# KONGUNADU ARTS AND SCIENCE COLLEGE

**(AUTONOMOUS)**

**COIMBATORE – 641 029**

## DEPARTMENT OF

## ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

**CURRICULUM AND SCHEME OF EXAMINATIONS**

**(2023 - 2024 onwards)**

**Vision**

Developing the total personality of every student in a holistic way by adhering to the principles of Swami Vivekananda and Mahatma Gandhi.

**Mission**

- Imparting holistic and man-making education with emphasis on character, culture andvalue - moral and ethical.
- Designing the curriculum and offering courses that transform its students into value addedskilled human resources.
- Constantly updating academic and management practices towards total quality managementand promotion of quality in all spheres.
- Extending the best student support services by making them comprehensive and byevolving a curriculum relevant to student community and society at large.
- Taking steps to make education affordable and accessible by extending scholarships to the meritorious and economically disadvantaged students.
- Molding the teachers in such a way that they become the role models in promoting HigherEducation.

## DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

**Vision**

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

**Mission**

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

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

| **Programme Outcomes (POs)** | |
|---|---|
| On successful completion of the B.Sc. Artificial Intelligence and Machine Learning the students are expected to | |
| **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 multidisciplinary 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 the hospitality 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. |

**KONGUNADU ARTS AND SCIENCE COLLEGE [AUTONOMOUS], COIMBATORE - 641 029.**

## Course Name: B. Sc Artificial Intelligence and Machine Learning

Curriculum and Scheme of Examination under CBCS
[Applicable to the students admitted during the Academic Year 2023-2024]

| Semester | Part | Subject code | Title of the Paper | Instruction Hours / Cycle | Exam. Marks | | | Duration of Exam.(hours) | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | CIA | ESE | Total | | |
| I | I | 23TML101 | Language - I @ | 6 | 25 | 75 | 100 | 3 | 3 |
| | II | 23ENG101 | English - I | 6 | 25 | 75 | 100 | 3 | 3 |
| | III | 23UAI101 | Core Paper 1- C and C ++ Programming | 5 | 25 | 75 | 100 | 3 | 4 |
| | III | 23UAI1CL | Core Practical 1- C and C ++ Programming Lab | 5 | 40 | 60 | 100 | 3 | 2 |
| | III | 23UAI1A1 | llied Paper 1- Discrete Mathematics and Statistics | 6 | 25 | 75 | 100 | 3 | 5 |
| | IV | 23EVS101 | Environmental Studies ** | 2 | - | 50 | 50 | 3 | 2 |
| **Total** | | | | **30** | - | - | **550** | - | **19** |
| II | I | 23TML202 | Language - II @ | 6 | 25 | 75 | 100 | 3 | 3 |
| | II | 23ENG202 | English - II | 4 | **25** | **25** | 50 @@ | 3 | 1 |
| | II | 23UGN201 | Effective English: Language Proficiency for Employability http://kb.naanmudhalvan.in/Special:Filepath/Cambridge Course_Details.pdf | 2 | **25** | **25** | 50 ## | | 2 |
| | III | 23UAI202 | Core Paper 2 - Java Programming | 5 | **25** | **75** | 100 | 3 | 4 |
| | III | 23UAI2CM | Core Practical 2 - Java Programming Lab | 5 | **40** | **60** | 100 | 3 | 2 |
| | III | 23UAI2A2 | Allied Paper 2 – Optimization techniques and Linear Algebra | 6 | **25** | **75** | 100 | 3 | 5 |
| III | IV | 23VED201 | Value Education - Moral and Ethics** | 2 | - | **50** | 50 | 3 | 2 |
| | **Total** | | | **30** | - | - | **550** | - | **19** |
| | I | 23TML303 | Language III@ | 6 | 25 | 75 | 100 | 3 | 3 |
| | II | 23ENG303 | English –III | 6 | 25 | 75 | 100 | 3 | 3 |
| | III | 23UAI303 | Core Paper 3 - Python Programming | 5 | 25 | 75 | 100 | 3 | 4 |
| | III | 23UAI3CN | Core Practical 3 - Python Programming Lab | 4 | 40 | 60 | 100 | 3 | 4 |
| | III | 23UAI3A3 | Allied Paper 3 – Foundations of Robotics | 5 | 25 | 75 | 100 | 3 | 5 |
| | IV | 23UGC3S1 | Skill Based Subject 1- Cyber Security | 2 | 100 | - | 100 | 3 | 3 |
| | IV | 23TBT301/ 23TAT301/ 23UHR3N1 | Basic Tamil*/ Advanced Tamil **/ Non - Major Elective 1 - Human Rights** | 2 | - | 75 | 75 | 3 | 2 |
| | **Total** | | | **30** | - | - | **675** | - | **24** |

| Semester | Part | Subject code | *UAI-2* Title of the Paper | Instruction Hours / Cycle | Exam. Marks | | | Duration of Exam.(hours) | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | CIA | ESE | Total | | |
| IV | I | 23TML404 | Language IV@ | 6 | 25 | 75 | 100 | 3 | 3 |
| | II | 23ENG404 | English –IV | 6 | 25 | 75 | 100 | 3 | 3 |
| | III | 23UAI404 | Core Paper 4 – R Programming | 4 | 25 | 75 | 100 | 3 | 4 |
| | III | 23UAI4CO | Core Practical 4 - R Programming Lab | 4 | 40 | 60 | 100 | 3 | 3 |
| | III | 23UAI4A4 | Allied Paper 4 - Big Data Analytics | 5 | 25 | 75 | 100 | 3 | 5 |
| | IV | 23UAI4S2 | Skill Based Subject 2 - Ethical Hacking | 2 | 25 | 25 | 50 @@ | 3 | 1 |
| | IV | 23UAI4NM ### | Office Fundamentals :Digital Skills for Employability http://kb.naanmudhalvan.in/Special:Filepath/Microsoft_Course_Details.xlsx | 1 | 25 | 25 | 50 @@ | | 2 |
| | IV | 23TBT402/ 23TAT402/ 23USG4N2 | Basic Tamil* / Advanced Tamil**/ Non - Major Elective 2 ** | 2 | - | 75 | 75 | 3 | 2 |
| **Total** | | | | **30** | **-** | **-** | **675** | **-** | **23** |
| V | III | 23UAI505 | Core Paper 5 - Machine Learning Techniques | 6 | 25 | 75 | 100 | 3 | 5 |
| | III | 23UAI506 | Core Paper 6 - Introduction to Artificial Intelligence and Machine Learning | 6 | 25 | 75 | 100 | 3 | 4 |
| | III | 23UAI507 | Core Paper 7 - Deep Learning | 6 | 25 | 75 | 100 | 3 | 4 |
| | III | 23UAI5CP | Core Practical 5 - Machine Learning Lab | 5 | 40 | 60 | 100 | 3 | 4 |
| | III | 23UAI5E1 | Major Elective – 1 | 5 | 25 | 75 | 100 | 3 | 5 |
| | IV | - | Extra Departmental Course | 2 | 100 | - | 100 | 3 | 3 |
| | - | 23UAI5IT | **Internship Training****** | Grade | | | | | |
| **Total** | | | | **30** | **-** | **-** | **600** | **-** | **25** |
| VI | III | 23UAI608 | Core Paper 8 - Natural Language Processing | 5 | 25 | 75 | 100 | 3 | 4 |
| | III | 23UAI609 | Core Paper 9 - Block Chain Technology | 4 | 25 | 75 | 100 | 3 | 4 |
| | III | 23UAI610 | Core Paper 10 – Artificial Neural Networks and Fuzzy Logic | 4 | 25 | 75 | 100 | 3 | 4 |
| | III | 23UAI6CQ | Core Practical 6 - Natural Language Processing Lab | 5 | 40 | 60 | 100 | 3 | 4 |
| | III | 23UAI6E2 | Major Elective – 2 | 5 | 25 | 75 | 100 | 3 | 5 |
| | IV | 23UAI6Z1 | Project and Viva -Voce *** | 4 | 20 | 80 | 100 | - | 5 |
| | IV | 23UAI6S3 | Skill based Subject 3 - Social and Ethical Issues in Artificial Intelligence | 2 | 25 | 25 | 50 @@ | 3 | 1 |
| | - | 23UAI6NM ### | Android APP Development $ http://kb.naanmudhalvan.in/images/0/08/Android_App_Dev.pdf | 1 | 25 | 25 | 50 ## | - | 2 |
| **Total** | | | | **30** | **-** | **-** | **700** | **-** | **29** |
| | V | 23NCC$/NSS YRC/PYE/ECC/ RRC/WEC101# | Co - curricular Activities * | - | **50** | | **50** | - | **1** |
| **Grand Total** | | | | - | - | - | **3800** | - | **140** |

**Note :**

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

@@ End semester examination will be conducted for 50 marks and the marks will be converted to 25 marks.

## Naan Mudhalvan Course: End of semester will be assessed by Industry for 25 marks and CIA will be done by the course teacher

### The course can be opted to suit the skill set requirement of the core domain from the courses provided by the Bharathiar University and the same may be intimated to the COE during the beginning of that particular semester.

**$** 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 – 23HIN/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 allotted for project will not be allocated for 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 10 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

**Non-Major Elective Papers**

1. Human Rights
2. Consumer Affairs
3. SOGIESC Studies

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

**23UAI5X1 -Mobile Application Development**

**# 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 to complete any **MOOC On learning platforms like SWAYAM, NPTEL, Course era, IIT Bombay Spoken Tutorial etc.,** before the completion of the 5th semester and the course completion certificate should be submitted through the HOD to the Controller of Examinations. Extra credits will be given to the candidates who have successfully completed.
- An **Onsite Training** preferably relevant to the course may be undertaken as per the discretion of the HOD.

## Components of Continuous Internal Assessment

| Components | | Marks | Total |
|---|---|---|---|
| **Theory** | | | |
| CIA I | 75 | (75+75) Converted to 15 | 25 |
| CIA II | 75 | | |
| Assignment/Seminar | | 5 | |
| Attendance | | 5 | |
| **Theory** | | | |
| CIA I | 50 | (50+50) Converted to 15 | 25 |
| CIA II | 50 | | |
| Assignment/Seminar | | 5 | |
| Attendance | | 5 | |
| **Practical** | | | |
| CIA Practical | | 25 | 40 |
| Observation Notebook | | 10 | |
| Attendance | | 5 | |
| **Practical** | | | |
| CIA Practical | | 10 | 25 |
| Observation Notebook | | 10 | |
| Attendance | | 5 | |
| **Project/Case study** | | | |
| Review | | 15 | 20 |
| Regularity | | 5 | |

*UAI-6*

**BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN**

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

**1. Theory Examination:**

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

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

**(ii) CIA I & II and ESE: 50 Marks**

| Knowledge Level | Section | Marks | Description | Total |
|---|---|---|---|---|
| K1<br>Q1 to 10 | A (Answer all) | 10 x 1 = 10 | MCQ | 50** |
| K1 – K5<br>Q11 to 15 | B (Either or pattern) | 5 x 3 = 15 | Short Answers | |
| K2 – K5<br>Q16 to 20 | C (Either or pattern) | 5 x 5 = 25 | Descriptive / Detailed | |

****For ESE 50 marks converted to 25 marks.**

**2. ESE Practical Examination:**

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

| Knowledge Level | Section | Marks | Total |
|---|---|---|---|
| K3 | Experiments | 20 | 25 |
| K4 | Record Work | 05 | |
| K5 | | | |

**3. ESE Project Viva Voce:**

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

Sub Code : **23UAI101**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Paper 1 - C and C++ Programming** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 5 | 75 | 4 |

## Course Objectives

1. To introduce the concepts of Procedure Oriented Programming and the various programming constructs of C programming.
2. To provide exposure to problem solving through programming and to develop programming skills.
3. To introduce the concepts of Object Oriented Programming paradigm and the programming constructs of C++.
4. To develop an in-depth understanding of functional, logic, and object-oriented programming paradigms.
5. To program using more advanced OOPS features such as objects, operator overloading, dynamic memory allocation, inheritance and polymorphism, File I/O.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | Describe about the fundamentals of computers, history and varioustypes of software and hardware devices. |
| | CO2 | Interpret the concepts of Variables, Constant, Operators and various types of expressions. |
| | CO3 | Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects. |
| | CO4 | Demonstrate the various basic programming constructs like decision making statements. Looping statements and functions. |
| | CO5 | Explain the object oriented concepts like overloading, inheritance, polymorphism, virtual functions, constructors and destructors. |

## 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.

Sub Code : **23UAI101**

**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 Functions.

**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.

*** 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. E. Balagurusamy ,(2008), **Programming in ANSI C** , Fourth Edition - Tata Mc Graw Hill.
2. E. Balagurusamy, **Object Oriented Programming with C++**, TMH, 1998.

Sub Code : **23UAI101**

**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, **Object Oriented Programming with ANSI and Turbo C++,** Pearson Education, 2003.

**MAPPING**

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

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

Sub Code: **23UAI1CL**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Practical 1 - C and C++ Programming Lab** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 5 | 75 | 2 |

## Course Objectives

1. To introduce C Programming concepts to develop the programming knowledge.
2. To enhance their analyzing and problem solving skills and use the same for writing programs in C.
3. To introduce he concepts of Object Oriented Programming Paradigm and the programming constructs of C++.
4. To develop an in - depth understanding of functional, logic, and object-oriented programming paradigms.
5. To program using more advanced OOPS features such as objects, operator overloading, dynamic memory allocation, inheritance and polymorphism, file I/O.

## Course Outcomes

| | | |
|---|---|---|
| K3 to K5 | CO1 | Learning process helps in deep understanding the concepts of C language. |
| | CO2 | Developing programs using control statements, Arrays and Strings. |
| | CO3 | Designing programs using appropriate predefined functions and classes in C++. |
| | CO4 | Developing applications using Friend functions, Inheritance and polymorphism. |
| | CO5 | Implementing stream I/O, Files and usage of the available classes to handle stream objects. |

## LIST OF PRACTICAL 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.

Sub Code: **23UAI1CL**

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 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 | 15 | 15 |
| Typing and Execution | 5 | 5 |

**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

*UAI-12*

Sub Code : **23EVS101**

| **Programme Code:** 24 | **B.Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **PART IV – Environmental Studies**** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 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 |

Sub Code : **23EVS101**

**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 (Prevention and control) – Wild Life Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness – Human Population and the environment – Population Growth and Distribution – Population Explosion – Family Welfare Programme – Environment and Human Health – Human Rights
– Value Education – HIV/ AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health.

**TEXT BOOK**

1.P.Arul, **A Text Book of Environmental Studies**, Environmental Agency, No 27, Nattar street, 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 : **23UAI202**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Paper 2 - Java Programming** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 5 | 75 | 4 |

## Course Objectives

1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2. Understand the fundamentals of object-oriented programming in Java, including managing classes, objects, invoking methods etc and exception handling mechanisms.
3. Demonstrate skills in writing programs using exception handling techniques and multithreading.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | Recite the history of Java and its evolution. |
| | CO2 | Explain the various programming language constructs, object oriented concepts like overloading, inheritance, polymorphism, Interfaces, threads, exception handling and packages. |
| | CO3 | Outline the benefits and applications of objects oriented programming concepts and defend how Java differs from other programming languages. |
| | CO4 | Judge the pros and cons of other object oriented language with the concepts of applets, graphics and exceptions. |
| | CO5 | Evaluating applications using files and stream classes. |

## Syllabus

### UNIT I (15 Hours)

Fundamentals of Object-Oriented Programming: Object-Oriented Paradigm – Basic Concepts of Object Oriented Programming – Benefits of Object-Oriented Programming – Application of Object-Oriented Programming. 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.

Sub Code : **23UAI202**

**UNIT III** **(15 Hours)**

Arrays, Strings and Vectors – Interfaces: Multiple Inheritance – Packages: Putting Classes together – **Multithreaded Programming***.

**UNIT IV** **(15 Hours)**

Managing Errors and Exceptions – Applet Programming – Graphics Programming.

**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 – **Random Access Files*.**

*** 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. E. Balagurusamy, **Programming with Java – A Primer** , 3rd Edition, TMH.

**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 | 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 | H |
| **CO5** | H | S | H | H | S |

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

Sub. Code: **23UAI2CM**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Practical 2 - Java Programming Lab** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 5 | 75 | 2 |

**Course Objectives**

1. To introduce the concepts of Object Oriented Programming paradigm and the programming constructs of Java.
2. To implement the Java language syntax and semantics.
3. To implement concepts such as variables, conditional and iterative execution methods.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K3 to K5 | CO1 | Applying the concepts of control structures, inheritance, method overriding in Java. |
| | CO2 | Implementing the concept of interface, packages, multithreading and applets. |
| | CO3 | Apply the various basic programming constructs of Java like decision making statements. Looping statements, overloading, inheritance, polymorphism, constructors and destructors. |
| | CO4 | Design programs using frames, menu bars, list boxes etc.. |
| | CO5 | Evaluate programs using various file stream classes; file types, and frames. |

## LIST OF PRACTICAL PROGRAMS

1. Java Program to perform various Arithmetic Operations on two Integer given by the User
2. Java Program to Calculate Average Using Arrays
3. Write a Java program to implement the concepts of classes and objects.
4. Write a Java program to implement the concepts of inheritance.
5. Write a Java program to implement the concepts of Polymorphism.
6. Write a Java program to implement the concept of Interface and Package.
7. Write a Java program to implement Flow, Border ,Grid Layouts.
8. Write a Java program to implement the concept of Frames, Menus, Dialog.
9. Develop a java program with swing concepts.
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 : **23UAI2CM**

**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 Writing | 15 | 15 |
| Typing and Execution | 5 | 5 |

**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

*UAI-19*

Sub Code: **23VED201**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper **: Value Education - Moral And Ethics**** | | | |
| **Batch**<br>2023-2024 | **Hours / Week**<br>2 | **Total Hours**<br>30 | **Credits**<br>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: **23VED201**

**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)**

**Physical Fitness and Mental Harmony:** Simplified Physical Exercise – Hand Exercises – Leg Exercises – Neuro Muscular Breathing Exercises – Eye Exercises – Kabalabathi – Maharasana A & B – Massage - Acupressure – Relaxation – Kayakalpa Yogam - LifeForce – Aim & Objectives – Principle – Methods. Introspection – Analysis of Thoughts – Moralization of Desires – Neutralization of Anger – Eradication of Worries.

**UNIT V** **(8 Hours)**

**Yoga and Meditation – The Asset of India:** Yogasanam – Rules & Regulations – Surya Namaskar – Asanas –Sitting – Stanging – Prone - Supine - Pranayama – Naadi Sudhi – Ujjayi – Seethali – Sithkari - Benefits. Meditation – Thanduvasudhi - Agna – Shanthi – Thuriyam – Benefits.

**TEXT BOOKS**

**Value Based Education – Moral and Ethics** – Compiled by Kongunadu Arts and Science College (Autonomous), 2nd Edition (2021).

**REFERENCE BOOKS**

1. **Swami Vivekananda – A Biography**, Swami Nikhilananda, Advaita Ashrama, India, 24th Reprint Edition (2010).
2. **Gandhi, Nehru, Tagore and other eminent personalities of Modern India**, Kalpana Rajaram, Spectrum Books Pvt. Ltd., revised and enlarged edition(2004).
3. **Freedom Fighters of India**, Lion M.G. Agrawal, Isha Books Publisher, First Edition (2008).
4. **Easy steps to Yoga by Swami Vivekananda**, A Divine Life Society Publication(2000).
5. **Yoga Practices - 1 – The World Community Service Centre** – Vethathiri Publications, Sixth Edition (2017),Erode.
6. **Yoga Practices - 2 – The World Community Service Centre** – Vethathiri Publications – Eighth Edition (2017),Erode.

*UAI-21*

Sub Code: **23VED201**

**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.

Sub Code : **23UAI303**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Paper 3 - Python Programming** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 5 | 75 | 4 |

**Course Objectives**

1. To provide comprehensive knowledge of python programming paradigms.
2. To understand the important functions in python programming.
3. To introduce the concepts of the various programming constructs of Python programming.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Summarize the concept of lists, tuples , functions and error handling. |
| | CO2 | Evaluate a program incorporating all the python language constructs. |
| | CO3 | To implement numerical programming, data handling through NumPy Modules. |
| | CO4 | To Visualize through MatplotLib modules. |
| | CO5 | To Manipulate Pandas Data Frame. |

**Syllabus**

**UNIT I** **(15 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** **(15 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** **(15 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**.**

Sub Code : **23UAI303**

**UNIT IV** **(15 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** **(15 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOKS**

1. Jake VanderPlas , **Python Data Science Handbook - Essential Tools for working with Data**, O'ReilyMedia,Inc, 2016.
2. Zhang.Y **, An Introduction to Python and Computer Programming**, Springer Publications, 2016.
3. T. R. Padmanabhan, **Programming with Python**, Springer Publications, 2016.

**REFERENCE BOOKS**

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

Sub Code : **23UAI303**

**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 : **23UAI3CN**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Practical 3 - Python Programming Lab** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 4 | 60 | 4 |

**Course Objectives**

1. To gain knowledge about the concepts of python programming.
2. To understand the concepts of Built-in functions and User-defined functions.
3. To develop programs using Numpyand Pandas.

**Course Outcomes**

| | | |
|---|---|---|
| K3 to K5 | CO1 | Apply the concept of Decision making statements, looping constructs , functions for solving basic programs. |
| | CO2 | Analyze the concepts of Lists, tuples and error handling mechanisms. |
| | CO3 | Evaluate a program incorporating all the python language constructs. |
| | CO4 | Develop programs to solve real-world problem using the language idioms, data structures and standard library. |
| | CO5 | Implement numerical programming, data handling and visualization through NumPy, Pandas and MatplotLib modules. |

## LIST OF PRACTICAL PROGRAMS

1. Write a python program to find the largest among three integers using if - else and conditional operator.
2. Write a python program to find the product of two matrices.
3. Write recursive functions to display prime number from 2 to n.
4. Write recursive functions for fibonacci sequence up to given number n.
5. Write a python program to perform linear search and binary search.
6. Write a programto demonstrate exception handling.
7. Write a programto 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

Sub Code : **23UAI3CN**

**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 | 15 | 15 |
| Typing and Execution | 5 | 5 |

**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 : **23UAI3A3**

| **Programme Code:** 24 | **Bachelor of Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Allied Paper 3 - Foundations of Robotics** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 5 |

**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 | Able to know the basics of robotics. |
| | CO2 | Able to understand the concepts of robot end effectors. |
| | CO3 | Obtain forward, reverse kinematics and dynamics model of the industrial robot arm |
| | CO4 | Develop the vision algorithms. |
| | CO5 | Understand the robot programming and applications of robots. |

**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.

Sub Code : **23UAI3A3**

**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. Carsten Steger, Markus Ulrich, Christian Wiedemann, **Machine Vision Algorithms and Applications**, Second edition, Weinheim, WILEY-VCH, 2018.
2. John J. Craig, **Introduction to Robotics - Mechanics and Control**, 3rd Edition, Pearson Education Inc, 2013.

**REFERENCE BOOKS**

1. Mikell P Groover, Mitchel Weiss, Roger N Nagel, Nicholas G Odrey, Ashish Dutta, **Industrial Robotics Technology, Programming and Applications**, Second edition, 2012.
2. S.R. DEB, S.DEB, **Robotics Technology and Flexible Automation**, 2nd Edition, Tata Mc Graw Hill Education, 2011.
3. S.K. Saha, **Introduction to Robotics**, 4th Edition, Tata Mc Graw Hill Education, 2011.
4. Ashitava Ghoshal, **Robotics - Fundamental Concepts and Analysis**, Oxford University Press, Sixth impression, 2010.

Sub Code : **23UAI3A3**

**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

*UAI-30*

Sub Code : **23UGC3S1**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Skill Based Subject 1 - Cyber Security** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 2 | 30 | 3 |

## 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 - 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.

Sub Code : **23UGC3S1**

**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 Punishmentsin India - Cyber Crime Prevention guide to users – Regulatory Authorities.

**Teaching Methods**

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

**TEXT BOOK**

1. **Cyber Security, Text Book** prepared by "Kongunadu Arts and Science College", Coimbatore - 641029, 2023.

**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.

Sub Code: **23UGC3S1**

**WEB REFERENCES**

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

**MAPPING**

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

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

Sub Code **: 23UAI404**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Paper 4 - R Programming** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 4 | 60 | 4 |

## Course Objectives

1. To expose the student to the fundamental concepts of R Programming.
2. To understand the important programming concepts of R, class and objects.
3. To understand the R programming environment and data important R Statistical packages.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | To understand the basics of R programming including matrix and vectors etc. |
| | CO2 | To understand the use of R for Big Data analytics. |
| | CO3 | To identify and implement appropriate control structures to solve a particular programming problem. |
| | CO4 | To perform appropriate statistical tests using R Create and edit visualizations. |
| | CO5 | To understand the foundations of and be able to design and describe simulation studies. |

## Syllabus

**UNIT I** **(12 Hours)**

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

**UNIT II** **(12 Hours)**

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

Sub Code **: 23UAI404**

**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 -Dimensionalplots*.**

**UNIT V** **(12 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOKS**

1. Norman Matloff, **The Art of R Programming: A Tour of Statistical Software Design**, No Starch Press, 2011.
2. Jared P. Lander, **R for Everyone: Advanced Analytics and Graphics**, Addison - Wesley Data & Analytics Series, 2013.

**REFERENCE BOOKS**

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

**MAPPING**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | S | H | S | S |
| **CO2** | S | H | S | H | M |
| **CO3** | 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 **: 23UAI4CO**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Practical 4 - R Programming Lab** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 4 | 60 | 3 |

**Course Objectives**

1. To provide students a hands-on exposure to scientific programming using R.
2. To provide wider knowledge to know about data structures in R and its types.
3. To know the customized graphical techniques in R using inbuilt graph packages.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K3 to K5 | CO1 | Understand the basics in R programming in terms of constructs, control statements, string functions. |
| | CO2 | Understand the use of R for Big Data analytics. |
| | CO3 | Apply R programming for Text processing. |
| | CO4 | Appreciate and apply the R programming from a statistical perspective. |
| | CO5 | Perform the Matrix operations using R built in functions. |

## 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 print the “Hello World” program.
8. Write a program to program to add two vectors.
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.

Sub Code **: 23UAI4CO**

**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 Writing | 15 | 15 |
| Typing and Execution | 5 | 5 |

**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: **23UAI4A4**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Allied Paper 4 - Big Data Analytics** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 5 |

## Course Objectives

1. To explore, design, and implement basic concepts of big data analytics.
2. To introduce the big data framework, its characteristics and use cases associated with it.
3. To introduce the Hadoop framework will prepare students to handle industry scenarios of big data analytics.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | To work with big data platform learn intelligent data analysis and compare old and modern data analytic tool. |
| | CO2 | Learn about the advanced analytics techniques to gain knowledge of latest techniques. |
| | CO3 | Understand the concepts of Hadoop Distributed file system and hadoop file system interfaces. |
| | CO4 | Understand the YARN Infrastructure. |
| | CO5 | Use HDFS and Map Reduce to analyze various industry use cases of big data analytics. |

## Syllabus

**UNIT I** **(15 Hours)**

Introduction – Why Big data - What is big data – Facts about Big Data - importance of Big Data Evaluation of Big Data – Market Trends – Sources of Data Explosion – Types of Data – Case Study for Netflix and the house of card. Need of Big Data – Big Data and its sources – Characteristics of Big Data – Difference between Traditional IT Approach and Big Data Technology – Capabilities of Big Data – Handling Limitations of Big Data - Technologies Supporting Big Data - Big Data Use Cases.

**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)**

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 - Example of MapReduce –Sorting, Shuffling – Reducing – Combiner – Partitioner – Creating MapReduce program by using Eclipse.

**UNIT V** **(15 Hours)**

Data Analytics with R Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

*** 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. Seema Acharya, Subhasini Chellappan, **Big Data Analytics**, Wiley 2015. References.
2. **Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data** (2015), EMC Education Services.

**REFERENCE BOOKS**

1. **Big Data, Black Book: Covers Hadoop 2, MapReduce, Hive, YARN, Pig, R and Data Visualization** (2016), DT Editorial Services.
2. Tom White , **Hadoop: The Definitive Guide**, Third Edit on, O'reily Media, 2012.
3. Stephan Kudyba, **Big Data, Mining, and Analytics: Components of Strategic Decision Making**, Auerbach Publications, March 12, 2014.

Sub Code: **23UAI4A4**

**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

Sub Code: **23UAI4S2**

| **Programme Code:** 24 | **Bachelor of Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Skill Based Subject 2 - Ethical Hacking** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 2 | 30 | 2 |

## Course Objectives

1. To introduce the concepts of security and carious kinds of attacks.
2. To explain about system hacking and penetration testing.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | Explain the importance of security and various types of attacks. |
| | CO2 | Understand the concepts of scanning and system hacking. |
| | CO3 | Explain about penetration testing and its methodology. |
| | CO4 | Identify the various programming languages used by security professional. |
| | CO5 | Analyze and understand the concept of penetration testing. |

## Syllabus

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

Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hacktivism – Vulnerability Research – Introduction to Footprinting – Information Gathering Methodology – Footprinting Tools – WHOIS Tools – DNS Information Tools– Locating the Network Range – Meta Search Engines.

**UNIT II** **(6 Hours)**

Scanning And Enumeration : Introduction to Scanning – Objectives – Scanning Methodology – Tools – Introduction To Enumeration – Enumeration Techniques – Enumeration Procedure – Tools.

**UNIT III** **(6 Hours)**

System Hacking **:** Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing – Password Cracking Tools – Password Cracking Countermeasures – Escalating Privileges – Executing Applications – Keyloggers and Spyware.

Sub.Code : **23UAI4S2**

**UNIT IV** **(6 Hours)**

Programming For Security Professionals **:** Programming Fundamentals – C language – HTML – Perl – Windows OS Vulnerabilities – Tools For Identifying Vulnerabilities – Countermeasures – Linux OS Vulnerabilities - **Tools for identifying Vulnerabilities*** – Countermeasures.

**UNIT V** **(6 Hours)**

Penetration Testing **:** Introduction – Security Assessments – Types of Penetration Testing- Phases of Penetration Testing – Tools – **Choosing Different Types of Pen-Test Tools*** – Penetration Testing Tools.

**Teaching Methods**

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

**TEXT BOOKS**

1. EC-Council, **Ethical Hacking and Countermeasures: Attack Phases**, Cengage Learning, 2010.
2. Jon Erickson, **Hacking: The Art of Exploitation**, 2nd Edition ,No Starch Press Inc., 2008.
3. Michael T. Simpson, Kent Backman, James E. Corley, **Hands-On Ethical Hacking And Network Defense**, Cengage Learning, 2013.

**REFERENCE BOOKS**

1. Patrick Engebretson, **The Basics of Hacking and Penetration Testing** – **Ethical Hacking andPenetration Testing Made Easy**, Second Edition, Elsevier, 2013.
2. Rafay Boloch, **— Ethical Hacking and Penetration Testing Guide**, CRC Press, 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 | 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: **23UAI505**

| **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** |
| 2023-2024 | 6 | 90 | 4 |

**Course Objectives**

1. To understand the basics of Machine Learning.
2. To understand the techniques of Machine Learning.
3. To know about the implementation aspects of machine learning.
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 | To understand the basic concepts and techniques of Machine Learning. |
| | CO2 | To understand the inference and learning algorithms for the hidden Markov model. |
| | CO3 | To explain the regression methods, classification methods, clustering methods. |
| | CO4 | To demonstrate dimensionality reduction techniques. |
| | CO5 | To analyse and appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning. |

**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.

Sub Code : **23UAI505**

**UNIT III** **(18 Hours)**

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

**UNIT IV** **(18 Hours)**

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

**UNIT V** **(18 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOK**

1. Ethem Alpaydin, **Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)**, Third Edition, MIT Press, 2014.

**REFERENCE BOOKS**

2. Jason Bell, **Machine Learning – Hands on for Developers and Technical Professionals**, First Edition, Wiley, 2014.
3. Peter Flach, **Machine Learning: The Art and Science of Algorithms that Make Sense of Data**, First Edition, Cambridge University Press, 2012.

Sub Code : **23UAI505**

**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 : **23UAI506**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Paper 6 - Introduction to Artificial Intelligence and Machine Learning** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 6 | 90 | 4 |

**Course Objectives**

1. To introduce the basic concepts of Artificial Intelligence and Expert Systems.
2. To imparts the knowledge of predictions.
3. To introduce the basic concepts and techniques of Machine Learning.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | To develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents. |
| | CO2 | To learn the overview of artificial intelligence principles and approaches. |
| | CO3 | To understand about fundamental areas of Local Search Algorithms, Adversarial Searching and Neural Networks. |
| | CO4 | To enable students to understand different techniques related to Machine Learning. |
| | CO5 | Choose the suitable machine learning methods/algorithms for various type of learning problems. |

**Syllabus**

**UNIT I** **(18 Hours)**

Introduction – Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents – Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

**UNIT II** **(18 Hours)**

Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems -Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games.

**UNIT III** **(18 Hours)**

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining- Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering- Categories and objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories - Reasoning with Default Information.

Sub Code : **23UAI506**

**UNIT IV** **(18 Hours)**

Learning – 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 – Perception – Linear Separability – **Linear Regression*.**

**UNIT V** **(18 Hours)**

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multilayer 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*.**

*** 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. Deepak Khemani, **Artificial Intelligence**, Tata Mc Graw Hill Education , 2013.
2. Bratko, **Prolog: Programming for Artificial Intelligence**, Fourth Edition, Addison - Wesley Educational Publishers Inc., 2011.

**REFERENCE BOOKS**

1. S. Russell and P. Norvig , **Artificial Intelligence: A Modern Approach**, Prentice Hall, Third Edition, 2009.
2. M. Tim Jones, **Artificial Intelligence: A Systems Approach(Computer Science)**, Jones and Bartlett Publishers, Inc.; First Edition, 2008.
3. Ethem Alpaydin, **Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)**, Third Edition, MIT Press, 2014.

Sub Code : **23UAI506**

**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** | H | H | S | H | S |

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

Sub Code : **23UAI507**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Paper 7 - Deep Learning** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 6 | 90 | 4 |

**Course Objectives**

1. To solve a wide range of problems in Computer Vision and Natural Language Processing.
2. To learn about the building blocks used in these Deep Learning based solutions.
3. To learn about feed forward neural networks, convolutional neural networks, recurrent neural networks and attention mechanisms.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Understanding the fundamentals of Deep Learning. |
| | CO2 | To know the main techniques in deep learning and the main research in this field. |
| | CO3 | Gaining knowledge of the different modalities of Deep learning currently used. |
| | CO4 | Be able to design and implement deep neural network systems. |
| | CO5 | Implement deep learning algorithms and solve real-world problems. |

**Syllabus**

**UNIT I** **(18 Hours)**

The Neural Network – Limits of Traditional Computing – Machine Learning – Neuron – FF Neural 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.

Sub Code : **23UAI507**

**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, **Fundamentals of Deep Learning: Designing Next Generation Machine Intelligence Algorithms**, O'Reilly Media, 2017.

2. Ian Good fellow and Yoshua Bengio and Aaron Courville, **Deep Learning , An MIT Press book**, 2012.

**REFERENCE BOOKS**

1. Raúl Rojas, **Neural Networks: A Systematic Introduction**, 1996.

2. Christopher Bishop, **Pattern Recognition and Machine Learning**, 2007.

.

**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

*UAI-51*

Sub Code :

| **Programme Code:** 24 | **Bachelor of Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Practical 5 - Machine Learning Lab** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 4 |

## Course Objectives

1. To introduce students to the concepts and techniques of Machine Learning.
2. To design and implement logical reasoning agents
3. To understand the theoretical and practical aspects of probabilistic graphical models.
4. To get practical knowledge on implementing machine learning algorithms in real time problems.

## Course Outcomes

| | | |
|---|---|---|
| K3 to K5 | CO1 | Understand the basic concepts and techniques of Machine Learning. |
| | CO2 | Understand the inference and learning algorithms for the hidden Markov model. |
| | CO3 | Explain the regression methods, classification methods, clustering methods. |
| | CO4 | Demonstrate Dimensionality reduction Techniques |
| | CO5 | Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning. |

## 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. Read the training data from a .CSV file
2. For a given set of training data examples stored in a .CSV file, 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 and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

**Teaching Methods**

| Presentation and Demonstration using Projectors |
|---|

**Guidelines to the distribution of marks for practical examinations**

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

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

| Particulars | Program I (Marks) | Program II (Marks) |
|---|---|---|
| Algorithm | 5 | 5 |
| Program Writing | 15 | 15 |
| Typing and Execution | 5 | 5 |

**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 : **23UAI53**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Paper 8 - Natural Language Processing** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 4 |

## Course Objectives

1. To make students understand syntactic and semantic elements of NLP.
2. To conceive basics of knowledge representation and inference.
3. To provides the models, methods, and algorithms of statistical NLP tasks.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | An ability to apply core computer science concepts and algorithms, such as dynamic programming. |
| | CO2 | To understand the linguistic phenomena and to explore the linguistic features relevant to each NLP task. |
| | CO3 | The student will be familiar with some of the NLP literature and will read and suggest improvements to published work. |
| | CO4 | The student will also analyze experimental results and write reports for each course project to develop scientific writing skills. |
| | CO5 | To understand natural language processing and to learn how to apply basic algorithms in this field. |

## 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*.**

Sub Code : **23UAI608**

**UNIT IV** **(15 Hours)**

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

**UNIT V** **(15 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOK**

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

**REFERENCE BOOKS**

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

Sub Code : **23UAI608**

**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 : **23UAI609**

| **Programme Code:** 24 | **Bachelor of Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Paper 9 - Block Chain Technology** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 4 | 60 | 4 |

## Course Objectives

1. To introduce the technical aspects of public distributed ledgers, block chain systems, Crypto currencies and smart contracts.
2. Students will learn how these systems are built, how to interact with them, how to design and build secure distributed applications.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | Stating block chain technologies basics are made possible through learning Distributed Database and various types of database. |
| | CO2 | Stating the Mining strategies followed in block chain teach the basic architecture behind the perfect building of block chain for industries. |
| | CO3 | Classifying the limitations and proofs are another essential part of block chain technologies, which are learned for betterment of creating block chain. |
| | CO4 | Describing the history behind the block chain and learning about Vulnerability, Attacks and Side chain gives an additional support for creating a secured block chain. |
| | CO5 | Design a method for solving a problem case study with different perspective. |

## Syllabus

**UNIT I** **(12 Hours)**

Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof positions.

**UNIT II** **(12 Hours)**

Introduction, Advantage over conventional distributed database, Block chain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, **Life of Blockchain application**, Soft & Hard Fork, Private and Public block chain.

Sub Code : **23UAI609**

**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*** - Miningstrategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin.

**UNIT IV** **(12 Hours)**

Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and **future of Block chain***.

**UNIT V** **(12 Hours)**

Case study on Naive 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

*** 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. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, **Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction**, Princeton University Press (July 19, 2016).

**REFERENCE BOOKS**

1. Draft version of S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, **Block chain Technology: Crypto currency and Applications**, Oxford University Press, 2019.
2. Josh Thompson, **Block chain: The Block chain for Beginnings, Guild to Block chain Technology and Block chain Programming**', Create Space Independent Publishing Platform, 2017.

Sub Code : **23UAI609**

**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 : **23UAI610**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Paper 10 - Artificial Neural Networks and Fuzzy Logic** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 4 | 60 | 4 |

**Course Objectives**

1. To introduce the concepts of Artificial Neural Networks and fuzzy systems.
2. To explain the basic mathematical elements of the theory of fuzzy sets.
3. To provide an emphasis on the differences and similarities between fuzzy sets and classical sets theories.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Understanding of the basic mathematical elements of the theory of fuzzy sets. |
| | CO2 | Understanding the differences and similarities between fuzzy sets and classical sets theories |
| | CO3 | Able to implement learning models for real life applications. |
| | CO4 | Solve problems that are appropriately solved by neural networks and fuzzy logic |
| | CO5 | Apply the algorithms to a real-world problem, optimize the models learned. |

**Syllabus**

**UNIT I** **(12 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** **(12 Hours)**

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

Sub Code : **23UAI610**

**UNIT III** **(12 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** **(12 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** **(12 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 |
|---|

**TEXT BOOKS**

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

**REFERENCE BOOKS**

1. Timothy J.Ross, **Fuzzy Logic Engineering Applications**, Mc Graw Hill, NewYork, 1997.
2. S. Rajasekaran and G. A. Vijayalakshmi, **Neural networks, Fuzzy logics, and Genetic Algorithms**, Pai Prentice Hall of India, 2003.

Sub Code : **23UAI610**

3. George J. Klir and Bo Yuan, **Fuzzy Sets and Fuzzy Logic** , Prentice Hall Inc., New Jersey,1995.
4. S. N. Sivanandam, S.N. Deepa , **Principles of Soft Computing**, Wiley India Pvt Ltd.

**MAPPING**

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

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

Sub Code **: 23UAI6CQ**

| **Programme Code:** 24 | **Bachelor of Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Core Practical 6 - Natural Language Processing Lab** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 4 |

## Course Objectives

1. To introduce the fundamental concepts and techniques of natural language processing (NLP).
2. To understand natural language processing and to learn how to apply basic algorithms in this field.
3. To understand the semantics and pragmatics of languages for processing.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K3 to K5 | CO1 | To understand the fundamental concepts and techniques of natural language processing (NLP). |
| | CO2 | To understand the models and algorithms in the field of NLP. |
| | CO3 | To demonstrate the computational properties of natural languages and the commonly used algorithms for processing linguistic information. |
| | CO4 | To understand the syntax, semantics and pragmatics of various languages. |
| | CO5 | To analyse natural language processing and to learn how to apply basic algorithms in this field. |

## LIST OF PRACTICAL PROGRAMS

1. Implementing word similarity.
2. Implementing simple problems related to word disambiguation.
3. Simple demonstration of part of speech tagging.
4. Implementing Lexical analyzer.
5. Implementing Semantic Analyzer.
6. Implementing Sentiment Analysis.

## Teaching Methods

| |
|---|
| Presentation and Demonstration using Projectors |

Sub Code **: 23UAI6CQ**

**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 | 15 | 15 |
| Typing and Execution | 5 | 5 |

**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: **23UAI6Z1**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Project Work and Viva – Voce*****| | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 4 | 60 | 5 |

## Course Objectives

1. To acquire the knowledge about selecting the task based on their course skills.
2. To get the knowledge about analytical skill 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 | Applythe programming skills for solving the project. |
| | CO2 | Analyze the task and to collect the necessary information about the software. |
| | CO3 | Evaluate the task based on the software. |
| | CO4 | Test the project for its successful implementation. |
| | CO5 | Implement and maintain the developed system. |

## Guidelines to the Distribution of marks

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

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

## Teaching Methods

Presentation & Program Demonstration using Projector

Sub Code: **23UAI6Z1**

**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

Sub Code: **23UAI6S3**

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Skill Based Subject 3 - Social and Ethical Issues in Artificial Intelligence** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 2 | 30 | 1 |

## Course Objectives

1. To analyze whether AI poses an existential threat to humanity.
2. To check learning algorithms from acquiring morally objectionable biases.
3. To study the ethical rules to be followed in using self driving cars.
4. To check the accountability while building artificial moral agents.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | Demonstrate knowledge of philosophical issues involved in ethics of AI. |
| | CO2 | Develop a super intelligent system without having to reveal the system itself. |
| | CO3 | Understand workplace automation in employment. |
| | CO4 | Appreciate the potential responsibility in handling ethics of artificial moral agents |
| | CO5 | To build intelligent systems those are safe without any global risk. |

## Syllabus

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

Ethics in Machine learning and other domain-specific AI algorithms-Artificial general intelligence - machines with moral status - minds with exotic properties - super intelligence. Singularity - A philosophical Analysis: Argument for a singularity-Intelligence explosion without intelligence.

**UNIT II** **(6 Hours)**

Orthogonality of motivation and intelligence-instrumental convergence. Racist AI: Rise of algorithmic decision making: contestable epistemic and normative assumptions-embodied values-algorithmic accountability as public reason-objections, limitations and challenges.

**UNIT III** **(6 Hours)**

Real world of robots at war-autonomous weapon systems-robot warriors and crimes-human oversight for avoiding problem-responsibility for robot war crimes-robot warriors and child soldiers**. Future of workplace automation-interaction of automation and employment***.

Sub Code : **23UAI6S3**

**UNIT IV** **(6 Hours)**

Moral agency and moral norms-moral turing test-Theoretical approaches: consequentialism-deontology-models of morality: Virtue approaches-associative learning-evolutionary approaches-role of emotions. Ethics of self driving cars: need for ethics settings-an applied trolley problem-empirical ethics.

**UNIT V** **(6 Hours)**

Anthropomorphic bias: width of mind design space-Prediction and design-understanding thepower of intelligence-capability and motive: Optimization processes-aiming at the target-friendly AI-technical failure and philosophical failure - rates of intelligence increase-hardware-threats and promises **- AI vs Human Intelligence Enhancement***.

*** 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. Bill Hibbord, **Ethical Artificial Intelligence, Machine Intelligence** Research Institute,CA, 2015.
2. N. Bostrom and E. Yudkowsky, **The Ethics of Artificial Intelligence**, In W. M. Ramsey and K. Frankish, editors, **The Cambridge Handbook of Artificial Intelligence**, Cambridge University Press, Cambridge, 2014.

**REFERENCE BOOKS**

1. Chalmers. D., **The Singularity: A Philosophical Analysis,** Journal of Consciousness Studies, 2010.
2. Bostrom, N, **The Superintelligent Will: Motivation and Instrumental Rationality in Advanced Artificial Agents**, Minds & Machines, 2012.
3. Sparrow. R., **Killer Robots,** Journal of Applied Philosophy, 2007.
4. Autor, D. H., **Why Are here Still So Many Jobs? The History and Future of Workplace Automation**, The Journal of Economic Perspectives, 2015.

Sub Code : **23UAI6S3**

**MAPPING**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | S | H | S | S |
| **CO2** | S | H | S | M | M |
| **CO3** | M | H | M | H | S |
| **CO4** | S | M | M | 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 - Internet Of Things** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 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, **Internet of Things – A Hands-on Approach**, Universities Press, 2015

**REFERENCE BOOKS**

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

*UAI-71*

**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** | **Bachelor of Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Elective Paper - Open Source Systems** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 5 |

## Course Objectives

1. To recognize the benefits and features of Open Source Technology.
2. To utilize open source software for developing a variety of software applications, particularly Web applications.
3. To understand concepts, strategies, and methodologies related to open source software development.

## Course Outcomes(CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | Understand the use ofvarious open source software available in the industry. |
| | CO2 | Summarize the basic concepts ofhow a database stores information via tables. |
| | CO3 | Learn howto use lists, tuples, and dictionaries in Python programs. |
| | CO4 | Applying exception handling methods in Python programs. |
| | CO5 | Evaluate applications byapplying programming concepts to solve real time problems. |

## 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 Graw Hill, Indian Reprint (2009).

**REFERENCE BOOKS**

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

**MAPPING**

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

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

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Elective Paper - Digital Forensics** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 5 |

## Course Objectives

1. To introduce the principle and concepts of digital forensics.
2. To detail about the various investigation procedures like data acquisition and evidence gathering.
3. To understand the basics of digital forensics and the techniques for conducting the forensic examination on different digital devices.
4. To understand how to examine digital evidences such as the data acquisition, identification analysis.
5. To understand the various categories of tools and procedures used in the digital forensic process.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | Analysing the digital evidences and arriving at conclusions. |
| | CO2 | Examine the Volatile and Non-volatile Digital Evidence. |
| | CO3 | Apply various techniques of digital forensics for the systematic crime investigation. |
| | CO4 | Apply the cyber-crime techniques to data acquisition and evidence collection. |
| | CO5 | Know how to apply forensic analysis tools to recover important evidence for identifying computer crime. |

## Syllabus

**UNIT I** **(15 Hours)**

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

**UNIT II** **(15 Hours)**

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

**UNIT III** **(15 Hours)**

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

**UNIT IV** **(15 Hours)**

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

**UNIT V** **(15 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOKS**

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

**REFERENCE BOOKS**

1. 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** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 5 |

## Course Objectives

1. To learn the data representation techniques.
2. To understand the data analysis pipeline.
3. To acquire knowledge on data mining techniques for analysis.
4. To study the visualization and its various types.

## Course Outcomes(CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | To understand data representation techniques. |
| | CO2 | To appreciate the data analysis pipeline. |
| | CO3 | To implement data mining techniques for analysis. |
| | CO4 | To apply multivariate data visualization on various applications. |
| | CO5 | To implement data analysis techniques using R. |

## Syllabus

**UNIT I** **(15 Hours)**

Data Representation Data Objects and Attribute Types: Nominal-Binary- Ordinal - Numeric-Discrete and Continuous - Types of data: Record - Temporal - Spatial Temporal - Graph-Unstructured and Semi structured data-Basic Statistical Descriptions of Data.

**UNIT II** **(15 Hours)**

Introduction to Data Analysis Probability and Random Variables-Correlation- Regression-Data Analysis Pipeline: Data pre-processing Attribute values-Attribute transformation-Sampling-Dimensionality reduction: PCA-Eigen faces Multidimensional Scaling- Non-linear Methods-Graph-based Semi-supervised Learning-Representation Learning Feature subset selection-Distance and Similarity calculation.

**UNIT III** **(15 Hours)**

Data Mining Techniques for Analysis Classification: Decision tree induction - **Bayes classification*-** Rule-based classification-Support Vector Machines - Classification Using Frequent Patterns - k-Nearest - Neighbor - Fuzzy-set approach Classifier Clustering **: K-Means*-** k-Medoids - Agglomerative versus Divisive Hierarchical Clustering Distance in Algorithmic Methods- Mean-shift Clustering.

**UNIT IV** **(15 Hours)**

Visualization Traditional Visualization-Multivariate Data Visualization-Principles of Perception-Color- Design and Evaluation -Text Data Visualization- Network Data Visualization-Temporal Data Visualization and visualization Case Studies.

**UNIT V** **(15 Hours)**

Implementation of data analytics techniques : Implementation of various data analytics techniques such as classification clustering on real world problems using 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. Phuong Vo.T.H, Martin Czygan, Ashish Kumar, Kirthi Raman, **Python: Data Analytics and Visualization**, Packet Publishing Limited, 2017.
2. Andy Kirk, **Data Visualization: A Handbook for Data Driven Design**, 1st EducationSAGE Publication, 2016.

**REFERENCE BOOKS**

1. Simon, P**., The Visual Organization: Data Visualization, Big Data, and the Quest for Better Decisions**, John Wiley & Sons, 2014.
2. Peng, D., R**., R Programming for Data Science**, Lulu.com, 2012.
3. Han, J., Kamber, M. and Pei, J**., Data Mining Concepts and Techniques**, Morgan Kaufmann 3rd Edition, 2011.
4. Hastie, T., Tibshirani, Rand Friedman, J., **The Elements of Statistical Learning**, 2nd Edition, Springer, 2009.

**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** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 5 |

**Course Objectives**

1. To understand geometric modeling and virtual environment.
2. To study about Virtual Hardware and Software.
3. To develop Virtual Reality applications.
4. To design virtual environment.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | To design the virtual environment. |
| | CO2 | To implement Virtual Hardware and software and geometric transformations. |
| | CO3 | To design geometric modeling applications. |
| | CO4 | To understand Virtual Reality toolkits. |
| | CO5 | To implement Virtual Reality applications. |

**Syllabus**

**UNIT I** **(15 Hours)**

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

**UNIT II** **(15 Hours)**

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

**UNIT III** **(15 Hours)**

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

**UNIT IV** **(15 Hours)**

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

**UNIT V** **(15 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOKS**

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

**REFERENCE BOOKS**

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

*UAI-83*

**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

*UAI-84*

| **Program Code :** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Elective Paper - Artificial Intelligence in Cyber Security** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 5 |

## Course Objectives

1. To apply core knowledge of AI concepts and tools.
2. To analyze a problem, identify and detect cyber security threats with AI.
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 | Understand the basic concepts of AI and the necessary tools for cyber security. |
| | CO2 | Detect cyber security threats in AI. |
| | CO3 | Understand the fundamentals of Network anomaly detection with AI and authentication abuse prevention. |
| | CO4 | Demonstrate working knowledge fraud prevention with cloud AI solutions. |
| | CO5 | Ability to evaluate algorithms and to test AI arsenal. |

## Syllabus

**UNIT I** **(15 Hours)**

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

**UNIT II** **(15 Hours)**

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

**UNIT III** **(15 Hours)**

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

**UNIT IV** **(15 Hours)**

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

**UNIT V** **(15 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOKS**

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

**REFERENCE BOOKS**

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

**MAPPING**

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

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

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Elective Paper - Design Thinking** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 5 | 75 | 4 |

**Course Objectives**

1. To expose students to the design process as a tool for innovation.
2. To develop students' professional skills in client management and communication.
3. To make students develop a portfolio of work to set them apart in the job market.
4. To provide an authentic opportunity for students to develop teamwork & leadership skills.
5. To demonstrate the value of developing a local network and assist students in making lasting connections with the business community.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | To develop a strong understanding of the Design Process and how it can be applied in a variety of business settings. |
| | CO2 | To learn to build empathy for target audiences from different cultures. |
| | CO3 | To learn to research and understand the unique needs of a company around specific challenges. |
| | CO4 | To learn to develop and test innovative ideas through a rapid iteration cycle. |
| | CO5 | To analyze and develop applications in logistics. |

**Syllabus**

**UNIT I** **(15 Hours)**

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

**UNIT II** **(15 Hours)**

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

**UNIT III** **(15 Hours)**

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

**UNIT IV** **(15 Hours)**

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

**UNIT V** **(15 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOKS**

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

**REFERENCE BOOKS**

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

*UAI-89*

**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 | **Bachelor of Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Elective Paper - Image and Speech Processing** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 5 | 75 | 5 |

**Course Objectives**

To learn Digital Image and Speech fundamentals.

1. To analyze simple Image processing techniques.
2. To understand Image compression and Enhancement techniques.
3. To learn Short-time Fourier analysis.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Understand the Digital Image and Speech fundamentals. |
| | CO2 | Apply Image Enhancement techniques. |
| | CO3 | Use Image Compression techniques in Image applications. |
| | CO4 | Understand Time domain models for Speech processing. |
| | CO5 | Work on Speech Recognition and Speaker Verification systems. |

**Syllabus**

**UNIT I** **(15 Hours)**

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

**UNIT II** **( 15 Hours)**

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

**UNIT III** **(15 Hours)**

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

**UNIT IV** **(15 Hours)**

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

**UNIT V** **(15 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOKS**

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

**REFERENCE BOOKS**

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

**MAPPING**

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

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

| **Programme Code:** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Elective Paper - Database Management System** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 5 | 75 | 5 |

**Course Objectives**

1. To understand the fundamentals of relational systems including data models, database Architectures and database manipulations.
2. To learn the basic concepts of databases in general with an emphasis on relational. databases, modeling techniques and writing queries.
3. To provide knowledge about relational database model.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Explain the role of data and databases in information systems. |
| | CO2 | Design relational model and pose complex SQL queries of relational databases. |
| | CO3 | Describe normalization and its role in the database design process. |
| | CO4 | Illustrate the concepts of transaction processing, concurrency control and recovery procedure. |
| | CO5 | Summarize the storage structures using different indexing techniques, query Optimization. |

**Syllabus**

**UNIT I** **(15 Hours)**

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

**UNIT II** **(15 Hours)**

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

**UNIT III** **(15 Hours)**

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

**UNIT IV** **(15 Hours)**

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

**UNIT V** **(15 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOKS**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, **Database System Concepts**, Fifth Edition, Tata McGraw Hill, 2006
2. Ramez Elmasri, Shamkant B. Navathe, **Fundamentals of Database Systems**, Fourth Edition, Pearson/Addision Wesley.2007

**REFERENCE BOOKS**

2. S. Sumathi, S. Esakkirajan, **Fundamentals of Relational Database Management Systems**, Springer Science & Business Media.
3. 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** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023 - 2024 | 5 | 75 | 5 |

## Course Objectives

1. To learn the basic concepts of Data Mining algorithms, methods and tools.
2. To develop and apply critical thinking, problem-solving, and decision-making skills.
3. To discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.

## Course Outcomes (CO)

| | | |
|---|---|---|
| K1 to K5 | CO1 | Understand the functionality of the various data mining and data warehousing components. |
| | CO2 | Describe different methodologies used in data mining and data ware housing. |
| | CO3 | Explain the analyzing techniques and Online Analytical Processing. |
| | CO4 | Explain about the association rule mining and classification. |
| | CO5 | Compare different approaches of data ware housing and data mining with various technologies. |

## Syllabus

**UNIT I** **(15 Hours)**

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

**UNIT II** **(15 Hours)**

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

**UNIT III** **(15 Hours)**

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

**UNIT IV** **(15 Hours)**

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

**UNIT V** **(15 Hours)**

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

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

**Teaching Methods**

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

**TEXT BOOKS**

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

**REFERENCE BOOKS**

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

**MAPPING**

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

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

Sub Code : **23UHR3N1**

| **Program Code :** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Part IV - Non Major Elective – 1 Human Rights** | | | |
| **Batch**<br>2023-2024 | **Hours / Week**<br>2 | **Total Hours**<br>30 | **Credits**<br>2 |

## Course Objectives

1. To prepare for responsible citizenship with awareness of the relationship between HumanRights, 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 Outcomes (CO)

| | | |
|---|---|---|
| K1toK5 | CO1 | To understand the hidden truth of Human Rights by studying various theories |
| | CO2 | To acquire overall knowledge regarding Human Rights given by United Nation Commission (UNO). |
| | CO3 | To gain knowledge about various organs responsible for Human Rights such as National Human Rights Commission and State Human Right Commission (UNHCR). |
| | CO4 | To get habits of how to treat aged person, others and positive social responsibilities. |
| | CO5 | To treat and confirm, child, refugees and minorities with positive social justice. |

## Syllabus

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

Definition, Meaning, Concept ,Theories and Kinds of Human Rights- Evaluation and Protection of Human Rights in India- Development of Human Rights under the United Nations.

**UNIT II** **(6 Hours)**

United Nations Charter and Human Rights - U.N. Commission on Human Rights- Universal Declaration of Human Rights - International Covenant on

- Civil & Political Rights
- Economic, Social and Cultural Rights

Sub Code : **23UHR3N1**

**UNIT III** **(6 Hours)**

Human Rights and Fundamental Rights (Constitution) - Enactments regarding Human Rights Laws in India - National Human Rights Commission and State Human Rights Commission.

**UNIT IV** **(6 Hours)**

Aged persons and their Human Rights - Human Rights of Persons with Disabilities - Tribal Human Rights in India - Three Generation Human Rights -Social Awareness and Responsibilities of Individuals.

**UNIT V** **(6 Hours)**

Rights of Women, Child, Refugees and Minorities – Social media and Human Rights -NGO's in protection of Human Rights - Right to Election.

**BOOKS FOR STUDY**

**1.** Human Rights (2019), Compiled by Kongunadu Arts and Science College, Coimbatore –29.

**BOOK FOR REFERENCE**

1. **Human Rights**, (2018) , 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.

**NON-MAJOR ELECTIVE I – HUMAN RIGHTS**

**QUESTION PAPER PATTERN**
**(External only)**

**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.

| **Program Code :** 24 | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Non- Major Elective – Consumer Affairs** | | | |
| **Batch**<br>2023-2024 | **Hours / Week**<br>2 | **Total Hours**<br>30 | **Credits**<br>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: ISO 10000 suite.

**UNIT II** **(6 Hours)**

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

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

**UNIT III** **(6 Hours)**

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

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

**UNIT IV** **(6 Hours)**

Role of Industry Regulators in Consumer Protection

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

**UNIT V** **(6 Hours)**

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

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

Note: Unit 2 and 3 refers to the Consumer Protection Act, 2086. Any change in law would be added appropriately after the new law is notified.

**Teaching Methods**

| |
|---|
| Smart Class rooms /Power Point Presentations / Seminars/Quiz /Discussion /Flipped Class |

**SUGGESTED READINGS**

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) Consumer Affairs, UniversitiesPress.
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, RegalPublications
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.

**E BOOKS**

1. www.consumereducation.in
2. Empowering Consumers e-book,www.consumeraffairs.nic.in
3. ebook,www.bis.org
4. The Consumer Protection Act, 2086 and its later versions.

*UAI-104*

**Question paper pattern (External Only)**

Duration: 3 hrs Max: 75 Marks

**Section A (5 x 5=25)**

Short notes

Either – or / type – question from each unit.

**Section B (5 x 10=50)**

Essay type

Either – or / type – question from each unit.

Sub Code : **23UAI5X1**

| **Programme Code: 24** | **B. Sc Artificial Intelligence and Machine Learning** | | |
|---|---|---|---|
| Title of the Paper : **Extra Departmental Course - Mobile Application Development** | | | |
| **Batch** | **Hours / Week** | **Total Hours** | **Credits** |
| 2023-2024 | 2 | 30 | 3 |

**Course Objectives**

1. To demonstrate their understanding of the fundamentals of Android operating systems.
2. To demonstrate their skills of using Android software development tools.
3. To demonstrate their ability to develop software with reasonable complexity on mobile platform.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Develop the basic Android App using Activity Lifecycle methods. |
| | CO2 | Design Android User Interfaces & Event Handling mechanisms. |
| | CO3 | Implement the different Intents and Notifications. |
| | CO4 | Design and Implement back end Android App using SQLite database. |
| | CO5 | Develop advanced Android App using location based services. |

**Syllabus**

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

Android Programming**:** What is Android? Obtaining the required tools, Creating your first Android Application. Android Studio for application development: Exploring IDE, Using code completion, debugging your Application, Generating a signed APK.

**UNIT II** **(6 Hours)**

Android User Interface: Components of a screen, Adapting to display orientation, Managing changes to Screen Orientation, Utilizing the action bar, Creating the User Interface programmatically, **Listening for UI Notifications*.**

**UNIT III** **(6 Hours)**

User Interface With Views**:** Using basic views, Using picker views, Using List views to display long lists, Understanding specialized fragments. Pictures and Menus with Views**:** Using Image views to display pictures, Using Menus with views, Using Web View.

Sub Code : **23UAI5X1**

**UNIT IV** **(6 Hours)**

Content Providers: Using a Content Provider, Creating your own Content Providers.

Messaging : SMS Messaging, Sending E-Mail.

**UNIT V** **(6 Hours)**

Developing Android Services: Creating your own services, Establishing Communication Between a Service and an activity, Binding activities to services, **Understanding Threading***

*** 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. J. F. DiMarzio, **Beginning Android Programming with Android Studio**, Wiley India (Wrox), 2017.

**REFERENCE BOOKS**

1. Wei-Meng Lee, **Beginning Android 4 Application Development**, Wiley India (Wrox), 2012.
2. Reto Meier**, Professional Android 4 Application Development**, Wiley India, (Wrox) , 2012.
3. James C Sheusi, **Android Application Development For Java Programmers**, Cengage Learning, 2013.

**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 | M | H | S |
| **CO4** | S | M | S | M | H |
| **CO5** | S | S | M | S | S |

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