAI5IT	Internship Training *****	Grade					
Total				30	-	-	600	-	25
VI	III	25UAI607	Core Paper 7 -Natural Language Processing	5	25	75	100	3	4
	III	25UAI608	Core Paper 8 - Block Chain Technology	4	25	75	100	3	4
	III	25UAI609	Core Paper 9 – Generative AI	5	25	75	100	3	4
	III	25UAI6CR	Core Practical 6 -Natural Language Processing Lab	5	40	60	100	3	4
	III	25UAI6E2	Major Elective Paper 2	5	25	75	100	3	5
	III	25UAI6Z1	Project and viva voce***	4	20	80	100	-	5
	IV	25UBI6S3	Skill Based Subject 3- Basics of IPR	2	100	-	100	3	3
Total				30	-	-	700	-	29
	V	24NCC \$ / NSS/YRC /PYE/ECC/ RRC/WEC10 1#	Cocurricular Activities*	-	50	-	50	-	1
Grand Total				-	-	-	3800	-	140

Note :

CBCS - Choice Based Credit system CIA - Continuous Internal Assessment
ESE - End of Semester Examinations

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\$ For those students who opt NCC under Cocurricular activities will be studying the prescribed syllabi of the UGC which will include Theory, Practical & Camp components. Such students who qualify the prescribed requirements will earn an additional 24 credits.

@ Hindi/Malayalam/ French/ Sanskrit – 24HIN/MLM/FRN/SAN101 – 404

***** No End-of-Semester Examinations. Only Continuous Internal Assessment (CIA)

****** No Continuous Internal Assessment (CIA). Only End-of-Semester Examinations (ESE)

******* Project Report – 60 marks; Viva voce – 20 marks; Internal-20 marks

******** The students shall undergo Internship training / field work for a minimum period of 14 working days at the end of the fourth semester during summer vacation and submit the report in the fifth semester which will be evaluated for 100 marks by the concerned guide and followed by an Internal Viva voce by the respective faculty or HOD as decided by the department. According to their marks, the grades will be awarded as given below.

Marks %	Grade
85 – 100	O
70 – 84	D
60 – 69	A
50 – 59	B
40 – 49	C
< 40	U (Reappear)

Major Elective Papers (2 papers are to be chosen from the following 14 papers)

1. Internet of Things
2. Open Source Systems
3. Digital Forensics
4. Foundations of Robotics
5. Virtual Reality
6. Artificial Intelligence in Cyber Security
7. Design Thinking
8. Image and Speech Processing
9. Database Management System
10. Data Mining and Warehousing
11. Big Data Analytics
12. Deep Learning
13. Artificial Neural Networks and Fuzzy Logic
14. Data Analytics and Visualization

Non-Major Elective Papers

1. Human Rights
2. Women's Rights
3. Consumer Affairs

Sub. Code & Title of the Extra Departmental Course (EDC) :

25UAI5XL – Fundamentals of Internet and Web Design Lab

List of Cocurricular Activities:

1. National Cadet Corps (NCC)
2. National Service Scheme (NSS)
3. Youth Red Cross (YRC)
4. Physical Education (PYE)
5. Eco Club (ECC)
6. Red Ribbon Club (RRC)
7. Women Empowerment Cell (WEC)

Note: In core/ allied subjects, no. of papers both theory and practical are included wherever applicable. However, the total credits and marks for core/allied subjects remain the same as stated below.

Tally Table:

S. No.	Part	Subject	Marks	Credits
1.	I	Language – Tamil/Hindi/Malayalam/ French/ Sanskrit	400	12
2.	II	English	400	12
3.	III	Core – Theory/Practical	1600	60
	III	Allied	400	20
		Electives/Project	300	15
4.	IV	Basic Tamil / Advanced Tamil (OR) Non-major electives	150	4
		Skill Based subject	300	9
		EDC	100	3
		Environmental Studies	50	2
		Value Education	50	2
5.	V	Cocurricular Activities	50	1
		Total	3800	140

- 25 % CIA is applicable to all subjects except JOC, COP and SWAYAM courses which are considered as extra credit courses.
- 100 % CIA for Cyber Security and EDC paper.
- The students who complete any **MOOC on learning platforms like SWAYAM, NPTEL, Coursera, IIT Bombay Spoken Tutorial etc.,** before the completion of the 5th semester and the course completion certificate should be submitted through the HOD to the Controller of Examinations. Extra credits will be given to the candidates who have successfully completed.
- An **Onsite Training** preferably relevant to the course may be undertaken as per the discretion of the HOD.
- Students who successfully complete **Naan Mudhalvan** courses in 3rd and 5th semester will be given 2 extra credits for each course. They are asked to submit the marks to Controller of Examinations through and undersigned by the HOD.
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Semester	Naan Mudhalvan Course Title
III	AWS Academy Introduction to Cloud: Semester 1
V	AWS Academy Introduction to Cloud: Semester 2

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Components of Continuous Internal Assessment

Components		Marks	Total
Theory			
CIA I	75	(75+75 = 150/10)	25
CIA II	75	15	
Assignment/Seminar		5	
Attendance		5	
Practical			
CIA Practical		25	40
Observation Notebook		10	
Attendance		5	
Project			
Review		15	20
Regularity		5	

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1-Remembering; K2-Understanding; K3-Applying; K4-Analyzing; K5-Evaluating

1. ESE Theory Examination:

(i) CIA I & II and ESE: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K1 – K5 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K2 – K5 Q16 to 20	C (Either or pattern)	5 x 8 = 40	Descriptive / Detailed	

2. ESE Practical Examination:

Knowledge Level	Section	Marks	Total
K3	Experiments	50	60
K4		10	
K5	Record Work		

3. ESE Project Viva Voce:

Knowledge Level	Section	Marks	Total
K3	Project Report	60	80
K4		20	
K5	Viva voce		

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8.	25UAI202	Core Paper 2 - Java Programming	11
9.	25UAI2CM	Core Practical 2 - Java Programming Lab	13
10.	25UAI303	Core Paper 3 - Python Programming for Machine Learning	15
11.	25UAI3CN	Core Practical 3 - Python Programming for Machine Learning Lab	17
12.	25UAI3A3	Allied Paper 3 – Distributed Operating System	19
13.	25UAI404	Core Paper 4 - R Programming	21
14.	25UAI4CO	Core Practical 4 - R Programming Lab	23
15.	25UAI4A4	Allied Paper 4 – Design and Analysis of Algorithms	25
16.	25UAI505	Core Paper 5 - Machine Learning Techniques	27
17.	25UAI506	Core Paper 6 - Introduction to Artificial Intelligence	29
18.	25UAI5CP	Core Practical 5 - Machine Learning Techniques Lab	31
19.	25UAI5CQ	Core Practical 6 - Data Analytics and Visualization Lab	33
20.	25UAI607	Core Paper 7 - Natural Language Processing	35
21.	25UAI608	Core Paper 8 - Block Chain Technology	37
22.	25UAI609	Core Paper 9 – Generative AI	39
23.	25UAI6CR	Core Practical 6 - Natural Language Processing Lab	41
24.	25UAI5E1/ 25UAI5E2	Major Elective: Internet of Things	45
25.		Major Elective: Open Source Systems	47
26.		Major Elective: Digital Forensics	49
27.		Major Elective: Foundations of Robotics	51
28.		Major Elective: Virtual Reality	53
29.		Major Elective: Artificial Intelligence in Cyber Security	55
30.		Major Elective: Design Thinking	57
31.		Major Elective: Image and Speech Processing	59
32.		Major Elective: Database Management System	61
33.		Major Elective: Data Mining and Warehousing	63
34.		Major Elective: Big Data Analytics	
35.		Major Elective: Deep Learning	
36.		Major Elective: Artificial Neural Networks and Fuzzy Logic	
37.		Major Elective: Data Analytics and Visualization	
38.	25UGC3S1	Skill Based Subject 1- Cyber Security	65
39.	25UAI4S2	Skill Based Subject 2- MongoDB Lab	68
40.	25UBI6S3	Skill Based Subject 3 - Basics of IPR	70
41.	25UAI5XL	EDC- Fundamentals of Internet and Web Design Lab	72
42.	25EVS101	Environmental Studies	73
43.	25VED201	Value Education- Moral and Ethics	76
44.	25UHR3N1	Non Major Elective 1: Human Rights	79
45.	25UWR4N2	Non Major Elective 2: Women's Rights	82
46.		Non Major Elective: Consumer Affairs	85
47.	25UAI5IT	Internship Training	88
48.	25UAI6Z1	Project Viva-Voce	43

Programme Code: 24		B.Sc. Artificial Intelligence and Machine Learning		
Title of the Paper: Core Paper 1 - C and C++ Programming				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 4	Skill Development

Course Objectives

1. To impart programming basics and fundamentals of C.
2. To make use of decision making and looping constructs for problem solving.
3. To gain understanding of arrays, pointers and file management in C.
4. To learn how to design and implement generic classes with C++.
5. To expose knowledge of constructor, destructor and function overloading.
6. To learn how to use pointers and develop code with reusability in C++.

Course Outcomes (CO)

K1 to K5	CO1	Remember the fundamentals of C programming.
	CO2	Understand the solutions for problems using decision making and branching concepts.
	CO3	Apply different operations on arrays, make use of functions, structures & unions and work efficiently with files.
	CO4	Analyze, design and implement C++ programs for complex problems, making good use of the features of the language such as classes & objects, function overloading, constructor and destructor.
	CO5	Evaluate the use of inheritance, pointers and polymorphism in C++.

Syllabus**Unit I****(15 Hours)**

Overview of C: History of C – Importance of C - Sample programs – Basic Structure of C programs – Programming style. Constants, Variables and Data types: Character set – C Tokens – Keywords and Identifiers – Constants – Variables – Data types – Operators and Expressions: Introduction – Arithmetic operator – Relational Operators – Logical operators - Assignment - Increment and Decrement – Conditional – Bitwise operators - Special Operators – Type conversions in Expressions.

Unit II**(15 Hours)**

Decision making and Branching: Decision making with if statement – Simple if Statement – The if else statement - Nested If – Else - If Ladder – The Switch statement - The Ternary Operator. Looping: The while statement – The do statement – The for statement – **Jumps in loops***.

Unit III**(15 Hours)**

Arrays: Introduction – one dimensional Arrays – Two dimensional Arrays – Multidimensional Arrays. String handling functions. User defined functions: Definition of Function, Structures and Unions, Pointers – File Management.

Unit IV**(15 Hours)**

Procedure Oriented Programming – Basic Concepts of Object-oriented Programming - Beginning with C++ - Classes & Objects - User defined functions: Function Prototypes - Call by Reference - Return by Reference - Inline Functions - Function overloading - friend functions - Constructors and Destructors.

Unit V**(15 Hours)**

Inheritance: Defining derived class - Types of inheritance - Virtual Base class. Pointers: This pointer - Pointers to Objects - Virtual functions & Polymorphism - Files: File operations.

***Self - study and questions for examinations may be taken from the self-study portions also.**

Teaching Methods

Smart Classroom/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended learning

TEXT BOOKS

1. E. Balagurusamy, (2022), Programming in ANSI C, Eighth Edition - Tata Mc Graw Hill Publishing Company Ltd, New Delhi.
2. E. Balagurusamy, Object Oriented Programming with C++, TMH, 2023, Seventh Edition - Tata Mc Graw Hill Publishing Company Ltd, New Delhi.

REFERENCE BOOKS

1. P. J. Deitel and H. M. Deitel, (2008), C How to Program ,5th Edition, Tata Mc Graw Hill.
2. Yeswanth Kanethkar, (2007), Let Us C, Eighth Edition - BTB Publications.
3. Yeswanth Kanetkar, (2008), Let us C++, Fourth Edition - BPB Publications.
4. Ashok N Kamthane, (2003), Object Oriented Programming with ANSI and Turbo C++ - Pearson Education.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S
CO2	S	S	H	H	S
CO3	S	H	S	S	H
CO4	S	H	H	M	H
CO5	S	S	S	S	S

S – Strong

H – High

M – Medium

L – Low

Programme Code:24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Core Practical 1 - C and C++ Programming Lab				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 2	Skill Development

Course Objectives

1. To provide exposure to problem-solving through programming
2. To gain hands-on experience with the basic concepts of C/C++ programming language.

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic programming concepts.
	CO2	Understand the use of control structures, arrays and structures.
	CO3	Apply friend functions, classes and objects.
	CO4	Analyze the overloading concepts.
	CO5	Evaluate the features of virtual functions and inheritance.

List of Programs

1. Write a C program to find the median for a given set of numbers.
2. Write a C program to find the Standard Deviation for a given set of numbers.
3. Write a C program to find the number of palindrome strings in a given sentence.
4. Write a C program to print the student's mark sheet assuming roll number, name, and marks in five subjects in a structure. Create an array of structures and print the mark sheet in the university pattern.
5. Write a C++ Program to implement the concept of Functions and friend functions.
6. Write a C++ Program to implement the concept of classes and objects.
7. Write a C++ program to perform function overloading.
8. Write a C++ program to implement Operator Overloading concept.
9. Write a C++ program to perform string manipulation operations.
10. Write a C++ program to find Area and Perimeter using Virtual function and Inheritance concept.

Teaching Methods

Presentation and Demonstration using Projectors

Guidelines to the distribution of marks for practical examination

Two questions will be given for each student (3 Hours / 60 Marks)

1. Record Work - 10 Marks
2. Algorithm, Program, Typing and Execution: 50 Marks.

Particulars	Program I (Marks)	Program II (Marks)
Algorithm	5	5
Program Typing and Execution	20	20

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
C01	S	S	S	H	M
C02	S	S	M	H	H
C03	H	S	H	S	M
C04	H	S	M	H	M
C05	S	S	H	S	H

S – Strong**H** – High**M** – Medium**L** – Low

Programme Code:24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Core Paper 2 – Java Programming				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 4	Skill Development

Course Objectives

1. To understand object oriented programming concepts in a Java program.
2. To know the principles of packages, inheritance and interfaces.
3. To introduce the concepts of exception handling, multithreading and I/O streams.
4. To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes (CO)

K1 to K5	CO1	Remember the principles of object-oriented programming in Java.
	CO2	Understand the solutions for problems using decision making and branching concepts.
	CO3	Apply inheritance, packages and interfaces.
	CO4	Analyze Java exception handling and applets with real time examples.
	CO5	Evaluate Input / Output file management in Java.

Syllabus**Unit I****(15 Hours)**

Fundamentals of Object-Oriented Programming: OOP Paradigm – Basic Concepts of OOP– Benefits of OOP – Application of OOP. Java Evolution: History – Features – How Java differs from C and C++ – Java and Internet – Java and www –Web Browsers. Overview of Java: Simple Java program – Structure – Java Tokens – Statements – Java Virtual Machine.

Unit II**(15 Hours)**

Constants, Variables, Data Types - Operators and Expressions – Decision Making and Branching: if, if...else, nested if, switch, ? : Operator - Decision Making and Looping: while, do, for – Jumps in Loops - Labeled Loops – Classes, Objects and Methods.

Unit III**(15 Hours)**

Arrays, Strings and Vectors – Interfaces – Inheritance and its types – Packages: Putting Classes together – Introduction to threads - **Multithreaded Programming***.

Unit IV**(15 Hours)**

Managing Errors and Exceptions : Try..Catch..finally, throw, throws, User defined Exceptions– Applet Programming: Life Cycle – Graphics Programming - Swing: Layouts, event handling(Action, Mouse, Key)

Unit V**(15 Hours)**

Managing Input / Output Files in Java: Concepts of Streams- Stream Classes – Byte Stream classes – Character stream classes – Using streams – I/O Classes – File Class – I/O exceptions – Creation of files – Reading / Writing characters, Byte-Handling Primitive Data Types – Java Collections - **Random Access Files***.

***Self - study and questions for examinations may be taken from the self-study portions also.**

Teaching Methods

Smart class room/ Power Point presentation/ Seminar/ Quiz/ Discussion/Flipped Class

TEXT BOOK

1. E. Balagurusamy, Programming with Java – A Primer, 5th Edition, TMH, 2021.

REFERENCE BOOKS

1. Patrick Naughton & Hebert Schildt, The Complete Reference Java 2, 3rd Edition, TMH.
2. John R. Hubbard, Programming with Java ,2nd Edition, TMH.

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	S	M	H	S
CO4	S	M	S	M	H
CO5	H	S	H	H	S

S–Strong

H –High

M–Medium

L–Low

Programme Code:24		B.Sc. Artificial Intelligence and Machine Learning		
Title of the Paper: Core Practical 2 – Java Programming Lab				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 2	Skill Development

Course Objectives

1. To learn an object oriented way of solving problems using java.
2. To develop java applications using inheritance and polymorphism.
3. To write programs using interface and package for solving real time problems.
4. To understand how to design applications with threads, I/O streams and exceptions in Java.
5. To create the Graphical User Interface using Applets, AWT Components & Swing Components.

Course Outcomes (CO)

K1 to K5	CO1	Remember object-oriented way of solving problems in Java.
	CO2	Understand Java programs with inheritance and polymorphism concepts.
	CO3	Apply interface and package in Java to solve real time problems.
	CO4	Analyze Java programs with threads, I/O streams and exceptions.
	CO5	Evaluate GUI using Applets, AWT and Swing components.

List of Programs

1. Java Program to perform various Arithmetic Operations on two Integer given by the User
2. Java Program to Calculate Average Using Arrays
3. Write a Java program to implement the concepts of classes and objects.
4. Write a Java program to implement the concepts of inheritance.
5. Write a Java program to implement the concepts of Polymorphism.
6. Write a Java program to implement the concept of Interface.
7. Write a Java program to implement the concept of Package.
8. Write a Java program to implement Flow, Border, Grid Layouts.
9. Write a Java program to implement the concept of Frames, Menus, Dialog.
10. Develop a java program with exception handling concept.
11. Write a java program to implement the concept of multithreading.
12. Develop a java program with I/O streams.

Teaching Methods

Presentation and Demonstration using Projectors

Guidelines to the distribution of marks for practical examination

Two questions will be given for each student (3 Hours / 60 Marks)

1. Record Work - 10 Marks
2. Algorithm, Program, Typing and Execution: 50 Marks.

Particulars	Program I (Marks)	Program II (Marks)
Algorithm	5	5
Program Typing and Execution	20	20

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	M	H	S
CO4	S	M	H	M	H
CO5	H	S	S	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Core Paper 3 - Python Programming for Machine Learning				
Batch 2025 – 2026	Hours/Week 4	Total Hours 60	Credits 4	Skill Development

Course Objectives

1. To understand the basic concepts of programming in Python.
2. To write functions and pass arguments in Python.
3. To design program using object oriented concepts and exception handling in python.
4. To work with Numpy and Pandas module in Python.

Course Outcomes (CO)

K1 to K5	CO1	Recall the basic syntax and structure of Python programming language
	CO2	Analyze the logical flow of Python programs involving expressions, statements, and control structures.
	CO3	Develop Python functions, use them for basic computations, and demonstrate the ability to write reusable functions.
	CO4	Develop complex data processing workflows using NumPy's structured arrays and advanced array manipulation techniques
	CO5	Evaluate the performance data analysis workflows using Pandas and visualize the results through various types of plots and graphs in Matplotlib.

Syllabus

Unit I (12 Hours)

Introduction to Python: Python Overview - Comments - Python Identifiers - Reserved Keywords - Variables - Standard data types - Operators - Statement and expressions - boolean expressions - Control statements- Iteration - While statement.

Unit II (12 Hours)

Functions - standard mathematics functions - time function - random function - importing function - writing own functions - parameter passing - custom function vs standard functions. Global variables - default variables – **recursion*** - reusable functions - functions as data.

Unit III (12 Hours)

Introduction to OOPS : Specialty of Python Language-Features of Object Oriented Programming System - Classes and Objects - Encapsulation - Abstraction - Inheritance – Polymorphism. Classes and Objects: Creating a Class - The Self Variable – Constructor. Exceptions:- Errors in a Python Program - Exceptions - Exception Handling. Files in Python:- Files - **Types of Files in Python***- opening a file-closing a file.

Unit IV (12 Hours)

Basics of NumPy - Computation on NumPy – Aggregations -Computation on Arrays - Comparisons, Masks and Boolean Arrays-Fancy Indexing-Sorting Arrays-Structured Data: NumPy's Structured Array.

Unit V (12 Hours)

Introduction to Pandas - Operating on Data in Pandas-Handling Missing Data - Hierarchical Indexing - Combining Data Sets. High Performance Pandas - eval() and query() - visualization and Matplotlib: Basic functions of Matplotlib - Simple Line Plot, Scatter Plot -Density and ContourPlots - Histograms, Binnings and Density - Customizing Plot Legends, Colour Bars - Three- Dimensional Plotting in Matplotlib.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion/ Flipped Class

TEXT BOOKS

1. Kamathane, Problem Solving and Python Programming, Second Reprint, 2018.
2. Zhang.Y, (2016), An Introduction to Python and Computer Programming, Springer Publications.
3. Jake VanderPlas, (2016), Python Data Science Handbook - Essential Tools for working with Data, O'ReillyMedia,Inc.

REFERENCE BOOKS

1. Mark Lutz, (2010), Programming Python, 4th Edition - O'Reilly Media.
2. David Beazley and Brian K. Jones Python Cookbook, (2013), 3rd Edition: Recipes for Mastering Python O'Reilly Atlas.
3. Guido van Rossum and Fred L. Drake Jr,(2011), An Introduction to Python – Revised and updated For Python 3.2, - Network Theory Ltd.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	M	H	S
CO4	S	M	S	M	H
CO5	S	H	H	H	S

S – Strong**H** – High**M** – Medium**L** – Low

Programme Code: 24	B.Sc. B. Sc Artificial Intelligence and Machine Learning			
Title of the Paper: Core Practical 3 - Python Programming for Machine Learning Lab				
Batch 2025 – 2026	Hours/Week 4	Total Hours 60	Credits 4	Skill Development

Course Objectives

1. To understand the fundamental concepts of python programming.
2. To learn about recursive functions and searching algorithms in Python.
3. To develop programs using Numpy, Pandas and Scikit-learn libraries.

Course Outcomes (CO)

K3 to K5	CO1	Identify the basic terminologies of Python programming such as data types, conditional statements, looping statements, and functions..
	CO2	Develop programs with the implementation of operators & I/O operations
	CO3	Construct programs with features of Lists, Strings
	CO4	Analyse readable programs with files for Exception handling concepts.
	CO5	Evaluate python programs to illustrate Numpy, Pandas and Scikit-learn libraries.

LIST OF PRACTICAL PROGRAMS

1. Write a python program to find the largest integer using conditional operator.
2. Write a python program to find the product of two matrices.
3. Write a python program using basic control structures
4. Write a python program using pivot function
5. Write a python program using fancy indexing
6. Write a program to demonstrate exception handling.
7. Write a program to demonstrate classes and their attributes.
8. Write a program to demonstrate functions in Python Libraries using NumPy.
9. Write a program to demonstrate functions in Python Library using Pandas.
10. Write a program to demonstrate functions in Python Library using Scikit.

Teaching Methods

Presentation and Demonstration using Projectors

Guidelines to the distribution of marks for practical examinations

Two questions will be given for each student (3 Hours / 60 Marks)

1. Record Work - 10 Marks
2. Algorithm, Program, Typing and Execution : 50 Marks.

Particulars	Program I (Marks)	Program II (Marks)
Algorithm	5	5
Program Typing and Execution	20	20

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	S	H	S
CO4	S	M	S	M	H
CO5	H	S	H	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24		B.Sc. B. Sc Artificial Intelligence and Machine Learning		
Title of the Paper: Allied Paper 3: Distributed Operating System				
Batch 2025 – 2026	Hours/Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

1. To Describe basic concepts of Operating System and Computer Networks.
2. To understand about naming, security, distributed file system.
3. To understand about message passing, remote procedure calls.
4. Understand the need of distributed shared memory, synchronization.
5. Understand the scope of resource, process management.

Course Outcomes (CO)

K1 to K5	CO1	Gain knowledge of distributed operating system architecture (Knowledge)
	CO2	Illustrate principles and importance of distributed operating system (Understand)
	CO3	Implement distributed client server applications using remote method invocation (Apply)
	CO4	Distinguish between centralized systems and distributed systems (Analyze)
	CO5	. Create stateful and state-less applications (Create)

Syllabus**Unit I****(18 Hours)**

Fundamentals of Distributed Operating System: Meaning – Evolution – Models – Issues in designing Distributed Operating System. Fundamentals of Computer Networks: Introduction – Network Types – LAN, WAN Technologies – Common Protocols.

Unit II**(18 Hours)**

Message Passing: Introduction – Features – Synchronization – Buffering – Multidatagram Message Passing – Encoding and Decoding of Message Data – Process Addressing – Failure Handling – Group Communication. Remote Procedure Calls: RPC Model – Transparency of RPC – RPC Messages.

Unit III**(18 Hours)**

Distributed Shared Memory: Introduction – General Architecture – Design and Implementation Issues – Granularity – Structure of shared Memory Space – Consistency Models – Replacement Strategy – Trashing – Heterogenous DSM – Advantages of DSM.

Unit IV**(18 Hours)**

Synchronization: Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithms. Resource Management : Task Assignment Approach – Load Balancing Approach – Load Sharing Approach. Process Management: Process Migration – Threads.

Unit V

Distributed File System: Introduction – Features – File Models – File Accessing Models – File Sharing, File Caching Schemes – File Replication – Fault Tolerance. Naming: Features – Fundamental Terminologies and Concepts. Security: Cryptography – Digital Signatures.

Text Book

1. Pradeep K.Sinha, “Distributed Operating Systems : Concepts and Design”, Prentice Hall of India, 2006

Reference Books

1. A.S. Tanenbaum, M. VanSteen, “Distributed Systems”, Pearson Education.4 th Edition 4.03. January 2025
2. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design”, Third Edition, Pearson Education.
3. Mukesh Singhal, “Advanced Concepts in Operating Systems”, McGraw-Hill Series in Computer Science.
4. Ajay D. Kshemkalyani, Mukesh Singhal, “Distributed Computing: Principles, Algorithms, and Systems”, Cambridge University Press
5. Distributed operating systems, Alagappa university, Dr Syed Mohsin Saif Andrabi, Dr Mudasir M Kirmani, Rohit Khurana, V.K. Govindan, ProfeVikas® Publishing House, Work Order No. AU/DDE/DE1-291/Preparation and Printing of Course Materials/2018 Dated 19.11.2018

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	H
CO2	S	S	S	H	S
CO3	M	H	S	S	H
CO4	S	H	H	M	M
CO5	S	S	M	H	H

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Core Paper 4 - R Programming				
Batch 2025 – 2026	Hours/Week 4	Total Hours 60	Credits 4	Skill Development

Course Objectives

1. To learn about fundamental data structures of R Programming.
2. To understand the important programming concepts and OOPS in R.
3. To gain understanding of R packages for basic statistics.

Course Outcomes (CO)

K1 to K5	CO1	Understand how to manipulate and operate on these data structures.
	CO2	Implement vectorized operations and perform common vector manipulations.
	CO3	Create and manipulate lists, perform list operations, and apply functions to list components.
	CO4	Apply control statements, Boolean operators, and recursive functions in R programming
	CO5	Analyze and apply statistical and machine learning models in R

Syllabus

Unit I

(12 Hours)

Introduction to R – R Data Structures – Help Functions in R – Vectors – Scalars – Declarations – Recycling – Common Vector Operations – Using all and any – Vectorized operations – NA and NULL values – Filtering – Vectorized if - then else – Vector Element names.

Unit II

(12 Hours)

Creating matrices – Matrix Operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector / Matrix Distinction – Avoiding Dimension Reduction – Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists.

Unit III

(12 Hours)

Creating Data Frames – Matrix-like operations in frames – merging Data frames – Applying functions to Data Frames – Factors and Tables – Factors and levels – Common Functions used with factors – Working with tables – Other factors and table related functions – Control statements – Arithmetic and Boolean operators and values – Default Values for arguments – Returning Boolean Values – Functions are objects – Environment and scope issues – Writing Upstairs – Recursion – Replacement functions – Tools for Composing function code – **Math and Simulation in R*.**

Unit IV

(12 Hours)

S3 Classes – S4 Classes – Managing your objects – Input/output – accessing keyboard and monitor – reading and writing files – accessing the internet – String Manipulation – Graphics – Creating Graphs – Customizing Graphs – Saving Graphs to files – Creating Three - **Dimensional plots*.**

Unit V

(12 Hours)

Interfacing R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linear models – Non-linear Models – Time Series and Auto - Correlation – Clustering.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion/ Flipped Class
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TEXT BOOKS

1. Norman Matloff, (2011), The Art of R Programming: A Tour of Statistical Software Design - NoStarch Press. (Unit I,II,III,IV,V)
2. Jared P. Lander, (2013), R for Everyone: Advanced Analytics and Graphics, Addison - Wesley Data & Analytics Series.
3. Tilman M. Davies(2019), The book of R : a first course in programming and statistics, First Edition, No Starch Press.(Unit I,II,III,IV,V)

REFERENCE BOOKS

1. Mark Gardner, (2013), Beginning R – The Statistical Programming Language, Wiley.
2. Robert Knell, (2013), Introductory R: A Beginner's Guide to Data Visualization, Statistical Analysis and Programming in R - Amazon Digital South Asia Services Inc.
3. O' Reilly Media, (2014), Learning R, Garret Golemund.
4. Hands-on Programming with R. (2013), O' Reilly Media, Inc. Richard Cotton.
5. Roger D. Peng, (2018), R Programming for Data Science - Lean Publishing.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	M	H	S
CO4	S	M	S	S	H
CO5	S	S	M	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. B. Sc Artificial Intelligence and Machine Learning			
Title of the Paper: Core Practical 4 - R Programming Lab				
Batch 2025 – 2026	Hours/Week 4	Total Hours 60	Credits 3	Skill Development

Course Objectives

1. To learn to install and configure R and RStudio.
2. To implement data structures and loop functions in R.
3. To execute basic operations in R.

Course Outcomes (CO)

K3 to K5	CO1	Understand the process of user input and how to implement basic functions in R
	CO2	Develop recursion to solve mathematical and computational problems Manipulate data structures such as vectors and data frames
	CO3	Implement R programs to solve problems and perform tasks and data visualization techniques using
	CO4	Evaluate various approaches for solving programming problems
	CO5	Solve mathematical problems, visualize data, and manage data structures efficiently

LIST OF PRACTICAL PROGRAMS

1. Write a R program to make a simple calculator.
2. Write a program to find sum of natural numbers using recursion.
3. Write a program to find fibonacci sequence using recursion in R.
4. Write a program to implement R program for the factors of a number.
5. Write a program to find the sum of natural numbers.
6. Write a program to check if a number is positive, negative or zero.
7. Write a program to visualize the bar plot() function
8. Write a program to manipulate the Data Frame
9. Write a function to find minimum and maximum.
10. Write a program to sort a vector.
11. Write a R program to check for leap year.
12. Write a program to multiply two matrices.

Teaching Methods

Presentation and Demonstration using projectors

Guidelines to the distribution of marks for practical examinations

Two questions will be given for each student (3 Hours / 60 Marks)

1. Record Work - 10 Marks
2. Algorithm, Program, Typing and Execution : 50 Marks.

Particulars	Program I (Marks)	Program II (Marks)
Algorithm	5	5
Program Typing and Execution	20	20

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	M	H	S
CO4	S	S	S	S	H
CO5	S	H	S	H	S

S – Strong**H** – High**M** – Medium**L** – Low

Programme Code: 24		B.Sc. Artificial Intelligence and Machine Learning		
Title of the Paper: Allied Paper 4 - Design and Analysis of Algorithms				
Batch 2025 – 2026	Hours/Week 6	Total Hours 90	Credits 5	Employability

Course Objectives

1. Gain a deep understanding of fundamental concepts in algorithms and Familiarize oneself with various algorithmic paradigms and techniques, such as divide and conquer, dynamic programming, greedy algorithms, and backtracking.
2. Develop the ability to design efficient algorithms to solve complex computational problems.
3. Become proficient in analyzing the time and space complexity of algorithms Understand the implications of different complexity classes on algorithm efficiency.
4. Learn to choose the appropriate paradigm for solving specific problems and understand their limitations and advantages.
5. Develop strong problem-solving skills through algorithmic challenges and exercises.
6. Learn to decompose complex problems into smaller, manageable sub problems and devise efficient algorithms to solve them.
7. Gain hands-on experience in implementing and analyzing algorithms to solve real-world problems.

Course Outcomes (CO)

K1 to K5	CO1	Understand the fundamentals of algorithmic problem-solving and Recognize the importance of algorithms in computing
	CO2	Apply implement divide and conquer algorithms such as Merge Sort, Quick Sort, and Strassen's Matrix Multiplication.
	CO3	Learn and apply greedy algorithms to solve problems like Minimum Spanning Tree, Huffman Coding, and the Knapsack problem
	CO4	Solve complex problems like Optimum Binary Search Trees, and shortest path algorithms using dynamic programming.
	CO5	Implement hashing techniques such as open hashing and closed hashing to optimize search operations in data structures.

Syllabus

UNIT I

(18 Hours)

Introduction Algorithms Design- Fundamentals of Algorithmic Problem Solving- Important Problem Types - Fundamental of Data Structures. A The Role of Algorithms in Computing: Algorithms- Algorithms as a technology- Insertion sort Analyzing algorithms- Designing algorithms- Growth of Functions: Asymptotic notations, Standard notations, and common functions.

UNIT II

(18 Hours)

Divide and Conquer: Merge Sort – Quick Sort – Medians – Binary Tree Traversal- Multiplication of large integers – Strassen's Matrix Multiplication – Closest Pairs Problems – Convex Hull Problem - Binary Search.

UNIT III

(18 Hours)

Greedy Algorithms: Minimum Spanning Tree – Huffman coding – Horn formulas - Set cover- Brute Force and Exhaustive Search: Depth First Search – Breadth First Search – Selection Sort – Bubble Sort – Travelling Salesman Problem - Knapsack Problem

UNIT IV**(18 Hours)**

Dynamic Programming: Knapsack Problem and Memory Functions- Optimum Binary Search - Warshall's Algorithm – Floyd's algorithm – Greedy Technique: Prim's Algorithm – Kruskal's Algorithm- Dijkstra's Algorithm – Huffman Trees and Codes- Hashing: Open hashing – Closed hashing – Shortest Path Algorithm.

UNIT V**(18 Hours)**

Backtracking: N-Queens Problem – Hamilton Circuits Problem- Subset Problems – Graph Coloring Problem- Iterative Improvement: Stable Marriage Problem - Maximum Matching in Bipartite Graphs – Maximum Flow Problem - Decision Tree – P, NP and NP Complete Problems - Branch and Bound: Assignment Problem - Knapsack problem - *Traveling salesman problem

*** Denotes Self Study and questions for examinations may be taken from the self-study portions also.**

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion / Flipped Class

Text Books

1. Anany Levitin , (2012) "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education.(Unit 1 – 5)
2. Jon Kleinberg and Eva Tardos , (2006) "Algorithm Design", Pearson Education. (Unit 1 – 5)
3. S Dasgupta , C H Papadimitriou, U V Vazirani, (2017) "Algorithms", 1st Edition, McGraw Hill Education. (Unit 1 – 5)

Reference Books

1. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein, (2012) "Introduction to Algorithms, 3rd Edition, PHI Learning Private Limited.
2. S. Sridhar, (2015) "Design and Analysis of Algorithms", Oxford University Press.
3. Sara Baase and Allen Van Gelder, (2000) "Computer Algorithms", Third Edition, Pearson Education.
4. Dexter C. Kozen ,(1992) " The Design and Analysis of Algorithms", Springer-Verlag.
5. Jon Kleinberg and Eva Tardos , (2006) "Algorithm Design", Pearson Education.
6. Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, 2nd Edition, 2014, Universities Press.
7. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein (2023), "Introduction to Algorithms"; - MIT Press.

MAPPING

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	S	H	H
CO2	M	H	S	S	H
CO3	H	M	S	S	S
CO4	M	M	S	S	S
CO5	H	H	M	M	S

S – Strong

H – High

M– Medium

L –Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper : Core Paper 5 - Machine Learning Techniques				
Batch 2025 – 2026	Hours/Week 6	Total Hours 90	Credits 5	Skill Development

Course Objectives

1. To understand the basics of machine learning and learning system.
2. To introduce different types of linear models and applications.
3. To gain the understanding of constructing decision trees and probabilistic model.
4. To understand the concepts of tree and probabilistic models.
5. To implement the graphical models in machine learning.

Course Outcomes (CO)

K1 to K5	CO1	Understanding of the brain and the neuron model in machine learning contexts.
	CO2	Describe linear models and multi-layer perceptrons (MLP) in machine learning.
	CO3	Analyze the strengths and weaknesses of various probabilistic models, such as Gaussian Mixture Models
	CO4	Apply dimensionality reduction techniques and genetic algorithms for optimization problems.
	CO5	Implement a tracking method using Hidden Markov Models for a given problem.

Syllabus

Unit I

(18 Hours)

Introduction – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – **Perspectives and Issues in Machine Learning *** – Concept Learning Task – Concept Learning as Search- Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

Unit II

(18 Hours)

Linear Models – Multi-Layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-Layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.

Unit III

(18 Hours)

Tree and Probabilistic Models – Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers - Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – **Self Organizing Feature Map***.

Unit IV

(18 Hours)

Dimensionality Reduction and Evolutionary Models - Dimensionality Reduction – Linear Discriminant Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic Algorithms – Genetic Offspring – Genetic Operators – Using Genetic Algorithms – Reinforcements Learning – Overview – Getting Lost Example–Markov Decision Process.

Unit V**(18 Hours)**

Graphical Models – Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods.

* Self Study and questions for examinations may be taken from the self study portions also.

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion/ Flipped Class
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TEXT BOOKS

1. Ethem Alpaydin, Introduction to Machine Learning 4e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2020.
2. Stephen Marsland, CRC Press, Machine learning – An Algorithmic Perspective, Second Edition.

REFERENCE BOOKS

1. Jason Bell, Machine Learning – Hands on for Developers and Technical Professionals, Second Edition, Wiley, 2020.
2. Peter Flach, Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	S	S	H	M
CO3	S	S	M	H	S
CO4	S	H	S	M	H
CO5	S	H	S	S	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24		B.Sc. Artificial Intelligence and Machine Learning		
Title of the Paper : Core Paper 6 - Introduction to Artificial Intelligence				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 4	Skill Development

Course Objectives

1. To represent and manipulate the knowledge using AI.
2. To learn different learning methods in AI to solve problems in real time applications.
3. To identify suitable machine learning algorithms for various type of learning problems.

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic building blocks of AI. .
	CO2	Understand the various problem solving methods
	CO3	Apply symbolic notations to represent knowledge and reasoning to manipulate and derive new knowledge.
	CO4	Analyze different Planning methods to solve problems in real time applications.
	CO5	Evaluate learning from observation.

Syllabus**Unit I****(15 Hours)**

Introduction and Problem Solving: Foundations of AI – History of AI – Intelligent agent – Types of agents - Structure – Problem solving agents – Uninformed search strategies – Breadth first search – Uniform cost search – Depth first search –Depth limited search – Bidirectional search – Searching with partial Information.

Unit II**(15 Hours)**

Informed Search and Game Playing: Informed search – Strategies – A* Heuristic function – Hill Climbing – Simulated Annealing – Constraint Specification problem – Local Search in continuous space – Genetic algorithm – Optimal decisions in games - Pruning- Imperfect decisions –Alpha-Beta pruning – Games that include an element of chance.

Unit III**(15 Hours)**

Knowledge and Reasoning: Knowledge based agent – The Wumpus world environment – Propositional logic – Inference rules - – First-order logic – Syntax and semantics – Situation calculus – Building a knowledge base – Electronic circuit domain – Ontology– Forward and backward chaining – Resolution – Truth maintenance system.

Unit IV**(15 Hours)**

Planning: Representation of planning – Partial order planning –Planning and acting in real world – Acting under uncertainty – Bayes's rules – Semantics of Belief networks – Inference in Belief networks – Making simple decisions – **Making complex decisions***.

Unit V**(15 Hours)**

Learning from observation : Learning decision trees –Ensemble learning – Learning general logical descriptions – Computational learning theory – Neural networks – Applications – Reinforcement learning– Passive reinforcement – Active reinforcement – Communication as action – Types of communicating agents – Parsing – DCG – **Semantic interpretation***.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion/ Flipped Class

TEXT BOOKS

1. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, Fourth Edition, 2024.
2. Elaine Rich, Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw Hill, 2017.

REFERENCE BOOKS

1. M. Tim Jones, Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008.
2. Ethem Alpaydin, Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.

MAPPING

CO \ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	S
CO3	S	H	M	H	S
CO4	S	S	S	M	H
CO5	S	H	S	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper : Core Practical 5 - Machine Learning Techniques Lab				
Batch 2025 – 2026	Hours/Week 6	Total Hours 90	Credits 4	Skill Development

Course Objectives

1. To implement learning algorithms in machine learning using Python.
2. To build decision tree classification model in Python.
3. To write python code to build a Neural Network with Back propagation.
4. To demonstrate how classifiers work with Python code.
5. To evaluate the classifier model using Java API.

Course Outcomes

K3 to K5	CO1	Design and implement new learning algorithms in machine learning using Python.
	CO2	Apply a decision tree algorithm to build a classification model using Python.
	CO3	Evaluate the effectiveness of different activation functions and learning rates in a Neural Network with Backpropagation, and justify their impact on training performance."
	CO4	Analyze the various components and steps involved in the implementation of different classifiers in python.
	CO5	Apply a classifier model using Java classes/API

LIST OF PRACTICAL PROGRAMS

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples.
2. Implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample
4. Build an Artificial Neural Network by implementing the Backpropagation algorithm.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

Teaching Methods

Presentation and Demonstration using Projectors

Guidelines to the distribution of marks for practical examinations

Two questions will be given for each student (3 Hours / 60 Marks)

1. Record Work - 10 Marks
2. Algorithm, Program, Typing and Execution: 50 Marks.

Particulars	Program I (Marks)	Program II (Marks)
Algorithm	5	5
Program Typing and Execution	20	20

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	S	M	H	S
CO4	S	H	S	M	H
CO5	S	H	S	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper : Core Practical 6 - Data Analytics and Visualization Lab				
Batch 2025 – 2026	Hours/Week 6	Total Hours 90	Credits 4	Skill Development

Course Objectives

1. To understand the fundamental concepts of python programming.
2. To learn about recursive functions and searching algorithms in Python.
3. To develop programs using Numpy, Pandas and Scikit-learn libraries

Course Outcomes (CO)

K1 to K5	CO1	Remember the usage of simple data set in Advanced Excel.
	CO2	Understand the creations of various types of charts in Advanced Excel.
	CO3	Apply the concept of customization and formatting in Advanced Excel.
	CO4	Analysing and implementing the formatting, sorting, filtering techniques in Power Bi.
	CO5	Evaluating aggregation, mapping, and interactive controls in Power Bi.

LIST OF PRACTICAL PROGRAMS

1. Create a simple dataset using Advanced Excel for an application.
2. Create a 2D charts using Advanced Excel for an application.
3. Create a 3D charts using Advanced Excel for an application.
4. Visualize the relationship between two variables using Advanced Excel scatter plots for an application.
5. Customize and Format the Advanced Excel Charts for an application.
6. Import the Data, visualize the design, and filter their usage in Power Bi for an application.
7. In Power Bi, implement conditional formatting, sorting, and filtering techniques.
8. Perform a time-series analysis and KPI visualization using Power Bi for an application.
9. Perform Data aggregation and calculate the fields using Power Bi for an application.
10. In Power Bi, use Geographic mapping and interactive controls for an application.

Teaching Methods

Presentation and Demonstration using Projectors

Guidelines to the distribution of marks for practical examinations

Two questions will be given for each student (3 Hours / 60 Marks)

1. Record Work - 10 Marks
2. Algorithm, Program, Typing and Execution: 50 Marks.

Particulars	Program I (Marks)	Program II (Marks)
Algorithm	5	5
Program Typing	20	20
Execution		

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	S	H	S
CO4	S	H	S	M	H
CO5	H	S	H	H	S

S – Strong **H** – High **M** – Medium **L** – Low

Programme Code:	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Core Paper 7 – Natural Language Processing				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 4	Employability

Course Objectives

1. To establish foundational understanding of NLP concepts.
2. To gain knowledge on syntactic parsing in NLP.
3. To describe elements of semantic analysis in NLP.
4. To appreciate the significance of NLG and machine translation.
5. To analyze various NLP techniques for information extraction.

Course Outcomes (CO)

K1 to K5	CO1	Recall the principles and concepts of Natural Language Processing
	CO2	Understand the techniques of text processing
	CO3	Analyze the issues in text data processing and identifying suitable methods
	CO4	Demonstrate how NLG and machine translation are used in real-world scenarios.
	CO5	Evaluate the limitations and advantages of various NLP techniques for extracting information.

Syllabus**Unit I****(15 Hours)**

Overview - Origins and challenges of NLP-Language and Grammar-Processing Indian Languages - NLP Applications-Information Retrieval - Language Modeling: Various Grammar - based Language Models - Statistical Language Model.

Unit II**(15 Hours)**

Word Level Analysis - Regular Expressions - Finite-State Automata - Morphological Parsing Spelling Error Detection and correction - Words and Word classes - Part-of Speech Tagging. Syntactic Analysis – Context - free Grammar - Constituency - Parsing - Probabilistic Parsing.

Unit III**(15 Hours)**

Semantic Analysis - Meaning Representation - Lexical Semantics – Ambiguity - Word Sense Disambiguation - Discourse Processing – cohesion - Reference Resolution - **Discourse Coherence and Structure***.

Unit IV**(15 Hours)**

Natural Language Generation - Architecture of NLG Systems - Generation Tasks and Representations - Application of NLG. Machine Translation - Problems in Machine Translation - Characteristics of Indian Languages - Machine Translation Approaches - **Translation involving Indian Languages***.

Unit V**(15 Hours)**

Information extraction – Automatic summarization - Information retrieval and Question answering - Named entity recognition and relation extraction - IE using sequence labeling - Machine translation: Basic issues in MT - Statistical translation - word alignment - phrase-based translation and synchronous grammars.

*** Self - study and questions for examinations may be taken from the self-study portions also.**

Teaching Methods

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended learning

TEXT BOOK

1. Tanveer Siddiqui, U.S. Tiwary (2012), Natural Language Processing and Information Retrieval, Oxford University Press.

REFERENCE BOOKS

1. Daniel Jurafsky and James H Martin, Speech and Language Processing (2008): An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, 2nd Edition, Prentice Hall.
2. James Allen, Natural Language Understanding (1995), 2nd Edition, Benjamin /Cummings Publishing Company.
3. Christopher Manning and Hinrich Schütze (2008), Foundations of Statistical Natural Language Processing, MIT Press.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	M	M	H	S
CO4	S	M	S	M	H
CO5	S	H	S	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code:		B.Sc. Artificial Intelligence and Machine Learning		
Title of the Paper: Core Paper 8 – Block Chain Technology				
Batch	Hours/Week	Total Hours	Credits	Skill Development
2025 – 2026	4	60	4	

Course Objectives

1. To understand the fundamentals and types of block chain.
2. To know how smart contract works with block chain.
3. To study the benefits and use cases of block chain types.
4. To acquire knowledge on real life applications of block chain.

Course Outcomes (CO)

K1 to K5	CO1	Recall the fundamental concepts of Blockchain technology and its components, including the origin, blocks, and types of blockchain.
	CO2	Understand and explain the consensus mechanism in blockchain, decentralization, and distribution in blockchain networks
	CO3	Evaluate the effectiveness of different consensus protocols, including Proof of Burn and Sybil Attacks
	CO4	Analyze case studies on naive blockchain construction and hash cash implementation, exploring real-world blockchain applications and challenges.
	CO5	Apply applications of blockchain in various industries, including banking, healthcare, energy, real estate, and supply chains.

Syllabus

Unit I

(12 Hours)

Fundamentals of Blockchain: Introduction - Origin of Blockchain - Blockchain Solution - Components of Blockchain - Block in a Blockchain - The Technology and the Future - Blockchain Types and Consensus Mechanism: Introduction - Decentralization and Distribution - Types of Blockchain - Consensus Protocol. Cryptocurrency – Bitcoin, Altcoin and Token: Bitcoin and the Cryptocurrency - Cryptocurrency Basics - Types of Cryptocurrency.

Unit II

(12 Hours)

Public Blockchain System: Introduction - Public Blockchain - Popular Public Blockchains – The Bitcoin Blockchain - Ethereum Blockchain. Smart Contracts : Introduction - Smart Contract - Characteristics of a Smart Contract - Types of Smart Contracts- Types of Oracles – Smart Contracts in Ethereum - Smart Contracts in Industry.

Unit III

(12 Hours)

Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate. History, Distributed Ledger, Bitcoin protocols* - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Side chain, Name coin*.

Unit IV

(12 Hours)

Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Case study on Naïve Block chain construction, Memory Hard algorithm – Hash cash implementation, Direct Acyclic Graph. Play with Go-ethereum, Smart Contract Construction, Toy application using Block chain, Mining puzzles.

Unit V**(12 Hours)**

Application of Blockchain: Introduction - Blockchain in Banking and Finance - Blockchain in Education - Blockchain in Energy - Blockchain in Healthcare - Blockchain in Real-estate - Blockchain in Supply Chain - The Blockchain and IoT. Limitations and Challenges of Blockchain - Blockchain Case Studies: Retail , Healthcare - **Blockchain Platform using GoLanguage***.

*** Self - study and questions for examinations may be taken from the self-study portions also.**

Teaching Methods

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/ Experiential Learning/Blended learning

TEXT BOOKS

1. Chandramouli Subramanian, Asha A George, Abhilash K A and Meena Karthikeyan, Blockchain Technology, First Edition, Universities Press (India) Pvt. Ltd., August 2020.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
3. Imran Bashir,(2018),Mastering Blockchain,Second Edition,Published by Packt Publishing Ltd.

REFERENCE BOOKS

1. Draft version of S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Block chain Technology: Crypto currency and Applications, Oxford University Press, 2019.
2. Josh Thompson, Block chain: The Block chain for Beginnings, Guild to Block chain Technology and Block chain Programming', Create Space Independent Publishing Platform, 2017.
3. Daniel Drescher,(2017),Blockchain Basics: A Non-Technical Introduction in 25 Steps,apress Publication.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	M	H	S
CO4	S	M	S	M	H
CO5	S	H	S	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24		B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Core Paper 9 – Generative AI					
Batch 2025 – 2026		Hours/Week 5	Total Hours 75	Credits 4	Employability

Course Objectives

1. Understand the core concepts of AI, unsupervised learning, classification, regression, clustering, and reinforcement learning.
2. Gain insight into the role and impact of Generative AI in modern applications, including natural language processing and image generation.
3. Learn about advanced generative models, including Boltzmann Machines, Autoencoders, and GANs, and their challenges.
4. Critically analyze the ethical concerns, privacy issues, and social implications related to the widespread use of Generative AI.
5. Explore the exponential growth patterns of AI technologies and trends towards Artificial General Intelligence (AGI).
6. Develop the ability to critically engage with the future of AI, including its potential effects on industry, jobs, and society.

Course Outcomes (CO)

K1 to K5	CO1	Define and recall the key concepts of AI, including unsupervised learning, classification, regression, clustering, and dimensionality reduction.
	CO2	Explain the difference between discriminative and generative AI models.
	CO3	Apply unsupervised learning techniques such as clustering, dimensionality reduction, and reinforcement learning to real-world problems.
	CO4	Analyze the challenges faced by Generative AI technologies, particularly in GANs and their application in image generation.
	CO5	Design innovative solutions and applications using Generative AI techniques to address complex problems in diverse fields (e.g., entertainment, healthcare, business).

Syllabus

UNIT I

(15 Hours)

AI in Nutshell- Introduction to AI -Unsupervised Learning- Generative AI a Decade Later-What Is Discriminative AI- Classification- Regression- Clustering- Dimensionality Reduction- Reinforcement Learning.

UNIT II

(15 Hours)

What Is Generative AI- Data Generation- Data Transformation- Data Enrichment- Generative AI's Early Impact- Natural Language Processing.

UNIT III

(15 Hours)

Generative Models- Boltzmann Machines- Deep Blue- Deep Boltzmann Machines- Autoencoders- Women in Generative AI- Modern Generative AI - GAN Challenges- Future of AI Image Generation.

UNIT IV**(15 Hours)**

Ethical Concerns and Social Implications of Generative AI- Intellectual Property and the Generative AI Platform- Misinformation and Misuse of Generative AI- Generative AI and Deep fakes-Privacy, Safety, and Security-Generative AI's Impact on Jobs and Industry-Dependency on AI- Environmental Concerns.

UNIT V**(15 Hours)**

Generative AI's Exponential Growth- Growth Pattern of New Technologies-Exponential Progress in Computing Artificial General Intelligence in Sight- Multitasking Generative AI- Multimodal Generative AI- Multisensory Generative AI-Trends in Generative AI

Teaching Methods

Smart Classroom/Power point presentation/Seminar/Quiz/Discussion/Experiential Learning

Text Book

1.Martin Musiol,(2024), Generative AI, Published by Wiley

Reference Book

1.[Numa Dhamani](#),[Maggie Engler](#),(2024),Introduction to Generative Ai , Manning PubnsCo. Press

MAPPING

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	S	H	H
CO2	M	H	S	S	H
CO3	H	M	S	S	S
CO4	M	M	S	S	S
CO5	H	H	M	M	S

S – Strong

H – High

M– Medium

L –Low

Programme Code: 24		B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Core Practical 7 - Natural Language Processing Lab					
Batch	Hours/Week	Total Hours	Credits	Skill Development	
2025 – 2026	5	75	4		

Course Objectives

1. To calculate similarity between words using NLP.
2. To know the significance of word sense disambiguation in NLP applications.
3. To learn the process of POS tagging and Lexical analyser.
4. To solve real time applications of semantic and sentiment analysis.

Course Outcomes (CO)

K3 to K5	CO1	Assess the effectiveness of various NLP libraries in computing word similarity.
	CO2	Implement word sense disambiguation techniques in an NLP application to improve accuracy.
	CO3	Recall the steps needed to perform part-of-speech (POS) tagging using the NLTK library.
	CO4	Analyze how the lexical analyzer identifies and classifies tokens in a sentence, and how it handles different sentence structures.
	CO5	Recall the concepts of semantic and sentiment analysis, and their importance in natural language processing (NLP).

LIST OF PRACTICAL PROGRAMS

1. Implementing word similarity.
2. Implementing Information Retrieval.
3. Simple demonstration of part of speech tagging.
4. Implementing Regular Expressions
5. Implementing simple problems related to word disambiguation.
6. Implementing Lexical analyzer.
7. Implementing Semantic Analyzer.
8. Implementing Sentiment Analysis
9. Implementing Machine Translation.
10. Simple Demonstration on Named Entity recognition

Teaching Methods

Presentation and Demonstration using Projectors

Guidelines to the distribution of marks for practical examinations

Two questions will be given for each student (3 Hours / 60 Marks)

1. Record Work - 10 Marks
2. Algorithm, Program, Typing and Execution: 50 Marks.

Particulars	Program I (Marks)	Program II (Marks)
Algorithm	5	5
Program Typing and Execution	20	20

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	H	H	S	H	M
CO3	S	H	M	H	S
CO4	S	M	S	M	H
CO5	S	H	H	S	S

S – Strong**H** – High**M** – Medium**L** – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Project and Viva Voce***				
Batch 2025 – 2026	Hours/Week 4	Total Hours 60	Credits 5	Employability/ Entrepreneurship

Course Objectives

1. To acquire the knowledge about selecting the task based on their course skills.
2. To get the knowledge about analytical skills for solving the selected task.
3. To get confidence by implementing the task in a real time projects.

Course Outcomes (CO)

K3 to K5	CO1	Apply the programming skills for solving the project.
	CO2	Analyze the task and collect necessary information about the software development.
	CO3	Evaluating and Testing the task based on the software.
	CO4	Implementing the software for getting the Report.
	CO5	Implementing and analyzing real time project

Guidelines to the Distribution of Marks

CIA	Project Review	15	20
	Regularity	5	
ESE	Project Report	60	80
	Viva– Voce	20	
Grand Total			100

- **Abstract Submission:** Prepare and submit your project abstract, summarizing the objectives, methodology and key aspects of your project.
- **Approval from the Guide:** Seek approval from your project guide by submitting the abstract for their review and feedback.
- **Project Approval:** Once your guide provides feedback and suggestions, make necessary revisions, resubmit the abstract for final approval, and proceed your Project.
- Provide the Joining/Acceptance Letter from the Company associated with your project.
- Submit a comprehensive review report to the Head of the Department (HOD) and your respective Guide.
- Prepare and present a PowerPoint (PPT) to your respective guide before the official presentation of all reviews and Final Presentation.
- Ensure regular updates on the project status by meeting your guide. Weekly updates are recommended, with at least one or two meetings during the designated project Hour in the Department.

Teaching Methods

Presentation & Program Demonstration using Projector

MAPPING

CO \ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	H	S
CO2	S	M	M	H	H
CO3	S	H	S	H	H
CO4	S	S	S	S	S
CO5	S	H	S	H	M

S – Strong**H** – High**M** – Medium**L** – Low

MAJOR ELECTIVES

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning				
Title of the Paper: Elective Paper - Internet of Things					
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability	

Course Objectives

1. To understand the fundamentals of Internet of Things.
2. To learn about the basics of IoT protocols.
3. To build a small low cost embedded system using Raspberry Pi.
4. To apply the concept of Internet of Things in the real world scenario.

Course Outcomes (CO)

K1 to K5	CO1	Analyze various protocols for IoT .
	CO2	Develop web services to access/control IoT devices.
	CO3	Design a portable IoT using Raspberry Pi.
	CO4	Deploy an IoT application and connect to the cloud.
	CO5	Analyze applications of IoT in real time scenario.

Syllabus

Unit I

(15 Hours)

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF - YANG - IoT Platforms Design Methodology.

Unit II

(15 Hours)

M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - **IoT reference architecture***.

Unit III

(15 Hours)

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security.

Unit IV

(15 Hours)

Building IOT with RASPBERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces - **Programming Raspberry Pi with Python*** - Other IoT Platforms - Arduino.

Unit V

(15 Hours)

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart Classroom / PowerPoint Presentation / Seminar / Quiz / Discussion / Flipped Class

TEXT BOOK

1. Arshdeep Bahga, Vijay Madisetti, Internet of Things – A Hands-on Approach, Universities Press, 2015

REFERENCE BOOKS

1. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), (2011), Architecting the Internet of Things - Springer.
2. Honbo Zhou, (2012), The Internet of Things in the Cloud: A Middleware Perspective - CRC Press.
3. Jan Holler, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, (2014), From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence, Elsevier.
4. Olivier Hersent, David Boswarthick, Omar Elloumi, (2012), The Internet of Things – Key applications and Protocols, Wiley.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	M	H	S	H	S
CO4	S	M	M	M	H
CO5	S	S	H	S	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Elective Paper - Open Source Systems				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

1. To introduce the fundamentals of Open source and Linux system.
2. To learn basic concepts of SQL statements.
3. To gain knowledge on fundamental concepts of PHP.
4. To understand core aspects of programming and features of the Python language.
5. To gain proficiency in Perl scripting.

Course Outcomes (CO)

K1 to K5	CO1	Assess the effectiveness of Open Source software versus proprietary software in terms of cost, security, and scalability."
	CO2	Recall and define MySQL commands.
	CO3	Develop complex PHP scripts using various concepts.
	CO4	Assess the advantages and disadvantages of using Python for various programming tasks.
	CO5	Evaluate the efficiency of the Perl script you wrote and identify any areas for improvement

Syllabus

Unit I

(15 Hours)

Introduction to Open Sources – Need of Open Sources – Advantages of Open Sources - application of Open Sources - Open Source Operating Systems: LINUX: Introduction – General Overview – Kernel Mode and User Mode- Development with Linux.

Unit II

(15 Hours)

MySQL Introduction – Setting up Account –Record Selection Technology – Working with Strings –Date and Time– Sorting QueryResults – Generating Summary – Working with Metadata – Using Sequences.

Unit III

(15 Hours)

PHP: Introduction – Programming in Web Environment – Variables – Constants –Data Types – Operators – Statements – Functions – Arrays – OOP – String Manipulation and Regular Expression – File Handling and Data Storage – PHP and SQL Database – PHP and LDAP – PHP Connectivity – **Sending and Receiving E-mails***.

Unit IV

(15 Hours)

Python Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples –Dictionaries* – Conditionals and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP – **Execution Environment***.

Unit V

(15 Hours)

Perl Background – Perl Overview – Perl Parsing Rules – Variables and Data – Statements and Control Structures – Subroutines - Packages and Modules - Working with Files – Data Manipulation.

***Self Study and questions for examinations may be taken from the self study portions also.**
Teaching Methods

Smart Classroom / PowerPoint Presentation / Seminar / Quiz / Discussion / Flipped Class

TEXT BOOKS

1. Remy Card, Eric Dumas and Frank Mevel (2003), The Linux Kernel Book, Wiley Publications.
2. Steve Suchring, MySQL Bible, John Wiley (2002).
3. Steven Holzner, PHP: The Complete Reference, Second Edition, Tata Mc Graw Hill, Indian Reprint (2009).
4. Wesley J. Chun, Core Python Programming, Prentice Hall (2001).
5. Martin C. Brown, Perl: The Complete Reference, Second Edition, Tata Mc Graw Hill, Indian Reprint (2009).

REFERENCE BOOKS

1. Vikram Vaswani (2009), MYSQL: The Complete Reference, Second Edition, Tata Mc Graw Hill, Indian Reprint.
2. Rasmus Lerdorf and Levin Tatroe (2002), Programming PHP, O'Reilly.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	H	S	M
CO2	H	H	S	H	M
CO3	S	M	M	H	S
CO4	H	M	S	M	H
CO5	S	H	H	S	S

S – Strong H – High M – Medium L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning				
Title of the Paper: Elective Paper - Digital Forensics					
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability	

Course Objectives

1. To understand basic methodology of digital forensics.
2. To gain skills in digital evidence
3. To learn how to handle data acquisition and evidence gathering in digital forensic
4. To understand process, techniques and tools of digital evidences
5. To know the number of artifacts unique and specific to Windows and Linux system

Course Outcomes (CO)

K1 to K5	CO1	Remember the basics of digital forensic.
	CO2	Understand on Investigation and analyze digital evidence with cyber forensic.
	CO3	Apply on data acquisition and evidence gathering in digital forensic.
	CO4	Analyze on digital evidences.
	CO5	Evaluate on number of artifacts unique and specific to Windows and Linux system.

Syllabus

UNIT I (15 Hours)

Basics of Digital Forensics: Digital Forensics - Introduction, Objective and Methodology, Rules of Digital Forensics, Good Forensic Practices, Daubert's Standards, Principles of Digital Evidence. Overview of types of Computer Forensics – Network Forensics, Mobile Forensics, Social Media Forensics and E-mail Forensics. Services offered by Digital Forensics. First Responder – Role, Toolkit and Do's and Don'ts.

UNIT II (15 Hours)

Cyber Crime Investigation : Introduction to Cyber Crime Investigation, Procedure for Search and seizure of digital evidences in cyber-crime incident- Forensics Investigation Process- Pre search consideration, Acquisition, Duplication & Preservation of evidences, Examination and Analysis of evidences, Storing of Evidences, Documentation and Reporting, Maintaining the Chain of Custody.

UNIT III (15 Hours)

Data Acquisition and Evidence Gathering: Data Acquisition of live system, Shutdown Systems and Remote systems, servers. E-mail Investigations, Password Cracking. Seizing and preserving mobile devices. Methods of data acquisition of evidence from mobile devices. Data Acquisition and Evidence Gathering from Social Media. Performing Data Acquisition of encrypted systems. Challenges and issues in cyber-crime investigation.

UNIT IV (15 Hours)

Analysis of Digital Evidences: Search and Seizure of Volatile and Non-volatile Digital Evidence, Imaging and Hashing of Digital Evidences, Introduction to Deleted File Recovery, Steganography and Steg analysis, Data Recovery Tools and Procedures, Duplication and Preservation of Digital Evidences, Recover Internet Usage Data, Recover Swap files/Temporary Files/Cache Files. Software and Hardware tools used in cyber-crime investigation – Open Source and Proprietary tools. **Importance of Log Analysis in forensic analysis***. Understanding Storage Formats for Digital Evidences – Raw Format, Proprietary Formats, Advanced Forensic Formats.

UNIT V

(15 Hours)

Windows and Linux Forensics: Windows Systems Artifacts: File Systems, Registry, Event logs, Shortcut files, Executables. Alternate Data Streams (ADS), Hidden files, Slack Space, Disk Encryption, Windows registry, startup tasks, jump lists, Volume Shadow, shell bags, LNK files, Recycle Bin Forensics (INFO, \$i, \$r files). Forensic Analysis of the Registry – Use of registry viewers, Regedit. Extracting USB related artifacts and examination of protected storages. Linux System Artifact: Ownership and Permissions, Hidden files, **User Accounts and Logs***.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart Class Room/ PowerPoint presentation/ Seminar/ Quiz/ Discussion/ Flipped Class

TEXT BOOKS

1. Nina Godbole and Sunit Belapore, Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley Publications, 2011.
2. Bill Nelson, Amelia Phillips and Christopher Steuart; Guide to Computer Forensics and Investigations – 3rd Edition, Cengage, 2010 BBS.
3. Shon Harris, All in One CISSP Guide, Exam Guide Sixth Edition, Mc Graw Hill, 2013.

REFERENCE BOOKS

1. LNJNI National Institute of Criminology and Forensic Science, A Forensic Guide for Crime Investigators – Standard Operating Procedures, LNJNNICFS, 2016.
2. Peter Hipson, Mastering Windows XP Registry, Sybex, 2002.
3. Harlan Carvey, Windows Forensic Analysis Toolkit, Syngress, 2012.
4. Anthony Reyes, Jack Wiles; The Best Damn Cybercrime and Digital Forensic Book, Syngress, USA, 2007.
5. Cory Altheide and Halan Carvey, Digital Forensics with Open Source Tools, Syngress Publications.

MAPPING

CO \ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	S	H	H
CO2	M	H	S	S	H
CO3	H	M	M	S	S
CO4	M	H	S	S	S
CO5	H	H	M	M	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Elective Paper - Data Analytics and Visualization				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

1. Gain a deep understanding in Advanced Excel.
2. Develop the ability to design efficient Data Analysis and Automation techniques.
3. Become proficient in Power BI.
4. Develop strong visualizations and relationships in Power BI.
5. Gain hands-on experience in implementing, analyzing and publishing Reports.

Course Outcomes (CO)

K1 to K5	CO1	Remember the Advanced Excel Functions and Formulas.
	CO2	Understand the Advanced Excel Data Analysis and Automation.
	CO3	Apply the Power BI in ecosystem and components.
	CO4	Analyse the Power BI Visualization and Modelling techniques.
	CO5	Evaluate the Power BI Service to publish reports.

Syllabus

UNIT I

(15 Hours)

Advanced Excel Functions and Formulas: Nested Functions - Logical Functions - Lookup & Reference Functions - Text Functions - Date and Time Functions. Data Validation: Setting up Data Validation Rules - Custom Data Validation - Creating Dependent Drop-down Lists - Named Ranges and Tables.

UNIT II

(15 Hours)

Advanced Excel Data Analysis and Automation: Pivot Tables and Pivot Charts - Combo Charts, Sparklines - Advanced Charting Techniques - Axis, Labels, and Format- Power Query Split columns, remove duplicates - Power Pivot - Creating Data Models - Writing DAX - Excel Macros.

UNIT III

(15 Hours)

Introduction to Power BI and Data Visualization Fundamentals - Overview of Power BI - Power BI ecosystem and components - Installing and setting up Power BI- Understanding the Power BI interface - Getting Data into Power BI - Connecting to different data sources- Understanding Power Query and transforming data - Data types and structure in Power BI -Loading data into Power BI - Data Visualization Basics - Principles of data visualization in Power BI - Creating basic visualizations: bar charts, line charts, pie charts, tables - Customizing visualizations (colors, labels, formatting) - Interactivity in Power BI: Filtering, slicing, and cross-highlighting.

UNIT IV

(15 Hours)

Advanced Visualizations in Power BI: Advanced chart types: Waterfall, Funnel, KPI, Treemaps - Custom visualizations: Importing custom visuals from the marketplace - Drill-through and tooltip pages - Data Modeling in Power BI - Relationships between tables (one-to-many, many-to-one, many-to-many) - Creating calculated columns, measures, and calculated tables - Using DAX for more advanced data calculations and aggregation - Enhancing Interactivity and User Experience - Using slicers and filters for dynamic reporting Creating interactive dashboards with multiple visualizations - Bookmarks and buttons for user navigation.

UNIT V**(15 Hours)**

Publishing Reports to Power BI Service- Introduction to Power BI Service (Power BI Online) - Publishing reports from Power BI Desktop to Power BI Service - Working with datasets and reports in Power BI Service - **Setting up a workspace and creating apps in Power BI Service*** - Sharing reports with others (internal and external sharing) - Setting up workspaces for collaboration and access control - Collaborating on reports and dashboards in Power BI Service.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart Classroom / PowerPoint Presentation / Seminar / Quiz / Discussion / Flipped Class

TEXT BOOKS

1. Excel 2019 Power Programming with VBA by John Walkenbach, 1st Edition, Wiley Publications, 2019. (Units I & II).
2. Microsoft Power BI Cookbook, Brett Powell, Third Edition, Packet Publications, 2024. (Units III, IV, & V).

REFERENCE BOOKS

1. Microsoft Excel 2019 Data Analysis and Business Modeling, Wayne Winston, Microsoft Press, 2019.
2. Beginning Microsoft Power BI: A Practical Guide to Self-Service Data Analytics, Dan Clark, APress Publications, 2020.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	M	S	H	M
CO3	M	H	M	H	S
CO4	S	M	S	M	H
CO5	S	H	H	S	S

S – Strong**H – High****M – Medium****L – Low**

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Elective Paper - Virtual Reality				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

1. To understand the basics of virtual reality.
2. To study about basic geometric transformation and generic model of VR.
3. To develop animated virtual environment and compare with physical simulation.
4. To gain knowledge on applications and future of virtual reality.

Course Outcomes (CO)

K1 to K5	CO1	Understand the fundamentals of virtual reality.
	CO2	Recall basic geometric transformation and generic VR systems.
	CO3	Analyze on animate virtual environment and compare VR simulation with physical simulation.
	CO4	Evaluate basic components of VR and use of VRML.
	CO5	Implement on various applications and future of VR.

Syllabus

UNIT I

(15 Hours)

Introduction to Virtual Reality: Virtual Reality & Virtual Environment : Introduction – Computer Graphics – Real Time Computer Graphics – Flight Simulation – Virtual Environments – Requirement – Benefits of Virtual Reality. Historical development of VR : Introduction – Scientific Landmark – 3D Computer Graphics: Introduction – The virtual world space – positioning the virtual observer – the perspective projection – human vision – stereo perspective projection – 3D clipping – Colour theory – Simple 3D modeling – Illumination models – Reflection models – Shading algorithms- Radiosity – Hidden Surface Removal – Realism- Stereographic image.

UNIT II

(15 Hours)

Geometric Modeling : From 2D to 3D – 3D space curves – 3D boundary representation – Geometrical Transformations: Introduction – Frames of reference – Modeling transformations – Instances – Picking Flying – Scaling the VE – Collision detection - A Generic VR system: Introduction – The virtual environment – the Computer environment – VR Technology – Model of interaction – VR Systems.

UNIT III

(15 Hours)

Virtual Environment Animating the Virtual Environment: The dynamics of numbers – Linear and Non-linear interpolation - The animation of objects – linear and nonlinear translation - shape & object inbetweening – free from deformation – particle system- Physical Simulation: Introduction – Objects falling in a gravitational field – Rotating wheels – Elastic collisions – projectiles – simple pendulum – springs – **Flight dynamics of an aircraft***.

UNIT IV

(15 Hours)

VR Hardwares & Softwares Human factors: eye – ear - somatic senses - VR Hardware: Introduction – sensor hardware – Head-coupled displays –Acoustic hardware – Integrated VR systems-VR Software: Introduction – modeling virtual world –Physical simulation- VR toolkits – **Introduction to VRML***.

UNIT V

(15 Hours)

VR Application Virtual Reality Applications: Introduction – Engineering – Architecture – Science – Education – Medicine – Entertainment - Training – The Future: Introduction – Virtual environments – modes of interaction.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart Classroom / PowerPoint Presentation / Seminar / Quiz / Discussion / Flipped Class

TEXT BOOKS

1. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, 3D User Interfaces, Theory and Practice, Addison Wesley, USA, 2017.
2. William R. Sherman, Alan B. Craig, Understanding Virtual Reality Interface, Application and Design, Morgan Kaufmann, 2018.

REFERENCE BOOKS

1. Alan B Craig, William R Sherman and Jeffrey D Will, Developing Virtual Reality Applications: Foundations of Effective Design, Morgan Kaufmann, 2009.
2. John Vince, Virtual Reality Systems, Pearson Education Asia, 2008.
3. Grigore C. Burdea, Philippe Coiffet, Virtual Reality Technology, Wiley Interscience, 2nd Edition, 2006.
4. Oliver Bimber and Ramesh Raskar, Spatial Augmented Reality: Merging Real and Virtual Worlds, 2005.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	H	S	S
CO2	S	M	S	H	M
CO3	M	H	M	H	S
CO4	S	M	S	M	H
CO5	S	H	S	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning				
Title of the Paper: Elective Paper - Artificial Intelligence in Cyber Security					
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability	

Course Objectives

1. To gain knowledge on AI concepts and AI tools for cyber security.
2. To give AI solutions for cyber security threats.
3. To detect network anomaly and prevent frauds with GANs.
4. To evaluate AI arsenal and to prevent authentication abuse.

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic concepts of AI and its tools for cyber security.
	CO2	Understand AI solutions for cyber security threats.
	CO3	Apply the fundamentals of Network anomaly detection with AI and authentication abuse prevention.
	CO4	Analyze the working knowledge fraud prevention with cloud AI solutions.
	CO5	Evaluate algorithms to test AI arsenal.

Syllabus

UNIT I

(15 Hours)

AI Core Concepts and Tools Applying AI in cyber security: Evolution in AI-Types of machine learning-algorithm training and optimization-Know Python's libraries. Python for AI and cyber security-Python libraries for cyber security-enter Anaconda-playing with Jupyter notebooks - Installing DL libraries.

UNIT II

(15 Hours)

Detecting cyber security threats with AI Detecting email cyber security threats with AI: Detecting spam with perceptrons - spam detection with SVM-Phishing detection with logistic regression and decision trees-spam detection with Naive Bayes NLP to the rescue. Malware threat detection: Malware analysis at a glance-telling different malware families apart-Decision tree malware detectors-detecting metamorphic malware with HMM-**Advanced malware detection with deep learning***.

UNIT III

(15 Hours)

Network anomaly detection with AI and authentication abuse prevention Network anomaly detection techniques- classifying network attacks-detecting botnet topology-ML algorithms for botnet detection. Securing user authentication: Authentication abuse prevention-account reputation scoring-user authentication with keystroke recognition-**biometric authentication with facial recognition***.

UNIT IV

(15 Hours)

Fraud prevention and GANs Fraud detection algorithms-predictive analytics for credit card fraud detection-IBM Watson cloud solution-importing sample data in the cloud - evaluating quality of our predictions. GANs in a nutshell GAN Python tools and libraries-network attack via model substitution- IDS evasion via GAN-facial recognition attacks with GAN.

UNIT V

(15 Hours)

Evaluating and testing AI Arsenal Best practices of feature engineering - evaluating a detector's performance with ROC-split data to training and test sets-using cross validation for algorithms. Assessing AI arsenal: Evading ML detectors challenging ML anomaly detection-testing for data and model quality-ensuring security and reliability.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart Classroom / PowerPoint Presentation / Seminar / Quiz / Discussion / Flipped Class

TEXT BOOKS

1. Alessandro Parisi, Hands on Artificial Intelligence for Cyber security, Packt Publishing Ltd., 2019.
2. Jack Caravelli and Nigel Jones, Cyber Security - Threats and responses for government and business ,Praeger security International, 2019.

REFERENCE BOOKS

1. Brij B. Gupta, Michael Sheng, Machine Learning for Computers and Cyber Security, CRC Press, 2019.
2. Clarence Chio, David freeman, Machine Learning and Security, O'Reilly, 1st Edition, 2018.
3. Soma Halder and Sinan Ozademir, Machine Learning for Cyber Security, Packt publishing, 2018.
4. Ted Coombs, Artificial Intelligence and Cyber Security for dummies, IBM Limited Edition, John Wiley & Sons, 2018.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	H	M	M	H	S
CO4	S	M	S	M	H
CO5	S	H	H	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Elective Paper - Design Thinking				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

1. To understand the overview of design thinking.
2. To identify the key habits and attitudes of design thinking.
3. To study design thinking research methodology.
4. To understand the role of feedback in design thinking.
5. To apply design thinking in logistic industry.

Course Outcomes (CO)

K1 to K5	CO1	Understand the fundamentals of design thinking.
	CO2	Recall the key habits and attitudes of design thinking.
	CO3	Analyze the research methods for design thinking.
	CO4	Assess user feedback and loop
	CO5	Evaluate design thinking in Logistics industry.

Syllabus

UNIT I (15 Hours)

Design thinking history and overview: Understand what came before Design thinking - Identify who did what to bring it about-Learn how it built upon previous approaches - How design thinking is introduced in an organization - Understand the transformation required - What outcomes are possible - Understand the whole approach to design thinking - Determine what is most important.

UNIT II (15 Hours)

Key habits: Introduction to key habits - types-avoid common anti-patterns - Optimize for success with these habits - Introduction to loop - **Importance of iteration** *- How to observe, Reflect & Make - Drill down and do tomorrow.

UNIT III (15 Hours)

User Research And Make : Importance of user research - Appreciate empathy through listening - Key methods of user research - How make fits into the loop - Leverage observe information - Ideation, storyboarding and Prototyping.

UNIT IV (15 Hours)

User Feedback And Teaching : User feedback and the loop - Different types of user feedback - How to carryout getting feedback - Understand the challenges of teaching EDT - Valuable hints and tips - Ready to teach the course.

UNIT V (15 Hours)

Logistics And Applications : Understand what type of room you need - Learn what materials and supplies you need - Learn how to setup the room - Domains that are applicable - Digital versus physical - **Explore some technology specialization***.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion/ Flipped Class

TEXT BOOKS

1. Tom Kelley, Creative Confidence 2013.
2. Tim Brown, Change by Design, 2009.

REFERENCE BOOKS

1. Nigel Cross, Design Thinking, Kindle Edition
2. IBM Course Ware. HICET – Department of Artificial Intelligence and Machine Learning

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	M	H	S
CO4	S	H	S	M	H
CO5	S	S	H	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24		B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Elective Paper - Image and Speech Processing					
Batch 2025 – 2026		Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

1. To understand the fundamentals of digital image.
2. To explain image enhancement approaches in spatial domain.
3. To learn the fundamental concepts of color image segmentation.
4. To study time domain methods for speech processing.
5. To analyze Linear Predictive Coding of speech signals.

Course Outcomes (CO)

K1 to K5	CO1	Understand digital image and speech fundamentals.
	CO2	Recall image enhancement approaches in spatial domain.
	CO3	Analyze fundamental concepts of color image segmentation.
	CO4	Evaluate time domain methods for speech processing.
	CO5	Analyze Linear Predictive Coding of speech signals.

Syllabus

UNIT I

(15 Hours)

Image Categories – Steps in Digital Image Processing – Components of an Image Processing System. Digital Image Fundamentals: Elements of Visual Perception – Electromagnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization - **Basic Relationship between Pixels***.

UNIT II

(15 Hours)

Basic Gray Level Transformations – Histogram Processing – Enhancement using Arithmetic and Logic Operations – Spatial Filtering – Smoothing Spatial Filters – Sharpening Spatial Filters – Combining Spatial Enhancement Methods.

UNIT III

(15 Hours)

Color Fundamentals – Color Models – Pseudocolor Image Processing. Image Segmentation: Detection of Discontinuities – Edge Linking and Boundary Detection – Use of Motion In Segmentation. Basis of Wavelet Transforms. Lossless and Lossy Compression Techniques.

UNIT IV

(15 Hours)

Discrete -Time Signals and Systems – Sampling Speech Signals - Transform Representation of Signals and Systems. Speech Production Mechanism – Acoustic Phonetics. Time-Domain Models for Speech Processing: Time-Dependent Processing of Speech – Short-Time Energy and Average Magnitude – Short-Time Average Zero-Crossing Rate – Speech Vs. Silence Discrimination – Pitch Period Estimation – Short-Time Autocorrelation Function.

UNIT V

(15 Hours)

Fourier Transform of Speech Signal - Linear Predictive Coding of Speech: Linear Predictive Analysis – Computation of Gain – Durbin's Recursive Solution. Man-Machine Communication: Voice-Response Systems – Speaker Recognition Systems – **Speech Recognition Systems***.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion/ Flipped Class

TEXT BOOKS

1. R.C. Gonzalez and Rafael. C. Woods, Richard E, Digital Image Processing, Fourth Edition, Pearson Education, 2018.
2. L. R. Rabiner and R.W. Schafer, Digital Processing of Speech Signals, Pearson Education, 2005.

REFERENCE BOOKS

1. Lizhe Tan Jean Jiang, Digital Signal Processing: Fundamentals and Applications, Third Edition, Academic Press, 9th November 2018.
2. D.O'Shaughnessy, Speech Communications - Human and Machine, Second Edition, University Press (India), 2001.
3. L. Rabiner and B.H. Juang, Fundamentals of Speech Recognition, Pearson Education, 2003.
4. A. K. Jain, Fundamentals of Digital Image Processing, Prentice-Hall of India, New Delhi, 2001.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	M	H	S
CO4	S	H	S	H	H
CO5	S	H	H	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Elective Paper - Database Management Systems				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

1. To learn the purpose of database systems and ER model.
2. To understand the relational model in DBMS and SQL fundamentals.
3. To provide knowledge about transaction processing and concurrency control.
4. To study data storage and query processing in database.

Course Outcomes (CO)

K1 to K5	CO1	Recall the purpose of database systems and ER model.
	CO2	Understand the relational model in DBMS for problem solving.
	CO3	Apply on manipulate data using SQL commands.
	CO4	Evaluate transaction processing and concurrency control in database.
	CO5	Analyze data storage and query processing in DBMS.

Syllabus

UNIT I (15 Hours)

Purpose of Database System - Views of data - Data Models - Database Languages - Database Architecture - Database users and Administrator – Entity Relationship model - E-R Diagrams - Introduction to relational databases.

UNIT II (15 Hours)

Structure of Relational Databases-The relational Model - Keys - Relational Query Languages - Relational Algebra - Domain Relational Calculus - Tuple Relational Calculus - SQL fundamentals - Integrity - Triggers - Security - Views – **Introduction to Distributed Databases and Client / Server Databases***.

UNIT III (15 Hours)

SQL Standards – Data types – Database Objects- DDL-DML-DCL-TCL-Embedded SQL -Static Vs Dynamic SQL – query optimization: Query Processing and Optimization - Heuristics and Cost Estimates in Query Optimization.

UNIT IV (15 Hours)

Transaction Concepts - ACID Properties - A Simple Transaction Model – Serializability - Two Phase Commit - Concurrency - Need for Concurrency - Locking Protocols - Two Phase Locking – Transaction Recovery – **Deadlock***.

UNIT V (15 Hours)

Overview of Physical Storage Media - RAID - File Organization - Indexing and Hashing - B+ tree Index Files - B tree Index Files - Query Processing Overview - Catalog Information for Cost Estimation - Selection Operation - Sorting - Join Operation - Query Optimization – Transformation of Relational expressions.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion/ Flipped Class

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, Database System Concepts, 7th Edition, Tata McGraw Hill, 2022.
2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Sixth Edition, Pearson/Addison Wesley, 2007

REFERENCE BOOKS

1. S. Sumathi, S. Esakkirajan, Fundamentals of Relational Database Management Systems, Springer Science & Business Media.
2. N. P. Singh, C. S. Gupta, Relational Database Management Systems, Abhishek Publications, 15-May-2014.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	M	H	S
CO4	S	H	S	M	H
CO5	S	S	H	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Elective Paper - Data Mining and Warehousing				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

1. To learn components and architecture of data warehouse.
2. To study business analysis tools in data warehouse.
3. To gain knowledge on tasks and functionalities of data mining.
4. To use mining frequent patterns, association rule & correlations in real time applications.
5. To learn different clustering analysis and its applications.

Course Outcomes (CO)

K1 to K5	CO1	Recall the components and architecture of data warehouse.
	CO2	Understand business analysis framework in data warehouse.
	CO3	Analyze tasks and functionalities of data mining.
	CO4	Apply mining frequent pattern, association rule & correlation in real time applications.
	CO5	Evaluate the output of different clustering procedures.

Syllabus

UNIT I

(15 Hours)

Data warehousing Components – Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools – Metadata.

UNIT II

(15 Hours)

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools OLAP Tools and the Internet.

UNIT III

(15 Hours)

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues – **Data Preprocessing***.

UNIT IV

(15 Hours)

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT V

(15 Hours)

Cluster Analysis – Types of Data – Categorization of Major Clustering Methods – K- means– Partitioning Methods – Hierarchical Methods – Density-Based Methods – Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data – Constraint – Based Cluster Analysis – Outlier Analysis – **Data Mining Applications ***

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion/ Flipped Class

TEXT BOOKS

1. Alex Berson and Stephen J. Smith, Data Warehousing, Data Mining and OLAP, TataMc Graw – Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, ThirdEdition Elsevier, 2012.

REFERENCE BOOKS

1. Margaret H. Dunham,(2003), Data Mining – Introductory and Advanced Topics, Pearson Education.
2. Pang Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining, Pearson Education, 2007.
3. K.P. Soman, Shyam Diwakar and V. Aja, Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	H	H	S
CO4	S	S	S	M	H
CO5	S	H	H	S	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Allied Paper 3 - Foundations of Robotics				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

1. To learn the basics of robotics.
2. To understand the robot end effectors.
3. To learn the techniques used in robot mechanics.

Course Outcomes (CO)

K1 to K5	CO1	Remember the fundamentals of robotics and its components.
	CO2	Understand uses, benefits and cost analysis of Robotic grippers and end effectors.
	CO3	Apply the techniques of kinematics and dynamics of robotics.
	CO4	Analyze the importance of machine vision in Robotics.
	CO5	Evaluate the design and program for performing specific robotic applications.

Syllabus

Unit I (15 Hours)

Introduction- Basic components of robot-Laws of robotics- classification of robot-work space - accuracy- resolution – repeatability of robot. Power transmission system: Rotary to rotary motion, Rotary to linear motion, **Harmonics drives***.

Unit II (15 Hours)

Robot End effectors: Introduction- types of End effectors- Tools as end effectors - Drive system for grippers - Mechanical gripper- types of gripper mechanism- gripper force analysis and gripper design - other types of gripper- special purpose grippers.

Unit III (15 Hours)

Robot kinematics: Introduction- Matrix representation- rigid motion & homogeneous transformation- forward & inverse kinematics- trajectory planning. Robot Dynamics: Introduction - Manipulator dynamics – Lagrange - Euler formulation- Newton - Euler formulation.

Unit IV (15 Hours)

Machine vision: image acquisition, digital images - sampling and quantization - levels of computation Feature extraction-windowing technique - segmentation- Thresholding - edge detection - binary morphology - grey morphology - Camera calibration – **Stereo Reconstruction***.

Unit V (15 Hours)

Robot programming: Robot Languages- Classification of robot language - Computer control and robot software - Val system and Languages - VAL language commands - motion control, hand control, program control, pick and place applications - palletizing applications using VAL - Robot welding application using VAL program - Rapid Language - basic commands Virtual robotics - VAL-II and AML – applications of robots.

*** Self Study and questions for examinations may be taken from the self-study portions also.**

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion/ Flipped Class

TEXT BOOKS

1. A Text Book on Robotics Principles, Elements and Applications, G. Kalivarathan/C. Aravind, (2017), First Edition.
2. S K Saha, Introduction to Robotics – First reprint, 2024, Tata McGraw-Hill Publication.
3. John J. Craig, Introduction to Robotics - Mechanics and Control, 3rd Edition, Pearson Education Inc, 2022.

REFERENCE BOOKS

1. Mikell P Groover, Mitchel Weiss, Roger N Nagel, Nicholas G Odrey, Ashish Dutta,(2012), Industrial Robotics Technology, Programming and Applications, Second edition.
2. S.R. DEB, S.DEB, Robotics Technology and Flexible Automation, (2011), 2nd Edition - TataMcGraw Hill Education.
3. S.K. Saha, (2011), Introduction to Robotics, 4th Edition - Tata Mc Graw Hill Education.
4. Ashitava Ghoshal,(2010), Robotics - Fundamental Concepts and Analysis, Oxford University Press, Sixth impression.
5. Carsten Steger, Markus Ulrich, Christian Wiedemann, Machine Vision Algorithms andApplications, Second edition, Weinheim, WILEY-VCH, 2018

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	S	S	H	M
CO3	S	H	M	H	S
CO4	S	M	S	M	H
CO5	S	H	H	S	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning				
Title of the Paper: Allied Paper 4 - Big Data Analytics					
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability	

Course Objectives

1. To understand big data platform and its use-cases.
2. To provide an overview of Hadoop and HDFS.
3. To know about anatomy of file operations in HDFS and Hadoop daemons.
4. To learn the architecture of Hadoop YARN and MapReduce.
5. To learn the role of R in Machine Learning and Data Analytics.

Course Outcomes (CO)

K1 to K5	CO1	Remember the fundamentals of Big data and its applications.
	CO2	Understand the components of Hadoop and HDFS configurations.
	CO3	Apply the HDFS file operations and daemons in Hadoop cluster.
	CO4	Analyze Apache Hadoop architecture in big data.
	CO5	Evaluate the machine learning model for data analysis using R.

Syllabus

Unit I

(15 Hours)

Introduction to Big data – Importance - Evaluation of Big Data – Characteristics of Big Data - Applications – Sources of Big Data - Types of Data - Data Explosion – Difference between Traditional IT Approach and Big Data Technology – Capabilities of Big Data – Handling Limitations of Big Data - Technologies Supporting Big Data.

Unit II

(15 Hours)

Introduction – Why Hadoop – What is Hadoop – History and Milestone of Hadoop – Core Components of Hadoop – Difference between Regular File System and HDFS – Common Hadoop Shell Commands – Hadoop Configuration. Visualizations – Visual data analysis techniques, interaction techniques;

Unit III

(15 Hours)

HDFS: Concepts and Architecture - Data Flow (File Read, File Write) - Fault Tolerance - Java Base API - Different Daemons in Hadoop cluster (NameNode, Secondary NameNode, Job Tracker, Task Tracker and DataNode) - Loading a dataset into the HDFS.

Unit IV

(15 Hours)

What is YARN – YARN Infrastructure - Introduction of MapReduce – Analogy of MapReduce – MapReduce Architecture - Basic concepts - Data Partitioning. Example of MapReduce –Sorting, Shuffling – Reducing – Combiner – Partitioner – Creating MapReduce program by using Eclipse.

Unit V

(15 Hours)

MapReduce: Introduction to MapReduceData, Architecture of MapReduce, Basic concepts. Data Partitioning.Data Analytics with R Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with Big R.

*** Self Study and questions for examinations may be taken from the self study portions also.**

Teaching Methods

Smart classroom / PowerPoint presentation / Seminar / Quiz / Discussion/ Flipped Class

TEXT BOOKS

1. V. Bhuvaneswari, T. Devi, Big Data Analytics - A Practitioners Approach, 2021, Scitech, Winners Wisdom.
2. Seema Acharya, Subhasini Chellappan, (2019) , Big Data Analytics, Wiley.
3. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data (2015), EMC Education Services.

REFERENCE BOOKS

1. Big Data, (2016), Black Book: Covers Hadoop 2, MapReduce, Hive, YARN, Pig, R and Data Visualization, DT Editorial Services.
2. Tom White, (2012), Hadoop: The Definitive Guide, Third Edit on, O'reily Media.
3. Stephan Kudyba, (2014), Big Data, Mining, and Analytics: Components of Strategic Decision Making, Auerbach Publications.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	H	M	H	S
CO4	S	H	S	M	H
CO5	S	S	S	H	S

S – Strong**H** – High**M** – Medium**L** – Low

Programme Code:24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Core Paper 10 - Artificial Neural Networks and Fuzzy Logic				
Batch 2025 – 2026	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

1. To understand the fundamentals of neural networks.
2. To explain the unsupervised neural network model with real life examples.
3. To show the differences and similarities between fuzzy sets and classical sets theories.

Course Outcomes (CO)

K1 to K5	CO1	Remember the basic concepts of neural networks.
	CO2	Under the algorithms used in unsupervised neural network models.
	CO3	Apply the technologies, principles of crisp set and fuzzy set.
	CO4	Analyze on crisp and fuzzy relations.
	CO5	Evaluate adaptive neuro fuzzy based inference systems and neuro fuzzy control with real life examples.

Syllabus

Unit I (15 Hours)

Basic concepts - single layer perceptron - Multi layer perceptron – Adaline - Madaline - Learning rules - Supervised learning - Back propagation networks - Training algorithm, Advanced algorithms - Adaptive network - Radial basis network modular network-Applications

Unit II (15 Hours)

Introduction - unsupervised learning – Competitive learning networks - Kohonen self quantization networks-Learning vector quantization – Hebbian learning – Hopfield network - Content addressable nature, Binary Hopfield network, Continuous Hopfield network Travelling Salesperson problem – Adaptive resonance theory – Bidirectional Associative Memory – Principle component Analysis.

Unit III (15 Hours)

Introduction – crisp sets an overview – the notion of fuzzy sets – Basic concepts of fuzzy sets – classical logic an overview – Fuzzy logic. Operations on fuzzy sets - fuzzy complement – fuzzy union – fuzzy intersection – combinations of operations – **general aggregation operations***.

Unit IV (15 Hours)

Crisp and fuzzy relations – binary relations – binary relations on a single set– equivalence and similarity relations – Compatibility or tolerance relations– orderings – Membership functions – Methods of generation – **defuzzification methods***.

Unit V (15 Hours)

Adaptive Neuro Fuzzy based inference systems – classification and regression trees: decision tress, Cart algorithm – Data clustering algorithms: K means clustering, Fuzzy C means clustering, Mountain clustering, Subtractive clustering – rule base structure identification – Neuro fuzzy control: Feedback Control Systems, Expert Control, Inverse Learning, Specialized Learning, Back propagation through Real –Time Recurrent Learning.

*** Self - study and questions for examinations may be taken from the self-study portions also.**

Teaching Methods

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/ Experiential Learning/Blended learning

TEXT BOOKS

1. Jang J. S. R, Sun C.T and Mizutani E , Neuro Fuzzy and Soft Computing, Pearson Education, 2004.
2. Laurene Fauseett, Fundamentals of Neural Networks, Prentice Hall India, New Delhi, 1994.

REFERENCE BOOKS

1. Timothy J.Ross, Fuzzy Logic Engineering Applications, Mc Graw Hill, NewYork, 1997.
2. S. Rajasekaran and G. A. Vijayalakshmi, Neural networks, Fuzzy logics, and Genetic Algorithms, Pai Prentice Hall of India, 2003.
3. George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic , Prentice Hall Inc., New Jersey,1995.
4. S. N. Sivanandam, S.N. Deepa , Principles of Soft Computing, Wiley India Pvt Ltd.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	M	S	H	M
CO3	S	H	M	H	S
CO4	S	M	H	M	H
CO5	S	H	S	H	S

S – Strong

H – High

M – Medium

L – Low

SKILL BASED SUBJECTS (SBS)

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Skill Based Subject 1 - Cyber Security				
Batch 2025 – 2026	Hours/Week 2	Total Hours 30	Credits 3	Skill Development

Course Objectives

- The course introduces the basic concepts of Cyber Security
- To develop an ability to understand about various modes of Cyber Crimes and Preventive measures
- To understand about the Cyber Legal laws and Punishments

Course Outcomes (CO)

K1 to K5	CO1	To Understand the Concepts of Cybercrime and Cyber Frauds
	CO2	To Know about Cyber Terrorism and its preventive measures
	CO3	To Analyze about the Internet, Mobile Phone and E-commerce security issues
	CO4	To Understand about E-mail and Social Media Issues
	CO5	To Describe about various legal responses to Cybercrime

Syllabus

UNIT I

(6 Hours)

Introduction to Cyber Security: Definition of Cyber Security- Why is Cyber Security important? Layers of Cyber Security- Evolution of Cyber Security. Cyber hacking - Cyber fraud: Definition- Different modes of cyber fraud - Cyber fraud in India. Cyber pornography.

UNIT II

(6 Hours)

Cyber Terrorism: Modes of cyber terrorism. Cybercrime: What is Cybercrime? Cybercrime preventive methods - Preventive steps for individuals & organizations - Kinds of cybercrime - Malware and its types – Cyber attacks.

UNIT III

(5 Hours)

Internet Mobile Phone and E-commerce Security issues: Data theft - Punishment of data theft- Theft of internet hours - Internet safety tips for children & parents. Mobile phone privacy - E-Commerce security issues.

UNIT IV

(6 Hours)

Email and Social media issues: Aspects of Social Media - The Vicious Cycle of unhealthy social media use- Modifying social media use to improve mental health. Computer Virus - Antivirus – Firewalls.

UNIT V

(7 Hours)

Cyber Forensics and Digital Evidence: What does Digital Footprint Mean? - Web Browsing and Digital Footprints- Digital Footprint examples – How to Protect Your Digital Footprints? - How to erase your Footprints? - Browser Extensions and Search Engine Deletion - Cyber Crime and Cyber Laws - Common Cyber Crimes and Applicable Legal Provisions: A Snapshot - Cyber Law (IT Law) in India – The Information Technology Act of India 2000 - Cyber Law and Punishments in India - Cyber Crime Prevention guide to users – Regulatory Authorities.

Teaching Methods

Chalk and Talk, Presentation, Seminar, Quiz, Discussion & Assignment
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TEXT BOOK

1. Cyber Security, Text Book prepared by “Kongunadu Arts and Science College”, Coimbatore - 641029, 2022.

REFERENCE BOOKS

1. Mayank Bhushan, Rajkumar Singh Rathore, Aatif Jamshed, “Fundamental of Cyber Security”, BPB Publications, 1st Edition, 2017.
2. Anand Shinde, “Introduction to Cyber Security-Guide to the world of Cyber Security”, Notion Press, 2021.
3. Paul Grishman, “Cyber Terrorism - The use of the Internet for Terrorist Purpose”, Axis Publication, 1st Edition 2010.
4. Shilpa Bhatnagar, “Encyclopaedia of Cyber and Computer Hacking”, Anmol Publications, 1st Edition 2009.

WEB REFERENCES

1. <http://deity.gov.in/> - Department of Electronics and Information Technology, Govt. of India
2. <http://cybercellmumbai.gov.in/> - Cybercrime investigation cell
3. <http://ncrb.gov.in/> - National Crime Records Bureau
4. <http://catindia.gov.in/Default.aspx> - Cyber Appellate Tribunal
5. <http://www.cert-in.org.in/> - Indian Computer Emergency Response Team
6. <http://cca.gov.in/rw/pages/index.en.do> - Controller of Certifying Authorities
7. www.safescrypt.com - Safescrypt
8. www.nic.in – National Informatics Centre
9. <https://www.kaspersky.com/resource-center/definitions/what-is-a-digital-footprint>
10. <https://geekflare.com/digital-footprint/>

Question Paper Pattern

Duration: 3 hrs

Max: 75 marks

Section - A (10x1=10)

Choose the correct answer

Section - B (5x5=25)

Short answer questions, either or type, one question from each unit.

Section - C (5x8=40)

Essay answer questions, either or type, one question from each unit.

CIA EXAMINATION MARK BREAKUP

S. NO	DISTRIBUTION COMPONENT	MARKS
1.	CIA I – 75 Marks Converted to 30	30
2.	CIA II – 75 Marks Converted to 30	30
3.	Assignment I	10
4.	Assignment II	10
5.	Attendance	05
6.	Any Case Study related to Cyber Security	15
Total		100

Programme Code: 24		B.Sc. Artificial Intelligence and Machine Learning		
Title of the Paper: Skill Based Subject 2 – MongoDB Lab				
Batch 2025 – 2026	Hours/Week 2	Total Hours 30	Credits 3	Skill Development

Course Objectives

1. Understand the installation and configuration of MongoDB on Windows.
2. Learn how to create and manage databases and collections in MongoDB.
3. Implement CRUD (Create, Read, Update, Delete) operations effectively.
4. Explore advanced querying techniques, indexing, and performance optimization in MongoDB.

Course Outcomes (CO)

K3 to K5	CO1	Remember to Install and configure simple database applications on Windows and set up a working environment.
	CO2	Understand to Install and configure MongoDB on Windows and set up a working environment. Create, modify, and delete databases and collections in MongoDB.
	CO3	Apply document-level operations, including insertion, updating, and deletion.
	CO4	Analyse the performance of projection, sorting, limiting, and skipping methods to retrieve specific data efficiently.
	CO5	Evaluate the indexing techniques to optimize query performance in MongoDB.

LIST OF PRACTICAL PROGRAMS

1. MongoDB installation and configuration in windows. Execute the commands and operations in MongoDB: Insert, Query, Update, Delete and Projection. (Note: use any collection)
2.
 - a. Develop a MongoDB query to select certain fields and ignore some fields of the documents from any collection.
 - b. Develop a MongoDB query to display the first 5 documents from the results obtained in a. [use of limit and find]
3. Execute Where Clause, AND, OR operations in MongoDB.
4.
 - a. Execute query selectors (comparison selectors, logical selectors) and list out the results on any collection
 - b. Execute query selectors (Geospatial selectors, Bitwise selectors) and list out the results on any collection
5. Create and demonstrate how projection operators (\$, \$elemmatch and \$slice) would be used in the MongoDB
6. Execute Aggregation operations (\$avg, \$min, \$max, \$push, \$addToSet etc.).
7. Execute Aggregation Pipeline and its operations (pipeline must contain \$match, \$group, \$sort, \$project, \$skip etc)
8. Find all listings with listing_url, name, address, host_picture_url in the listings and Reviews collection that have a host with a picture url
9.
 - a. Demonstrate creation of different types of indexes on collection (unique, sparse, compound and multikey indexes)
 - b. Demonstrate optimization of queries using indexes
10.
 - a. Develop a query to demonstrate Text search using catalog data collection for a given word
 - b. Develop queries to illustrate excluding documents with certain words and phrases

Teaching Methods

Projector / PowerPoint Presentation / Seminar / Quiz / Discussion / Flipped Class

Guidelines to the distribution of marks for practical Examinations

Two questions will be given for each student (3 Hours / 60 Marks)

1. **Record Work:** 10 Marks.
2. **Algorithm, Program, Typing and Execution:** 50 Marks.

Particulars	Program I (Marks)	Program II (Marks)
Algorithm	5	5
Program Writing Typing and Execution	20	20

Internal Mark Split up for 40 Marks:

Observation: 10 Marks

Attendance: 5 Marks

One Model Practical: 25 Marks.

MAPPING

PSO CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	H	S	H	M
CO3	S	S	M	H	S
CO4	S	M	S	M	S
CO5	S	H	H	H	S

S – Strong

H – High

M – Medium

L – Low

Programme Code: 24	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper: Skill Based Subject 3 – Basics of Intellectual Property Right's				
Batch 2025 – 2026	Hours/Week 2	Total Hours 30	Credits 3	Skill Development

Course Objectives

- To create awareness about recent trends in IPR and Innovation
- To explore the basic concepts IPR
- To focus upon trademarks, copyrights, patents, industrial designs and traditional knowledge.
- To learn more about managing IP rights and legal aspects.

Course Outcomes (CO)

K1 to K5	CO1	Know about basic concepts of IPR and patent
	CO2	Understand copyrights, industrial designs and geographical indication of goods.
	CO3	Differentiate between trademarks and trade secrets
	CO4	Acquire knowledge on protection of traditional knowledge and plant varieties.
	CO5	Manage and protect IP Rights

Syllabus**UNIT I****(6 Hours)**

Introduction -origin and development of Intellectual Property Rights (IPR), need for protecting IP, **Patents:** Foundation of patent law, patent searching process, basic criteria of patentability. Patentable and non - patentable subject matters in India. Patent prior art search, drafting the patent specification and filing procedure

UNIT II**(6 Hours)**

Copyrights: Fundamentals of copyright law, originality of material, right of reproduction, right to perform the work publicly, copyright ownership issues, notice of copyright. **Industrial Designs:** Kind of protection provided in Industrial design. **Geographical Indication of Goods:** Basic aspects and need for the registration.

UNIT III**(6 Hours)**

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, transfer of rights, selecting and evaluating trademark, registration of trademarks, claims. **Trade Secrets:** Trade secret law, determination of trade secret status, liability form is appropriation of trade secrets, trade secret litigation.

UNIT IV**(6 Hours)**

Protection of traditional knowledge - Objectives, concept of traditional knowledge, issues concerning, bioprospecting and biopiracy. **Protection of Plant Varieties** - Objectives, international position, plant varieties protection in India. Rights of farmers, breeders and researchers.

UNIT V**(6 Hours)**

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, protecting IP Rights: non-disclosure agreement, cease and desist letter, settlement memorandum. **Transferring IP Rights:** Assignment contract, license agreement, deed of assignment. Infringement and enforcement.

Teaching Methods

Smart Classroom / PowerPoint Presentation / Seminar / Quiz / Discussion

TEXT BOOKS

1. Ramakrishna Chintakunta and M. Geethavani (2022). A Textbook of Intellectual Property Rights. Blue Hills publications.
2. N.K Acharya (2021).Intellectual property rights(8thEdn). Asia Law House.
3. Craig Allen Nard, Michael J. Madison, and Mark P. McKenna. (2017). Law of Intellectual Property (5thEdn). New York Aspen publishers.
4. Barrett and Margreth (2009). Intellectual Property. New York Aspen publishers.
5. Deborah E.Bouchoux(2013). Intellectual property:The Law of Trademarks, Copyrights, Patents, and Trade Secrets. Publisher: Cengage India

REFERENCE BOOKS

1. B.Ramakrishna and H.S.Anil Kumar (2017). Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers.Notion Press.
2. V. K. Ahuja(2013). Law relating to Intellectual Property rights (2nd Edn). LexisNexis.
2. R. Radhakrishnan and S. Balasubramanian(2008).Intellectual property rights: Text and Cases. Excel Books India.
4. D. Goeland S. Parashar (2013). IPR Biosafety and Bioethics. Pearson Education India.

EXTRA DEPARTMENT COURSE (EDC)

Programme Code: 23	B.Sc. Artificial Intelligence and Machine Learning			
Title of the Paper :EDC - Fundamental of Internet and Web Design Lab				
Batch 2025 – 2026	Hours/Week 2	Total Hours 30	Credits 3	Employability

Course Objectives

1. Students will learn to create well-structured, semantic HTML documents and style them effectively using CSS.
2. Students will gain proficiency in writing clean and efficient code, adhering to best practices in web development.
3. Students will be introduced to JavaScript programming concepts and learn how to use it to enhance the interactivity and functionality of web pages.
4. Impart knowledge and essential skills necessary to use the internet and its various components.
5. Use Google Apps for education effectively and to Create and develop various forms in Google and understand the concepts MS-Excel in advance

Course Outcomes (CO)

K 1 to K 5	CO1	Remember to design a HTML webpage
	CO2	Understand the structured content, heading styles and paragraphs
	CO3	Apply image and its properties
	CO4	Analyze the Google Drive
	CO5	Evaluate Google Forms.

LIST OF PRACTICAL PROGRAMS

1. Design a HTML page having suitable background colour and text colour with title “My First Web Page” using the attributes of the Font tag and Create a HTML document having details of your [Name, Age], [Register Number, Class, Department, E-Mail ID] and [Address, Phone] and aligned in proper order using alignment attributes of Paragraph tag.
2. Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.
3. Write HTML code to create a Web Page that contains an Image at its center and description of the image.
4. Use table tag to format web page and create the Time Table of your class using table properties
5. Create your profile page i.e. educational details, Hobbies, Achievement, My Ideals etc.
6. Create an email account in Gmail. Using the account created compose a mail to invite other college students for your college fest, enclose the invitation as attachment and send the mail to at least 50 recipients. Use CC and BCC options accordingly.
7. Create and share a folder in Google Drive using “share a link” option and set the permission to access that folder by your friends only.
8. Create a registration form for your Department Seminar or Conference using Google Forms.
9. Create a online quiz with multiple-choice types of questions for a subject of your choice, using Google Forms.
10. Create Sheet and Charts in Excel to analysis Student Mark of your Class

Text Books

1. Jon Duckett (2000) – “Beginning Web Programming With HTML, XHTML AND CSS”, – Second Edition, Wiley India Pvt Ltd
2. John Dean, (2019), Web programming with HTML5, CSS, and JavaScript, Jones & Bartlett Learning.
3. Adam Ramirez, (2020), Excel Formulas and Functions 2020 Basics: Step-by-Step Guide with Examples for Beginners, Caprioru

Reference Books

1. Thomas A. Powell, “The Complete Reference HTML”, – Second Edition Tata McGraw Hill Publication.
2. Chris Bates - “Web Programming Building Internet Applications”, Second Edition, John Wiley & Sons, Ltd.

Teaching Methods:

Smart Classroom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended learning

Guidelines to the distribution of marks for practical Examinations

Two questions will be given for each student (3 Hours / 60 Marks)

1. **Record Work:** 10 Marks.
2. **Algorithm, Program, Typing and Execution:** 50 Marks.

Particulars	Program I (Marks)	Program II (Marks)
Algorithm	5	5
Program Typing and Execution	20	20

Internal Mark Split up for 100 Marks

Observation: 20 Marks

Attendance: 10 Marks

Internal Practical: 70 Marks.

MAPPING					
PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO					
CO1	S	S	S	H	M
CO2	S	S	M	H	H
CO3	S	H	H	S	M
CO4	H	S	M	H	M
CO5	S	H	H	S	S
S – Strong H – High M – Medium L – Low					

PART IV

GENERAL BOARD PAPERS

Programme Code: 24		B.Sc Artificial Intelligence and Machine Learning	
Title of the Paper : PART IV – Environmental Studies**			
Batch	Hours / Week	Total Hours	Credits
2025-2026	2	30	2

Course Objectives

1. The course will provide students with an understanding and appreciation of the complex interactions of man, health and the environment. It will expose students to the multi-disciplinary nature of environmental health sciences.
2. To inculcate knowledge and create awareness about ecological and environmental concepts, issues and solutions to environmental problems.
3. To shape students into good “Ecocitizens” thereby catering to global environmental needs.
4. This course is designed to study about the types of pollutants including gases, chemicals petroleum, noise, light, global warming and radiation as well as pollutant flow and recycling and principles of environmental pollution such as air, water and soil.
5. The course will address environmental stress and pollution, their sources in natural and workplace environments, their modes of transport and transformation, their ecological and public health effects, and existing methods for environmental disease prevention and remediation.

Course Outcomes

On successful completion of the course, the students will be able to

K1 to K5	CO 1	Understand how interactions between organisms and their environments drive the dynamics of individuals, populations, communities and ecosystems
	CO2	Develop an in depth knowledge on the interdisciplinary relationship of cultural, ethical and social aspects of global environmental issues
	CO3	Acquiring values and attitudes towards complex environmental socio-economic challenges and providing participatory role in solving current environmental problems and preventing the future ones
	CO4	To gain inherent knowledge on basic concepts of biodiversity in an ecological context and about the current threats of biodiversity
	CO5	To appraise the major concepts and terminology in the field of environmental pollutants, its interconnections and direct damage to the wildlife, in addition to human communities and ecosystems

UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENT

(6 Hours)

Definition : scope and importance – Need for public awareness - Natural resources – Types of resources – Forest Resources – Water Resources – Mineral Resources – Food Resources – Energy Resources – Land Resources.

(6 Hours)

UNIT III BIODIVERSITY AND ITS CONSERVATION

(6 Hours)

UNIT IV ENVIRONMENTAL POLLUTION

(6 Hours)

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT

(6 Hours)

Sustainable Development – Smart City, Urban planning, Town Planning , Urban problems related to energy – Water Conservation: Rain Water Harvesting and Watershed Management – Resettlement and rehabilitation of people, its problems and concerns, case studies Narmatha Valley Project – Environmental ethics, issues and possible solutions – Climate change, global warming, ozone layer depletion, acid rain, nuclear accidents and holocaust, case studies – Hiroshima and Nagasaki, Chernobyl – Consumerism and waste products – Environmental Protection Act – Air Pollution Act (Prevention and Control) – Water Pollution Act (Prevention and control) – Wild Life Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness – Human Population and the environment – Population Growth and Distribution – Population Explosion – Family Welfare Programme – Environment and Human Health – Human Rights – Value Education – HIV/ AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health.

TEACHING METHODS

Smart Class Room/Powerpoint presentation/Seminar/Quiz/Discussion

TEXT BOOK

1. P.Arul, A Text Book of Environmental Studies, Environmental Agency, No 27, Nattarstreet, Velachery main road, Velachery, Chennai – 42, First Edition, Nov.2004.

REFERENCES

1. Purohit Shammi Agarwal, A Text Book of Environmental Sciences, Publisher Mrs.Saraswati Prohit, Student Education , Behind Naswan Cinema Chopansi Road, Jodhpur.
2. Dr.Suresh and K.Dhameja, Environmental Sciences and Engineering , Publisher S.K.Kataria & Sons, 424/6, Guru Nanak Street, Vaisarak, Delhi -110 006.
3. J.Glynn Henry and Gary W Heinke, Environmental Science and Engineering, Prentice Hall of India Private Ltd., New Delhi – 110 001.

Question Paper Pattern for General Papers

Environmental Studies

Question Paper Pattern

(External only)

Duration: 3 hours

Total Marks : 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

Programme Code: 24	B. Sc Artificial Intelligence and Machine Learning		
Title of the Paper : Value Education - Moral And Ethics**			
Batch 2025-2026	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

- To impart Value Education in every walk of life.
- To help the students to reach excellence and reap success.
- To impart the right attitude by practicing self introspection.
- To portray the life and messages of Great Leaders.
- To insist the need for universal brotherhood, patience and tolerance.
- To help the students to keep them fit.
- To educate the importance of Yoga and Meditation.

Course Outcomes (CO)

After completing the course the students:

K1 to K5	CO1	will be able to recognize Moral values, Ethics, contribution of leaders, Yoga and its practice
	CO2	will be able to differentiate and relate the day to day applications of Yoga and Ethics in real life situations
	CO3	can emulate the principled life of great warriors and take it forward as a message to self and the society
	CO4	will be able to Analyse the Practical outcome of practicing Moral values in real life situation
	CO5	could Evaluate and Rank the outcome of the pragmatic approach to further develop the skills

Syllabus

UNIT I

(4 Hours)

Moral and Ethics: Introduction – Meaning of Moral and Ethics – Social Ethics – Ethics and Culture – Aim of Education.

UNIT II

(6 Hours)

Life and Teachings of Swami Vivekananda: Birth and Childhood days of Swami Vivekananda – At the Parliament of Religions – Teachings of Swami Vivekananda.

UNIT III

(4 Hours)

Warriors of our Nation: Subhas Chandra Bose – Sardhar Vallabhbhai Patel – Udham Singh – V. O. Chidambaram Pillai – Bhagat Singh – Tiruppur Kumaran – Dheeran Chinnamalai Thillaiaadi Valliammai – Velu Nachiyar – Vanchinathan

UNIT IV

(8 Hours)

Introduction -yoga and its benefits - Ardhasiddhasana- Yoga for peace- Yoga for health - Yoga for wellbeing - Yoga for success - Brain yoga benefits - The science of Yoga.

UNIT V

(8 Hours)

Isha kriya -Surya Shakthi and it's benefits.

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

Value Based Education – Moral and Ethics – compiled by Kongunadu Arts and Science College (Autonomous), 3rd Edition (2024).

REFERENCE BOOKS

1. Swami Vivekananda – A Biography, Swami Nikhilananda, Advaita Ashrama, India, 24th Reprint Edition (2010).
2. Gandhi, Nehru, Tagore and other eminent personalities of Modern India, Kalpana Rajaram, Spectrum Books Pvt. Ltd., revised and enlarged edition (2004).
3. Freedom Fighters of India, Lion M.G. Agrawal, Isha Books Publisher, First Edition (2008).
4. Easy steps to Yoga by Swami Vivekananda, A Divine Life Society Publication (2000).

UAI - 84

Sub Code: 25VED201

Value Education – Moral & Ethics

Question Paper Pattern

(External only)

Duration: 3 hours

Total Marks: 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

NON MAJOR ELECTIVE (NME)

Programme Code : 24		B. Sc Artificial Intelligence and Machine Learning	
Title of the Paper : Part IV - Non Major Elective - 1 ** Human Rights			
Batch 2025 - 2026	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

1. To prepare for responsible citizenship with awareness of the relationship between Human Rights, democracy and development.
2. To impart education on national and international regime on Human Rights.
3. To sensitive students to human suffering and promotion of human life with dignity.
4. To develop skills on human rights advocacy
5. To appreciate the relationship between rights and duties
6. To foster respect for tolerance and compassion for all living creature.

K1 to K5	CO1	To understand the hidden truth of Human Rights by studying various provisions in the Constitution of India
	CO2	To acquire overall knowledge regarding the Feminist perspectives in the Liberative Empowerment of Women
	CO3	To gain knowledge about various gender roles and stereotypes involved in the comprehension of gender equality and women's rights.
	CO4	To comprehend the legal provisions and policies that foreground the safety of children in the society and to promote awareness.
	CO5	To gain enhanced knowledge about sexual and gender minorities to recognize, celebrate and acknowledge the diversified forms of gender expressions and rights.

Syllabus

UNIT I

6 Hours

HUMAN RIGHTS HUMANS RIGHTS CONSTITUTION OF INDIA: Humans Rights - Constitution Of India

UNIT II

6 Hours

WOMEN EMPOWERMENT IN INDIA: Feminism And Sexual Violence - Women And Liberation

UNIT III**6 Hours**

GENDER EQUALITY AND WOMEN'S RIGHTS: Stereotype Gender Roles - Women's Education, Power And Science

UNIT IV**6 Hours**

RIGHTS OF THE CHILD IN INDIA: Status of child in contemporary Indian society - Special Laws and Policies for protection of children

UNIT V**6 Hours**

SOGIESC RIGHTS: Understanding SOGIESC- basic Definitions- inclusivity of SOGIESC- importance of studying SOGIESC- presence of SOGIESC in Indian Traditions- temples and cultural practices that exemplify SOGIESC in India- Genetics of Sex determination- Genetics of Intersex community- Successful SOGIESC Personalities and achievers – Alan Turing- Sally Ride- Leonardo da vinci- Alan Hart- Virginia -Woolf- Bayard Rustin- Padmini Prakash- Akkai Padmashali- K Prithika Yashini- Laxmi Narayan Tripathi- Madhu Bai Kinnar-Manabi Bandhopadhyay- SOGIESC Rights and laws

Teaching Methods

Smart Class Room / Power Point presentation / Seminar / Quiz / Discussion

TEXT BOOK

1. **Human Rights** (2024), compiled by Kongunadu Arts and Science College, Coimbatore –29.

REFERENCE BOOK

1. Human Rights, (2018) by Jaganathan, MA.,MBA.,MMM.,ML.,ML., (Humanitarian Law) and J.P. Arjun Proprietor: Usha Jaganathan, Refugee Law

Law series, 1st floor, Narmatha Nanthi Street, Magathma Gandhi Nagar, Madurai – 625014.

2. Country Report on SOGIESC Rights In India: An Unfinished Agenda.

Weblink: <https://www.ilgaasia.org/publications/india-country-report-an-unfinished-agenda>

3. Intersex.

Weblink: <https://my.clevelandclinic.org/health/articles/16324-intersex>

4. SOGIESC Personalities:

<https://www.bbc.com/news/world-asia-india-29357630>

https://en.wikipedia.org/wiki/Laxmi_Narayan_Tripathi

https://en.wikipedia.org/wiki/Akkai_Padmashali

<https://www.indiatoday.in/india/story/prithika-yashini-india-first-transgender-police-officer-tamil-nadu-969389-2017-04-04>

<https://yourstory.com/2018/03/first-transgendre-college-principal-west-bengal>

5. SOGIESC Rights and laws

<https://www.openglobalrights.org/lgbtqia-to-sogiesc-reframing-sexuality-gender-human-rights/>
<https://static1.squarespace.com/static/5a84777f64b05fa9644483fe/t/625ead0484f9005d75b92dd0/1650371887436/ILGA+Asia+India+Report+2021.pdf>

Question Paper Pattern

Duration: 3 Hours

Max Marks: 75

Answer ALL Questions

SECTION A

(5 x 5 = 25 Marks)

Short answers, either or type, one question from each unit.

SECTION B

(5 x 10 = 50 Marks)

Essay type questions, either or type, one question from each unit.

Programme Code : 24		B. Sc Artificial Intelligence and Machine Learning	
Title of the Paper : Part IV - Non Major Elective – 2 **: Women’s Rights			
Batch	Hours / Week	Total Hours	Credits
2025 - 2026	2	30	2

Course Objectives

- To know about the laws enacted to protect Women against violence.
- To impart awareness about the hurdles faced by Women.
- To develop a knowledge about the status of all forms of Women to access to justice.
- To create awareness about Women's rights.
- To know about laws and norms pertaining to protection of Women.
- To understand the articles which enables the Women's rights.
- To understand the Special Women Welfare laws.
- To realize how the violence against Women puts an undue burden on healthcare services.

Course Outcomes (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Appraise the importance of Women's Studies and incorporate Women's Studies with other fields
	CO2	Analyze the realities of Women Empowerment, Portrayal of Women in Media, Development and Communication
	CO3	Interpret the laws pertaining to violence against Women and legal consequences
	CO4	Contribute to the study of the important elements in the Indian Constitution, Indian Laws for Protection of Women
	CO5	Spell out and implement Government Developmental schemes for women and create awareness on modernization and impact of technology on Women

Syllabus

UNIT I

6 Hours

Women's Studies: Basic concepts of Women's studies in Higher education, Women's studies perspectives- Socialization- Patriarchy- Women's studies as an academic discipline- Growth and development of Women's studies as a discipline internationally and in India.

UNIT II

6 Hours

Socio-economic Development of Women's : Family welfare measures, role of Women in economic development, representation of Women in media, status of Women land rights, Women Entrepreneurs, National policy for the empowerment of women.

UNIT III**6 Hours**

Womens' rights – Access to Justice : Crime against Women, domestic violence – physical abuse-verbal abuse – emotional abuse - economic abuse – minorities, dowry- harassment and death, code of conduct for work place, abetment of suicide.

UNIT IV**6 Hours****Women Protective acts**

Protective legislation for Women in the Indian constitution- Anti dowry, SITA, PNDT, and Prevention Sexual Harassment at Workplace (Visaka case), Domestic violence (Prevention) Act.

UNIT V**6 Hours****Women and Child welfare**

Safety provisions - various forms of mass media, radio, visual, internet, cyber space, texting, SMS and smart phone usage. Healing measures for the affected Women and child society by private and public sector, NGO and society.

Teaching Methods

Smart Class Room / Power point presentation / Seminar / Quiz / Discussion / Flipped Class

TEXT BOOK

1. **Women's Rights** (2021) Published by Kongunadu Arts & Science College, Coimbatore – 641 029.

REFERENCE BOOKS

1. **Rights of Indian Women** , by Vipul Srivatsava. Publisher: Corporate Law Advisor ,2014.
2. **Women's security and Indian law** by Harsharam Singh. Publisher : AabhaPublishers and Distributors, 2015.
3. **Women's Property Rights in India** by Kalpaz publications, 2016.

Question Paper Pattern

Duration: 3 hrs

Max: 75 marks

Answer ALL Questions

SECTION A

(5 x 5 = 25 Marks)

Short answers, either or type, one question from each unit.

SECTION B

(5 x 10 = 50 Marks)

Essay type questions, either or type, one question from each unit.

Programme Code : 24		B. Sc Artificial Intelligence and Machine Learning	
Title of the Paper : Part IV- Non Major Elective 3 – Consumer Affairs			
Batch 2025 - 2026	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

1. To familiarize the students with their rights and responsibilities as a consumer.
2. To understand the procedure of redress of consumer complaints.
3. To know more about decisions on Leading Cases by Consumer Protection Act.
4. To get more knowledge about Organizational set-up under the Consumer Protection Act
5. To impart awareness about the Role of Industry Regulators in Consumer Protection
6. To understand Contemporary Issues in Consumer Affairs

Course Outcomes (CO)

K1 to K5	CO1	Able to know the rights and responsibility of consumers.
	CO2	Understand the importance and benefits of Consumer Protection Act.
	CO3	Applying the role of different agencies in establishing product and service standards.
	CO4	Analyse to handle the business firms' interface with consumers.
	CO5	Assess Quality and Standardization of consumer affairs.

Syllabus

UNIT I

6 Hours

Conceptual Framework - Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology. Experiencing and Voicing Dissatisfaction: Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO10000suite

UNIT II

6 Hours

The Consumer Protection Law in India - Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, restrictive trade practice.

Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

UNIT III

6 Hours

Grievance Redressal Mechanism under the Indian Consumer Protection Law - Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.

Leading Cases decided under Consumer Protection law by Supreme Court/National Commission: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

UNIT IV

6 Hours

Role of Industry Regulators in Consumer Protection

- i. Banking: RBI and Banking Ombudsman
- ii. Insurance: IRDA and Insurance Ombudsman
- iii. Telecommunication: TRAI
- iv. Food Products: FSSAI
- v. Electricity Supply: Electricity Regulatory Commission
- vi. Real Estate Regulatory Authority

UNIT V

6 Hours

Contemporary Issues in Consumer Affairs - Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings.

Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview.

Note: Unit 2 and 3 refers to the Consumer Protection Act, 2006. Any change in law would be added appropriately after the new law is notified.

Teaching methods

Smart Class Room / Power point presentation / Seminar / Quiz / Discussion / Flipped Class

SUGGESTED READINGS

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) Consumer Affairs, Universities Press.
2. Choudhary, Ram Naresh Prasad (2005). Consumer Protection Law Provisions and Procedure, Deep and Deep Publications Pvt Ltd.
3. G. Ganesan and M. Sumathy. (2012). Globalisation and Consumerism: Issues and Challenges, Regal Publications
4. Suresh Misra and Sapna Chadah (2012). Consumer Protection in India: Issues and Concerns, IIPA, New Delhi
5. Rajyalaxmi Rao (2012), Consumer is King, Universal Law Publishing Company
6. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.
7. E-books :- www.consumereducation.in
8. Empowering Consumers e-book, www.consumeraffairs.nic.in
9. ebook, www.bis.org
10. The Consumer Protection Act, 2006 and its later versions.

Question Paper Pattern(External only)

Duration: 3 hrs

Max: 75 marks

Section A (5x5=25)

Short Notes

Either – Or / Type - Question from each unit

Section B (5X10=50)

Essay Type

Either – Or / Type - Question from each unit

Programme Code:24		B. Sc Artificial Intelligence and Machine Learning		
Coursecode: 25UAI5IT		Internship Training		
Batch:2025 - 2026	Semester V	Hours/ Week -	Total Hours -	Grade

Course objective

1. To provide an opportunity to work in industry / institute under the mentorship of an industrial personnel.
2. To develop key skill sets that are industry relevant for future placements.
3. To have a flavor of corporate life in an industry sector.
4. To build strength, spirit of team work and self-confidence.
5. To prepare the students to comprehend industrial problem.

Working Instructions

- The tutor of the respective class shall identify a list of industries/institutes at the beginning of the fourth semester and the same shall be approved by the HoD
- The tutor shall prepare a letter of request with the name of the student who will be placed in a particular industry and send the same or concurrence from the industry
- The class tutor shall ensure not more than four students allotted to a particular industry or institute
- The class tutor shall ensure that a daily log book provided to all the students while they leave for the internship during the summer vacation (The format of the logbook will be available with the HoD)
- The tutor shall also ensure that the following documents are received from the students before they leave for the internship
 - i. The letter of undertaking from the concerned student
 - ii. A letter of undertaking from a parent / guardian indicating the willingness for permitting for his/her ward to the internship either in Coimbatore or other places
 - iii. During the internship the student must be in contact with the tutor and shall send weekly report
 - iv. After the internship is completed the logbooks have to be submitted to the tutor which has to be verified
 - v. The tutor shall arrange for an evaluation in consultation with the HoD and grades be allotted.

Mark breakup for Evaluation

Component	Marks
Logbook submission	20
Report	50
Review &Evaluation	30
Total	100

The students shall undergo Internship training / field work for a minimum period of 2 weeks at the end of the fourth semester during summer vacation and submit the report in the fifth semester. The report will be evaluated for 100 marks along with the internal viva voce by the respective Faculty. According to their marks, the grades will be awarded as given below.

Marks %	Grade
85 – 100	O
70 – 84	D
60 – 69	A
50 – 59	B
40 – 49	C
< 40	U (Reappear)