KONGUNADU ARTS AND SCIENCE COLLEGE

(AUTONOMOUS)

COIMBATORE - 641029

DEPARTMENT OF

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING (UG)

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 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:

- Delivering rigorous training that fosters deep knowledge through state-of-the-art concepts and technologies in Artificial Intelligence and Machine Learning.
- Initiating, sustaining, and nurturing research groups in core and emerging areas of Artificial Intelligence.
- Establishing Centers of Excellence in advanced computing and Artificial Intelligence to foster innovation and interdisciplinary collaboration.
- Transforming the department into a leader in education and research in Artificial Intelligence and Machine Learning.
- Inspiring and empowering the learner community to explore entrepreneurial opportunities and innovations, and to connect their work with real-world industry challenges.

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.

UAI - 1

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	25UAI101	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	25TML202	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	25UAI3A3	Allied Paper 3 – Distributed Operating System	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**

IV	I	25TML404	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	25UAI4A4	Allied Paper 4 - Design and Analysis of Algorithms	6	25	75	100	3	5
	IV	**25UAI4SL**	**Skill Based Subject 2 - MongoDB Lab**	**2**	**40**	**60**	**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 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 7 - 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	25NCC $ / NSS/YRC /PYE/ECC/ RRC/WEC101#	Cocurricular Activities*	-	50	-	50	-	1
Grand Total				-	-	-	**3800**	-	**140**

Note :

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

$ 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 – 25HIN/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

&& 4 Hours allocated for project will not be allocated in staff workload

**** 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. Data Analytics and Visualization
5. Virtual Reality
6. Artificial Intelligence in Cyber Security
7. Design Thinking
8. Image and Speech Processing
9. Database Management Systems
10. Data Mining and Warehousing
11. Foundations of Robotics
12. Big Data Analytics
13. Deep Learning
14. Artificial Neural Networks and Fuzzy Logic

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 should complete **Health and Wellness Programme (25UHW401)**[###] in the 4th semester and the completion marks should be submitted through the HOD to the Controller of Examinations. Extra credits will be given to the candidates who have successfully completed.
- The students should complete any **MOOC course available for Online learning platforms like SWAYAM, NPTEL, Coursera[$$], IIT Bombay Spoken Tutorial, e-Pathshala etc.,** with a minimum of 4 weeks in duration 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.

  [$$]**Note:** One course to be taken from coursera for all the under graduate students of self finance stream during the even semester of the I year. Appropriate extra credits and certification as applicable shall be awarded to the students who have completed the course.
- 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.

Semester	Naan Mudhalvan Course Title
III	AWS Academy Introduction to Cloud: Semester 1
V	AWS Academy Introduction to Cloud: Semester 2

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	Record Work	10	
K5			

3. ESE Project Viva Voce:

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

Scheme of Evaluation - Health and Wellness Programme (25UHW401)###

Part	Description	Mark
A	Report	40
B	Attendance	20
C	Activities (Observation during Practice)	40
Total		100

Table of Content

Sub. Code: 25UAI101

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Core Paper 1 - C and C++ Programming				
Batch 2025 – 2028	**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.**

Sub. Code: 25UAI101

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

Sub. Code: 25UAI1CL

Programme Code:24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Core Practical 1 - C and C++ Programming Lab				
Batch **2025 – 2028**	**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.
3. To familiarize students with the use of control structures, arrays, and structures.
4. To introduce the principles of object-oriented programming using classes, objects, and friend functions.
5. To understand and implement function and operator overloading.

Course Outcomes (CO)

K3 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

Sub. Code: 25UAI1CL

Internal Mark Split up for 40 Marks:

Observation: 10 Marks
Attendance: 5 Marks
One Model Practical: 25 Marks

TEXT BOOKS

1. Scholl, J., Nugent, G., & Malik, D. S. (2010), "Lab manual for C++ programming: From problem analysis to program design",5th edition, Cengage Learning.
2. Sidnal, N. S. (2012), "C programming laboratory: Handbook for beginners", 1st edition. John Wiley & Sons.
3. Brandle, S., Roberg, J., Geisler, J., & Whittington, D. (2008), "C++ data structures: A laboratory course*",* (3rd edition, Jones and Bartlett Publishers.

REFERENCE BOOKS

1. Mohana Priya, T., & Rajesh Kanna, R. (2023), "Programming in C++ lab manual",1st edition, LAP Lambert Academic Publishing.
2. Vidyarthiplus. (2022). "Programming in C lab manual (R2020 syllabus)", Vidyarthiplus Publications.

MAPPING

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

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

Sub. Code: 25UAI202

Programme Code:24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Core Paper 2 – Java Programming				
Batch **2025 – 2028**	**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

Sub. Code: 25UAI2CM

Programme Code:24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Core Practical 2 – Java Programming Lab				
Batch **2025 – 2028**	**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)

K3 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. Write a Java Program to perform various Arithmetic Operations on two Integer given by the User.

2. Write a 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.

Sub. Code: 25UAI2CM

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

Internal Mark Split up for 40 Marks:

Observation: 10 Marks
Attendance: 5 Marks
One Model Practical: 25 Marks

TEXT BOOK

1. Suganthi, T., Janaki, V., & Sharmila, B. (2024), " Java Programming (A.Y. 2023–2024)". VR1 Publications.
2. Majithia, R. (2024)," Java Programming", 1st edition, Techknowledge Books.

REFERENCE BOOKS

1. Susilabai, S. S., Malar, J. A. J., & Sumathi, G. (2025), "Java Programming", Royal Book Publishing.
2. Babu, D., & Sujitha, M. J. (2024), "JAVA Programming Lab Manual", CliffsNotes.

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

Sub. Code: 25UAI303

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Core Paper 3 - Python Programming for Machine Learning				
Batch	**Hours/Week**	**Total Hours**	**Credits**	**Skill Development**
2025 – 2028	**4**	**60**	**4**	

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.**

Sub. Code: 25UAI303

Teaching Methods

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

TEXT BOOKS

1. Kamathane(2018), "Problem Solving and Python Programming", Second Reprint.
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
4. Data, O'ReilyMedia,Inc.

REFERENCE BOOKS

1. Mark Lutz, (2010), "Programming Python", 4th Edition - O'Reilly Media.
2. David Beazley and Brian K. Jones(2013), "Python Cookbook", 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

Sub. Code: 25UAI3CN

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 – 2028**	**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

Sub. Code: 25UAI3CN

TEXT BOOKS

1. Barua, T., Hiran, K. K., Jain, R. K., & Doshi, R. (2024),"Machine learning with Python", De Gruyter,O'Reilly Media.
2. Theobald, O. (2024), "Machine learning with Python", Packt Publishing. O'Reilly Media.
3. Muddana, A. L., & Vinayakam, S. (2024), "Python for data science", Springer.

REFERENCE BOOKS

1. Thapar, P., & Bhatia, S. (2023), "Machine learning with Python", Cambridge University Press.
2. Dasgupta, M. (2024), "Mastering machine learning algorithms using Python", Packt Publishing, O'Reilly Media
3. Bisht, A. K. (2024), "AI and machine learning programming with Python", GEH 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	H	S	H	S
CO4	S	M	S	M	H
CO5	H	S	H	H	S

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

Sub. Code: 25UAI3A3

Programme Code: 24	**B.Sc. B. Sc Artificial Intelligence and Machine Learning**			
Title of the Paper: Allied Paper 3: Distributed Operating System				
Batch 2025 – 2028	**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	Understand the knowledge of distributed operating system architecture.
	CO2	Implement the principles and importance of distributed operating system.
	CO3	Create distributed client server applications using remote method invocation.
	CO4	Analyze the difference between centralized systems and distributed systems.
	CO5	Create stateful and state-less applications.

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.

Sub. Code: 25UAI3A3

Unit V **(18 Hours)**

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.

***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. 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

Sub. Code: 25UAI404

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Core Paper 4 - R Programming				
Batch 2025 – 2028	**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.
4. To develop proficiency in data manipulation and visualization using R.
5. To explore data structures and control statements in R programming.

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 – Accessinglist 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*.**

Sub. Code: 25UAI404

Unit V **(12 Hours)**

Interfacing R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linearmodels – 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

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 Grolemund.
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

Sub. Code: 25UAI4CO

Programme Code: 24	**B.Sc. B. Sc Artificial Intelligence and Machine Learning**			
Title of the Paper: Core Practical 4 - R Programming Lab				
Batch **2025 – 2028**	**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.
4. To perform data import, cleaning, and transformation using R.
5. To create effective data visualizations using R libraries.

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

Sub. Code: 25UAI4CO

Internal Mark Split up for 40 Marks:

Observation: 10 Marks
Attendance: 5 Marks
One Model Practical: 25 Marks

TEXT BOOKS

1. Barua, T., Hiran, K. K., Jain, R. K., & Doshi, R. (2024), "Machine learning with Python", De Gruyter. O'Reilly Media.
2. Theobald, O. (2024), "Machine learning with Python", Packt Publishing.

REFERENCE BOOKS

1. Muddana, A. L., & Vinayakam, S. (2024), "Python for data science", Springer.
2. McMahon, A. (2023), "Machine learning engineering with Python: Manage the lifecycle of machine learning models using MLOps with practical examples", 2nd edition, Packt 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	S	S	S	H
CO5	S	H	S	H	S

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

Sub. Code: 25UAI4A4

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Allied Paper 4 - Design and Analysis of Algorithms				
Batch **2025 – 2028**	**Hours/Week** **6**	**Total Hours** **90**	**Credits** **5**	**Employability**

Course Objectives

1. Gain a solid understanding of core algorithmic paradigms including divide and conquer, dynamic programming, greedy algorithms, and backtracking.
2. Develop the ability to design and implement efficient algorithms for complex computational problems.
3. Analyze time and space complexities, and understand the impact of complexity classes on algorithm performance.
4. Apply suitable algorithmic paradigms based on problem requirements, recognizing their advantages and limitations.
5. Strengthen problem-solving skills through real-world algorithmic challenges and hands-on implementation.

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

Sub. Code: 25UAI4A4

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 Tress 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*.**

***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. Levitin, A. (2012), "Introduction to the design and analysis of algorithms", 3rd edition, Pearson Education.
2. Kleinberg, J., & Tardos, É (2006), "Algorithm design", Pearson Education.
3. Dasgupta, S., Papadimitriou, C. H., & Vazirani, U. V. (2017), "Algorithms", 1st edition, McGraw Hill Education.

Reference Books

1. Sridhar, (2015) "Design and Analysis of Algorithms", Oxford University Press.
2. Jon Kleinberg and Eva Tardos , (2006) "Algorithm Design'', Pearson Education.
3. Ellis Horowitz, SatrajSahni and Rajasekaran(2014), "Computer Algorithms/C++", 2nd Edition, Universities Press.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein (2023), "Introduction to Algorithms" , MIT Press.

MAPPING

PSO / CO	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

Sub.Code:25UAI505

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper : Core Paper 5 - Machine Learning Techniques				
Batch	**Hours/Week**	**Total Hours**	**Credits**	**Skill Development**
2025 – 2028	**6**	**90**	**5**	

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.

Sub.Code:25UAI505

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

TEXT BOOKS

1. Ethem Alpaydin (2020), "Introduction to Machine Learning", 4e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press,
2. Stephen Marsland (2015), "Machine learning – An Algorithmic Perspective", Second Edition, CRC Press

REFERENCE BOOKS

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

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

Sub. Code:25UAI506

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper : Core Paper 6 - Introduction to Artificial Intelligence				
Batch **2025 – 2028**	**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 AI learning algorithms for various type of learning problems.
4. To apply AI techniques in solving complex real-world problems.
5. To evaluate the effectiveness of various AI algorithms in different contexts and applications.

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.**

Sub. Code:25UAI506

Teaching Methods

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

TEXT BOOKS

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

REFERENCE BOOKS

1. M. Tim Jones(2008), “Artificial Intelligence: A Systems Approach”, Jonesand Bartlett Publishers, Inc.; First Edition.
2. Ethem Alpaydin(2014), “Introduction to Machine Learning”, 3e, Third Edition, 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	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

Sub. Code : 25UAI5CP

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper : Core Practical 5 - Machine Learning Lab				
Batch **2025 – 2028**	**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 storedas 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 modelto 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

Sub. Code : 25UAI5CP

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 40 Marks:

Observation: 10 Marks
Attendance: 5 Marks
One Model Practical: 25 Marks

TEXT BOOKS

1. Géron, A. (2022), "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow", 3rd edition, O'Reilly Media.
2. Raschka, S., Liu, Y. (H.), & Mirjalili, V. (2022), "Machine learning with pytorch and scikit-learn", Packt Publishing.
3. Burkov, A. (2021), "Machine Learning Engineering", Andriy Burkov.

REFERENCE BOOKS

1. Huyen, C. (2022), "Designing Machine Learning Systems". O'Reilly Media.
2. Makin, J. G. (2022), "An Introduction to Modern Statistical Learning". arXiv.

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

Sub Code: 25UAI5CQ

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper : Core Practical 6 - Data Analytics and Visualization Lab				
Batch	**Hours/Week**	**Total Hours**	**Credits**	**Skill Development**
2025 – 2028	**6**	**90**	**4**	

Course Objectives

1. To create and manage datasets using Advanced Excel for data-driven applications.
2. To design and implement 2D and 3D charts in Excel for data visualization in real-world applications.
3. To utilize scatter plots in Advanced Excel to visualize relationships between variables for analytical applications.
4. To customize and format Excel charts effectively for professional data presentations.
5. To apply Power BI tools for data import, visualization design, and filtering to build impactful dashboards and reports.

Course Outcomes (CO)

K3 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	Analyze and implement formatting, sorting, filtering techniques in Power Bi.
	CO5	Evaluate aggregation, mapping, and interactive controls in Power Bi.

LIST OF PRACTICAL PROGRAMS

1. Create a dataset in Excel with employee details (ID, name, department, salary, and experience) of at least 50 rows.
2. Generate a 2D bar or line chart in Excel to visualize salary distribution across departments.
3. Create a 3D column or surface chart in Excel to visualize salary, experience, and department.
4. Use a scatter plot in Excel to show the relationship between years of experience (x-axis) and salary (y-axis).
5. Customize the Excel charts by adding titles, labels, adjusting chart types, and formatting the axes.
6. Import the employee dataset into Power BI and create a report showing average salary by department with filters.
7. Apply conditional formatting in Power BI to display salaries above a threshold in green and below in red, and sort data to show top 5 employees.
8. Perform time-series analysis in Power BI to track salary trends over time and include a KPI to visualize salary growth.
9. Use Power BI to calculate total salary and average experience for each department through aggregation.
10. Plot employee locations using geographic mapping in Power BI and add interactive slicers to filter data by department.

Teaching Methods

Presentation and Demonstration using Projectors

Sub. Code : 25UAI5CQ

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 Execution	20	20

Internal Mark Split up for 40 Marks:

Observation: 10 Marks
Attendance: 5 Marks
One Model Practical: 25 Marks

TEXT BOOKS

1. Hyman, J. A., Massaron, L., McFedries, P., Mueller, (2024), "Data analytics & visualization all-in-one for dummies", Wiley.
2. Sarka, D., Rihar, J., & Vončina, K. (2023), "Advanced analytics with Power BI and Excel", Orange Education Pvt Ltd.
3. Jagannathan, S. K. (2023)," Data visualization insights – hands-on book", Saint Peter's University Press.

REFERENCE BOOKS:

1. Sinha, C. (2024), "Mastering Power BI", 2nd edition, BPB Publications.
2. Kolokolov, A., & Zelensky, M. (2024), "Data visualization with Microsoft Power BI". O'Reilly Media.

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

Sub. Code: 25UAI607

Programme Code:	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Core Paper 7 – Natural Language Processing				
Batch **2025 – 2028**	**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.**

Sub. Code: 25UAI607

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(1995), "Natural Language Understanding", 2nd Edition, Benjamin /Cummings Publishing Company.
3. Christopher Manning and Hinrich Schütze (2008), "Foundations of Statistical Natural Language Processing", MIT Press.

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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

Sub. Code: 25UAI608

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 – 2028	**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.

Sub. Code: 25UAI608

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(2020), "Blockchain Technology", First Edition, Universities Press (India) Pvt. Ltd.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder(2016), "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press.
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 (2019), "Block chain Technology: Crypto currency and Applications", Oxford University Press.
2. Josh Thompson (2017), "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

Sub.Code : 25UAI609

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Core Paper 9 – Generative AI				
Batch	**Hours/Week**	**Total Hours**	**Credits**	**Employability**
2025 – 2028	**5**	**75**	**4**	

Course Objectives

1. Understand fundamental AI concepts including supervised, unsupervised, and reinforcement learning.
2. Explore the role and applications of Generative AI in NLP, vision, and creative tasks.
3. Learn advanced generative models such as Autoencoders, GANs, and Boltzmann Machines.
4. Analyze ethical, privacy, and societal issues associated with Generative AI.
5. Examine AI's growth trends and the implications of advancing toward Artificial General Intelligence (AGI).

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.

Sub.Code : 25UAI609

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.

***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/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

PSO / CO	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

Sub. Code: 25UAI6CR

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 – 2028	**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

Sub. Code : 25UAI6CQ

Internal Mark Split up for 40 Marks:

Observation: 10 Marks
Attendance: 5 Marks
One Model Practical: 25 Marks

TEXT BOOKS

1. Antić, Z., & Chakravarty, S. (2024), "Python natural language processing cookbook", 2nd edition, Packt Publishing, O'Reilly Media.
2. Kumar, L. A., & Renuka, D. K. (2023), " Deep learning approach for natural language processing, speech, and computer vision", CRC Press, O'Reilly Media.
3. Lee, R. (2025), "Natural language processing: A textbook with Python implementation", Springer

REFERENCE BOOKS

1. Rothman, D. (2024), "Transformers for natural language processing and computer vision", 3rd edition. Packt Publishing.
2. Singh, J. (2023)," Natural language processing in the real world: Text processing, analytics, and classification", Chapman & Hall/CRC.
3. Tunstall, L., von Werra, L., & Wolf, T. (2022),"Natural language processing with transformers (Revised ed.)", O'Reilly Media.

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

Sub Code: 25UAI6Z1

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Project and Viva Voce* **				
Batch 2025 – 2028	**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

Sub Code: 25UAI6Z1

MAPPING

PSO / CO	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	**Hours/Week**	**Total Hours**	**Credits**	**Employability**
2025 – 2028	**5**	**75**	**5**	

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 Rasperry 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 RASPERRY 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(2015), "Internet of Things – A Hands-on Approach", UniversitiesPress.

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 – 2028	**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 Backgrounder – 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 GrawHill, 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	**Hours/Week**	**Total Hours**	**Credits**	**Employability**
2025 – 2028	**5**	**75**	**5**	

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 (2011)," Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley Publications.
2. Bill Nelson, Amelia Phillips and Christopher Steuart (2010), "Guide to Computer Forensics andInvestigations", 3rd Edition, Cengage, BBS.
3. Shon Harris (2013), "All in One CISSP Guide", Exam Guide Sixth Edition, Mc Graw Hill.

REFERENCE BOOKS

1. LNJN 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

PSO / CO	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 – 2028	**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.

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

REFERENCE BOOKS

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

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 – 2028	**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 – **Introductionto 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 (2017), "3D User Interfaces, Theory and Practice", Addison Wesley, USA.
2. William R. Sherman, Alan B. Craig (2018), "Understanding Virtual Reality Interface, Applicationand Design", Morgan Kaufmann.

REFERENCE BOOKS

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

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 – 2028	**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 anddecision 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 (2019),"Hands on Artificial Intelligence for Cyber security", Packt PublishingLtd.
2. Jack Caravelli and Nigel Jones(2019), " Cyber Security - Threats and responses for government and business", Praeger security International.

REFERENCE BOOKS

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

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 – 2028	**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 MachineLearning

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 – 2028	**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 (2018), "Digital Image Processing", Fourth Edition, Pearson Education,.
2. L. R. Rabiner and R.W. Schafer (2005), "Digital Processing of Speech Signals", Pearson Education.

REFERENCE BOOKS

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

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 – 2028	**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 (2022), " Database System Concepts", 7th Edition, Tata McGraw Hill.
2. Ramez Elmasri, Shamkant B. Navathe (2016), "Fundamentals of Database Systems", Sixth Edition, Pearson/Addision Wesley.

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 – 2028	**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 toa 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 (2008), "Data Warehousing, Data Mining and OLAP", TataMc Graw – Hill Edition, Thirteenth Reprint.
2. Jiawei Han and Micheline Kamber (2012), " Data Mining Concepts and Techniques", ThirdEdition Elsevier.

REFERENCE BOOKS

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

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: Elective Paper - Foundations of Robotics				
Batch **2025 – 2028**	**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. S K Saha (2024), "Introduction to Robotics", Tata McGraw Hill Publication.
2. John J. Craig (2022), "Introduction to Robotics - Mechanics and Control", 3rd Edition, PearsonEducation Inc.

REFERENCE BOOKS

1. Mikell P Groover, Mitchel Weiss, Roger N Nagel (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 (2018), " Machine Vision Algorithms andApplications", Second edition, Weinheim, WILEY-VCH.

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: Elective Paper - Big Data Analytics				
Batch **2025 – 2028**	**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 (2021), "Big Data Analytics - A Practitioners Approach", Scitech, Winners Wisdom.
2. Seema Acharya, Subhasini Chellappan, (2019), "Big Data Analytics", Wiley.

REFERENCE BOOKS

1. DT Editorial Services (2016), "Big data black book: Covers Hadoop 2, MapReduce, Hive, YARN, Pig, R and data visualization", Dream tech Press.
2. White, T. (2012), "Hadoop: The definitive guide", 3rd edition, O'Reilly Media.
3. Kudyba, S. (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 : Elective Paper - Deep Learning				
Batch	**Hours/Week**	**Total Hours**	**Credits**	**Skill Development**
2025 – 2028	**6**	**90**	**4**	

Course Objectives

1. To understand the basics of machine learning and neural networks.
2. To illustrate the use of tensor flow for deep learning.
3. To study the overview and applications of Convolution Neural Networks.
4. To understand the working of RNN with real time applications.
5. To learn algorithms and real world applications of Reinforcement Learning.

Course Outcomes (CO)

K1 to K5	CO1	Understand the basics of machine learning and neural networks.
	CO2	Illustrate the use of tensor flow for deep learning
	CO3	Explain the overview and applications of Convolution Neural Networks.
	CO4	Demonstrate the working of RNN with real time applications.
	CO5	Explore algorithms and real world applications of Reinforcement Learning.

Syllabus

UNIT I **(18 Hours)**

The Neural Network – Limits of Traditional Computing – Machine Learning – Neuron – FFNeural Networks – **Types of Neurons** *– Softmax output layers.

UNIT II **(18 Hours)**

Tensor flow – Variables – Operations – Placeholders – Sessions – Sharing Variables – Graphs – **Visualization***.

UNIT III **(18 Hours)**

Convolution Neural Network – Feature Selection – Max Pooling – Filters and Feature Maps – Convolution Layer –Applications.

UNIT IV **(18 Hours)**

Recurrent Neural Network – Memory cells – sequence analysis – word2vec- LSTM - Memory augmented Neural Networks – NTM—Application.

UNIT V **(18 Hours)**

Reinforcement Learning – MDP – Q Learning – 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. Nikhil Buduma, Nicholas Locascio (2022), "Fundamentals of Deep Learning: Designing Next Generation Machine Intelligence Algorithms", O'Reilly Media.
2. Ian Good fellow, Yoshua Bengio, Aaron Courville (2022), "Deep Learning" ,MIT Press book.

REFERENCE BOOKS

1. Hammad, M. M. (2024), "Artificial neural network and deep learning: Fundamentals and theory", arXiv.
2. Poole, D. L., & Mackworth, A. K. (2023), "Neural networks and deep learning", Cambridge University Press

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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	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 Neural Networks and Fuzzy Logic				
Batch	**Hours/Week**	**Total Hours**	**Credits**	**Employability**
2025 – 2028	**5**	**75**	**5**	

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 (2019), "Neuro Fuzzy and Soft Computing", Pearson Education.
2. Laurene Fauseett (2004), "Fundamentals of Neural Networks", Prentice Hall India, New Delhi,.

REFERENCE BOOKS

1. Timothy J.Ross (2021), Fuzzy Logic Engineering Applications, Mc Graw Hill, NewYork.
2. S. Rajasekaran and G. A. Vijayalakshmi (2021), "Neural networks, Fuzzy logics, and Genetic Algorithms", Pai Prentice Hall of India.
3. George J. Klir and Bo Yuan (1995), "Fuzzy Sets and Fuzzy Logic", Prentice Hall Inc., New Jersey.
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)

Sub Code : 25UGC3S1

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Skill Based Subject 1 - Cyber Security				
Batch 2025 – 2028	**Hours/Week 2**	**Total Hours 30**	**Credits 3**	**Skill Development**

Course Objectives

1. The course introduces the basic concepts of Cyber Security
2. To develop an ability to understand about various modes of Cyber Crimes and Preventive measures
3. 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.

Sub Code : 25UGC3S1

Teaching Methods

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

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

UAI - 75

Sub Code : 25UGC3S1

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**

Sub Code: 25UAI4SL

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Skill Based Subject 2 – MongoDB Lab				
Batch 2025 – 2028	**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. Install and configure MongoDB on Windows and perform basic CRUD and projection operations on a collection.
2. Write a MongoDB query to include/exclude fields and limit the result to the first 5 documents.
3. Execute MongoDB queries using `where`, `AND`, and `OR` conditions.
4. Apply comparison, logical, geospatial, and bitwise query selectors on any collection.
5. Demonstrate the use of projection operators `$`, `$elemMatch`, and `$slice` in MongoDB.
6. Perform aggregation operations using `$avg`, `$min`, `$max`, `$push`, and `$addToSet`.
7. Build and execute an aggregation pipeline using `$match`, `$group`, `$sort`, `$project`, and `$skip`.
8. Retrieve listings with specific fields where `host_picture_url` exists in listings and reviews collections.
9. Create unique, sparse, compound, and multikey indexes and demonstrate query optimization with `explain()`.
10. Perform text search queries to find and exclude documents with specific words or phrases in the catalog collection.

Teaching Methods

Presentation and Program Demonstration using Projector

Sub Code: 25UAI4SL

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.

TEXT BOOKS:

REFERENCE BOOKS

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

Sub Code: 25UBI6S3

Programme Code: 24	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper: Skill Based Subject 3 – Basics of IPR				
Batch 2025 – 2028	**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 parotection 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.

Sub Code: 25UBI6S3

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(8th Edn). Asia Law House.
3. Craig Allen Nard, Michael J. Madison, and Mark P. McKenna. (2017). Law of Intellectual Property (5th Edn). 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.
3. 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.

CIA EXAMINATION MARK BREAKUP

The CIA Examination mark breakup for the course **Basics of IPR** is given below:

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 IPR (as a Group)	15
	Total	**100**

QUESTION PAPER PATTERN

The following question paper pattern will be followed for the above said courses:

Section A - Multiple Choice (10 × 1 = 10 Marks)
Section B - Either or Type (5 × 5 = 25 Marks)
Section C - Either or Type (5 × 8 = 40 Marks)

Maximum Marks : 75 Duration : 3 Hours

EXTRA DEPARTMENT COURSE (EDC)

Sub.Code: 25UAI5XL

Programme Code: 23	**B.Sc. Artificial Intelligence and Machine Learning**			
Title of the Paper :EDC - Fundamental of Internet and Web Design Lab				
Batch **2025 – 2028**	**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)

K3 to K5	**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:

Presentation and Program Demonstration using Projector

Guidelines to the distribution of marks for internal practical Examinations

S. NO	DISTRIBUTION COMPONENT	MARKS
1.	CIA Practical I – 60 Marks Converted to 30	**30**
2.	CIA Practical II – 60 Marks Converted to 30	**30**
3.	Observation to be Submitted - (10 Experiments/Programs×3= 30 Marks)	**30**
4.	Record	**05**
5.	Attendance	**05**
Total		**100**

*In case a student is absent for an Experiment / Program conducted on a particular day, the Student will not be allowed to compensate that Experiment/Program and will be awarded zero for that particular Experiment/Program and shall be marked absent. In case any students has an attendance lack; the concerned faculty handling the course in consultation with HoD may permit the student who has an attendance lack to compensate one or two Experiments/Programs as the case may be to enable them to become eligible with mandate of 75% attendance to appear for the Continuous Internal Practical Examinations. However the compensated Experiments/Programs will not be awarded any marks whatsoever.

MAPPING					
PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
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

Sub Code : 25EVS101

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 – 2028	**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.

UNIT II ECOSYSTEMS (6 Hours)

Concept of an ecosystem – Structure and functions of an ecosystem – Procedures, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food web and ecological pyramids – Structure and function of the following ecosystem – Forest Ecosystem –Grassland Ecosystem – Desert Ecosystem – Aquatic Ecosystem.

UNIT III BIODIVERSITY AND ITS CONSERVATION (6 Hours)

Introduction – Definition – Genetic – Species and ecosystem diversity- Bio geographical classification of India – Value of biodiversity – Biodiversity at global, national and local levels – India as a mega - diversity Nation - Hot spot of biodiversity – Threats to biodiversity - Endangered and endemic species of India – Conservation of Biodiversity – Insitu Conservation of Biodiversity – Exsitu Conservation of Biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION (6 Hours)

Definition - Causes, effects and control measures of : Air Pollution – Water Pollution – Soil Pollution – Marine Pollution – Noise Pollution – Thermal Pollution – Nuclear Pollution – Solid Waste Management: Causes, effects, control measures of urban and industrial wastes – Role of individual in prevention of pollution – Pollution case studies – domestic waste water, effluent from paper mill and dyeing, cement pollution – Disaster Management – Food, Drought, Earthquake, Tsunami, Cyclone and Landslide.

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 (Preventionand 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 InformationTechnology in Environment and Human Health.

Sub Code : 25EVS101

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.

Sub Code: 25VED201

Programme Code: 24	**B. Sc Artificial Intelligence and Machine Learning**		
Title of the Paper : Value Education - Moral and Ethics**			
Batch **2025-2028**	**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.

Sub Code: 25VED201

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, 24thReprint Edition (2010).
2. Gandhi, Nehru, Tagore and other eminent personalities of Modern India, KalpanaRajaram, 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).

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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)

Sub. Code : 25UHR3N1

Programme Code : 24	**B. Sc Artificial Intelligence and Machine Learning**		
Title of the Paper : Part IV - Non Major Elective - I ** Human Rights			
Batch **2025 - 2028**	**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.

Course Outcome (CO)

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 Tripati- 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

Sub. Code : 25UHR3N1

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.

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Sub. Code : 25UWR4N2

Programme Code : 24	**B. Sc Artificial Intelligence and Machine Learning**		
Title of the Paper : Part IV - Non Major Elective – II ** : Women's Rights			
Batch	**Hours / Week**	**Total Hours**	**Credits**
2025 - 2028	**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.

Sub. Code : 25UWR4N2

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.

UAI - 93

Sub. Code : 25UWR4N2

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 III – Consumer Affairs			
Batch **2025 - 2028**	**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 andUN 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, 2086. 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 PvtLtd.
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, NewDelhi
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, 2086 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

Sub. Code : 25UHW401

Programme Code : 24	**B. Sc Artificial Intelligence and Machine Learning**	
Title of the Paper : Health and Wellness		
Batch **2025 - 2028**	**Semester IV**	**Credits** **2**

Skill Areas:

Physical Fitness, Nutrition, Mental Health, Awareness on Drug addiction and its effects

Purpose:

The Health & Wellness course focuses on teaching the elements of physical, mental, emotional, social, intellectual, environmental well-being which are essential for overall development of an individual. The course also addresses the dangers of substance abuse and online risks to promote emotional and mental health.

Learning Outcomes:

Upon completion of the Health & Wellness course, students will be able to:

1. Demonstrate proficiency in sports training and physical fitness practices.
2. Improve their mental and emotional well-being, fostering a positive outlook on health and life.
3. Develop competence and commitment as professionals in the field of health and wellness.
4. Awareness on drug addiction and its ill effects

Focus:

During the conduct of the Health & Wellness course, the students will benefit from the following focus areas:

1. Stress Management.
2. Breaking Bad Habits.
3. Improving Interpersonal Relationships.
4. Building Physical Strength & Inner Strength.

Role of the Facilitator:

The faculty plays a crucial role in effectively engaging with students and guiding them towards achieving learning outcomes. Faculty participation involves the following areas:

1. **Mentorship & Motivation:** The Facilitator mentors students in wellness and self-discipline while inspiring a positive outlook on health. Faculty teach stress management, fitness, and daily well-being.
2. **Promoting a Safe and Inclusive Environment:** The facilitator ensures a safe, inclusive, and respectful learning environment for active student participation and benefit.
3. **Individualised Support and Monitoring Progress:** The facilitator plays a crucial role in providing personalized support, monitoring and guidance to students.

Guided Activities:

In this course, several general guided activities have been suggested to facilitate the achievement of desired learning outcomes. They are as follows:

1. Introduction to Holistic Well-being.
2. Holistic Wellness Program- Nurturing Body and Mind
3. Breaking Bad Habits Workshop.
4. Improving the elements of physical, emotional, social, intellectual, environmental and mental well-being.
5. Creating situational awareness, digital awareness.
6. Understanding substance abuse, consequences and the way out.

Period Distribution

The following are the guided activities suggested for this Audit course.

The Physical Director should plan the activities by the students.

Arrange the suitable Mentor / Guide for the wellness activities.

Additional activities and programs can be planned for Health and Wellness.

S.No	Guided Activities	Period
1	**Introduction to Holistic Well-being** 1. Introduce the core components of Health & Well-being namely Physical, mental and emotional well-being 2. Provide worksheets on all the four components individually and explain the interconnectedness to give an overall understanding.	
2	**Wellness Wheel Exercise (Overall Analysis)**	

	• Guide students to assess their well-being in various life dimensions through exercises on various aspects of well – being, and explain the benefits of applying wellness wheel. • Introduce Tech Tools: • Explore the use of technology to support well-being. • Introduce students to apps for meditation, sleep tracking, or healthy recipe inspiration.	
3	**Breaking Bad Habits (Overall Analysis)** • Open a discussion on bad habits and their harmful effects. • Provide a worksheet to the students to identify their personal bad habits. • Discuss the trigger, cause, consequence and solution with examples. • Guide them to replace the bad habits with good ones through worksheets.	
4	**Physical Well-being** **1. Fitness** Introduce the different types of fitness activities such as basic exercises, cardiovascular exercises, strength training exercises, flexibility exercises, so on and so forth. (Include theoretical explanations and outdoor activity). **2. Nutrition** Facilitate students to reflect on their eating habits, their body type, and to test their knowledge on nutrition, its sources and the benefits. **3. Yoga & Meditation** Discuss the benefits of Yoga and Meditation for one's overall health. Demonstrate different yoga postures and their benefits on the body through visuals (pictures or videos)	

	4. Brain Health Discuss the importance of brain health for daily life. Habits that affect brain health (irregular sleep, eating, screen time). Habits that help for healthy brains (reading, proper sleep, exercises). Benefits of breathing exercises and meditation for healthy lungs. **5. Healthy Lungs** Discuss the importance of lung health for daily life. Habits that affect lung health (smoking, lack of exercises). Benefits of breathing exercises for healthy lungs. **6. Hygiene and Grooming** Discuss the importance of hygienic habits for good oral, vision, hearing and skin health. Discuss the positive effects of grooming on one's confidence level and professional growth. **Suggested Activities (sample):** **Nutrition:** Invite a nutritionist to talk among the students on the importance of nutrition to the body or show similar videos shared by experts on social media. Organize a 'Stove less/fireless cooking competition' for students where they are expected to prepare a nutritious dish and explain the nutritive values in parallel.	
5	**Emotional Well-being** **1. Stress Management** Trigger a conversation or provide self-reflective worksheets to identify the stress factors in daily life and their impact on students' performance. Introduce different relaxation techniques like deep breathing, progressive muscle relaxation, or guided imagery. (use audio recordings or visuals to guide them through these techniques). After practicing the techniques, have them reflect on how these methods can help manage stress in daily life. **2. Importance of saying 'NO'.**	

	Explain the students that saying 'NO' is important for their Physical and mental well-being, Academic Performance, Growth and Future, Confidence, Self-respect, Strong and Healthy Relationships, building reputation for self and their family (avoid earning a bad name). Factors that prevent them from saying 'NO'. How to practice saying 'NO". **3. Body Positivity and self-acceptance** Discuss the following with the students. • What is body positivity and self-acceptance? • Why is it important? • Be kind to yourself. • Understand that everyone's unique. **Suggested Activities(Sample):** (Importance of saying 'NO') Provide worksheets to self-reflect on... ...how they feel when others say 'no' to them ...the situations where they should say 'no' Challenge students to write a song or rap about the importance of saying no and how to do it effectively. Students can perform their creations for the class.	
6	**Social Well-Being** **1. Practicing Gratitude** Discuss the importance of practicing gratitude for building relationships with family, friends, relatives, mentors and colleagues. Discuss how one can show gratitude through words and deeds. Explain how practicing gratitude can create 'ripple effect'. **2. Cultivating Kindness and Compassion** Define and differentiate between kindness and compassion. Explore practices that cultivate these positive emotions. Self-Compassion as the Foundation.	

	The power of small gestures. Understanding another's perspective. The fruits of compassion. **3. Practising Forgiveness** Discuss the concept of forgiveness and its benefits. Forgiveness: What is it? and What it isn't? Benefits of forgiveness. Finding forgiveness practices. **4. Celebrating Differences** Appreciate the value of individual differences and foster inclusivity. The World: A Tapestry of Differences (cultures, backgrounds, beliefs, abilities, and appearances). Finding strength in differences (diverse perspectives and experiences lead to better problem-solving and innovation). Celebrating differences, not ignoring them (respecting and appreciating the unique qualities). Activities for celebrating differences (share culture, learn about others, embrace new experiences). **5. Digital Detox** **Introduce the students to:** The concept of a digital detox and its benefits for social well-being. How to disconnect from devices more often to strengthen real-world connections. **Suggested Activities (sample)**: (Practicing Gratitude) Provide worksheets to choose the right ways to express gratitude. Celebrate 'gratitude day' in the college and encourage the students to honour the house keeping staff in some way to express gratitude for their service.	
7.	**Intellectual Well-being** **1. Being a lifelong Learner** **Give students an understanding on:** The relevance of intellectual well-being in this 21st century to meet	

	the expectations in personal and professional well-being The Importance of enhancing problem-solving skills Cultivating habits to enhance the intellectual well-being (using the library extensively, participating in extra-curricular activities, reading newspaper etc.) **2. Digital Literacy** **Discuss:** The key aspects of digital literacy and its importance in today's world. It is more than just liking and sharing on social media. The four major components of digital literacy (critical thinking, communication, problem-solving, digital citizenship). Why is digital literacy important? Boosting one's digital skills. **3. Transfer of Learning** Connections between different subjects – How knowledge gained in one area can be applied to others. **Suggested Activities(sample):** Intellectual Well-being. Provide worksheets to students for teaching them how to boost intellectual well-being. Ask the students to identify a long-standing problem in their locality, and come up with a solution and present it in the classroom. Also organize an event like 'Idea Expo' to display the designs, ideas, and suggestions, to motivate the students to improve their intellectual well-being.	
8	**Environmental Well-being** 1.The Importance of initiating a change in the environment. **The session could be around:** Defining Environmental well-being (physical, chemical, biological, social, and psychosocial factors) – People's behaviour, crime, pollution, political activities, infra-structure, family situation etc. Suggesting different ways of initiating changes in the environment (taking responsibility, creating awareness, volunteering,	

	approaching administration). **Suggested Activities (sample):** Providing worksheets to self-reflect on how the environment affects their life, and the ways to initiate a change. Dedicate a bulletin board or wall space (or chart work) in the classroom for students to share their ideas for improving environmental well-being. Creating a volunteers' club in the college and carrying out monthly activities like campus cleaning, awareness campaigns against noise pollution, (loud speakers in public places), addressing anti-social behaviour on the campus or in their locality.	
9	**Mental Well-being** **1. Importance of self-reflection** **Discuss:** Steps involved in achieving mental well-being (self-reflection, self-awareness, applying actions, achieving mental well-being). Different ways to achieve mental well-being (finding purpose, coping with stress, moral compass, connecting for a common cause). The role of journaling in mental well-being. **2. Mindfulness and Meditation Practices** Benefits of practicing mindful habits and meditation for overall well-being. **1. Connecting with nature** Practising to be in the present moment – Nature walk, feeling the sun, listening to the natural sounds. Exploring with intention – Hiking, gardening to observe the nature. Reflecting on the emotions, and feeling kindled by nature. **2. Serving people** Identifying the needs of others. Helping others. Volunteering your time, skills and listening ear. Finding joy in giving. **3. Creative Expressions**	

	Indulging in writing poems, stories, music making/listening, creating visual arts to connect with inner selves. **Suggested Activities(Sample):** (Mindfulness and Meditation) – Conducting guided meditation every day for 10 minutes and directing the students to record the changes they observe.	
10	**Situational Awareness (Developing Life skills)** **1. Being street smart** **Discuss:** Who are street smarts? Why is it important to be street smart? Characteristics of a street smart person: Importance of acquiring life skills to become street smart – (General First-aid procedure, CPR Procedure, Handling emergency situations like fire, flood etc). **2. Digital Awareness** **Discuss:** Cyber Security Information Literacy Digital Privacy Fraud Detection **Suggested Activities** (sample): (Street Smart) Inviting professionals to demonstrate the CPR Procedure Conducting a quiz on Emergency Numbers	
11	**Understanding Addiction** **Plan this session around:** Identifying the environmental cues, triggers that lead to picking up this habit. Knowing the impact of substance abuse – Adverse health conditions, social isolation, ruined future, hidden financial loss and damaging the family reputation. Seeking help to get out of this addiction. **Suggested Activities**:	

	Provide Worksheets to check the students' level of understanding about substance addiction and their impacts. Share case studies with students from real-life. Play/share awareness videos on addiction/de-addiction, experts talk. *Conduct awareness programmes on Drugs and its ill effects. (Arrange Experts from the concerned government departments and NGOs working in drug addiction issues) and maintain the documents of the program.	

Closure:

Each student should submit a Handwritten Summary of their Learnings & Action Plan for the future.

Assessments:

- Use Self-reflective worksheets to assess their understanding.
- Submit the worksheets to internal audit/external audit.
- Every student's activities report should be documented and the same have to be assessed by the Physical Director with the mentor. The evaluation should be for 100 marks. No examination is required.

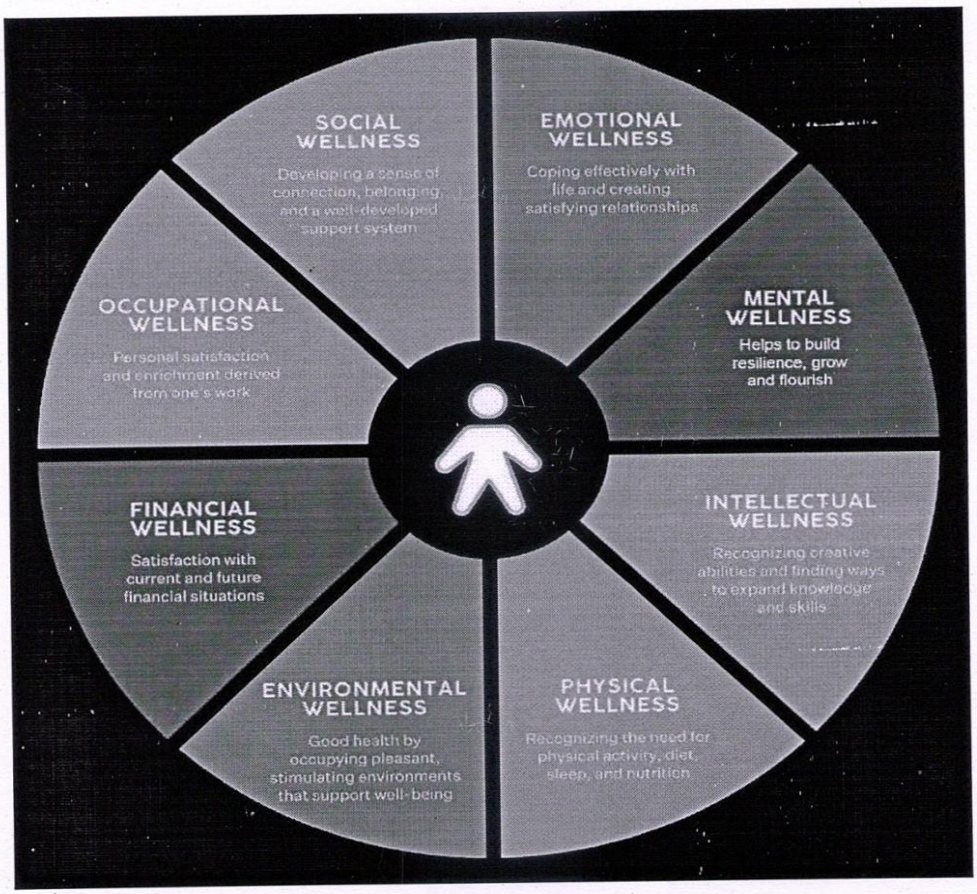
Scheme of Evaluation

Part	Description	Marks
A	Report	40
B	Attendance	20
C	Activities (Observation During Practice)	40
Total		100

References/Resource Materials:

The course acknowledges that individual needs for references and resources may vary. However, here are some general reference materials and resources that may be helpful:

1. **The Well-Being Wheel:**



2. **Facilities & Spaces:** Some activities may require access to specific facilities, resources or spaces. Students may need to coordinate with the college administration to reserve these as required.
3. **Online Resources:**
    1. United Nations Sustainable Development Goals - Goal 3 - Good Health & Well-Being: https://www.un.org/sustainabledevelopment/health/
    2. Mindfulness and Meditation: Stanford Health Library offers mindfulness and meditation resources: https://healthlibrary.stanford.edu/books-resources/mindfulness-meditation.html

3. Breaking Bad Habits: James Clear provides a guide on how to build good habits and break bad ones: https://jamesclear.com/habits
4. 6 Ways to Keep Your Brain Sharp https://www.lorman.com/blog/post/how-to-keep-your-brain-sharp
5. What Is Social Wellbeing? 12+ Activities for Social Wellness https://positivepsychology.com/social-wellbeing/
6. How Does Your Environment Affect Your Mental Health? https://www.verywellmind.com/how-your-environment-affects-your-mental-health-5093687
7. How to say no to others (and why you shouldn't feel guilty) https://www.betterup.com/blog/how-to-say-no

Sub.Code: 25UAI5IT

Programme Code:24		**B. Sc Artificial Intelligence and Machine Learning**		
Coursecode: 25UAI5IT		**Internship Training**		
Batch:2025 - 2028	**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, sprit 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 receivedfrom 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.

Sub.Code:25UAI5IT

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)