

**KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)**

*Re-accredited by NAAC with 'A+' Grade (4th Cycle) College of*

*Excellence (UGC) Coimbatore – 641 029*

**DEPARTMENT OF  
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**

**COURSE OUTCOMES (CO) OF  
DEPARTMENT OF  
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**

**For the students admitted in the  
Academic Year 2022 -2023**

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 1 - C &amp; C++ Programming</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 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 about the fundamentals of computers, history and various types 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Practical1 -C &amp; C++ Programming Lab</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 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 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

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.

<b>Programme Code:</b> 24	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 2 - Java Programming</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Practical2 - Java Programming Lab</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 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.

<b>Programme Code:</b> 24	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
<b>Title of the Paper : Core Paper 3 - Python Programming</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 6	<b>Total Hours</b> 90	<b>Credits</b> 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)**

<b>K1 to K5</b>	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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 4 - Design Thinking</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
<b>Title of the Paper : Core Paper 5 - Introduction to Artificial Intelligence and Machine Learning</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 4

### Course Objectives

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

### Course Outcomes (CO)

<b>K1 to K5</b>	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.



<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
<b>Title of the Paper : Core Practical 3 - Python Programming Lab</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 4	<b>Total Hours</b> 60	<b>Credits</b> 2

### 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 Numpy and 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.

<b>Programme Code:</b> 24	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Allied Paper 3 - Data Mining and Warehousing</b>			
<b>Batch</b> 2022 – 2023	<b>Hours / Week</b> 6	<b>Total Hours</b> 90	<b>Credits</b> 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 6 - R Programming</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 5

### 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 7 - Deep Learning</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 5

### 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 this 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 8 - Database Management System</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 4

### 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Practical 4 - R Programming Lab</b>			
<b>Batch</b> 2022 - 2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 2

### 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Allied Paper 4 - Big Data Analytics</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 6	<b>Total Hours</b> 90	<b>Credits</b> 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 9 - Machine Learning Techniques</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 6	<b>Total Hours</b> 90	<b>Credits</b> 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 analyze and appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.



<b>Programme Code: 24</b>	<b>B.Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 10 - Foundations of Robotics</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 6	<b>Total Hours</b> 90	<b>Credits</b> 4

### 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.

<b>Programme Code: 24</b>	<b>Bachelor of Artificial Intelligence and Machine Learning</b>		
<b>Title of the Paper : Core Paper 11 - Image and Speech Processing</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 6	<b>Total Hours</b> 90	<b>Credits</b> 4

### **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)**

<b>K1 to K5</b>	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.

<b>Programme Code: 24</b>	<b>B.Sc Artificial Intelligence and Machine Learning</b>		
<b>Title of the Paper : Core Practical 5 - Machine Learning Lab</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 2

### **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**

<b>K3 to K5</b>	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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 12 - Natural Language Processing</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 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.

<b>Programme Code: 24</b>	<b>Bachelor of Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 13 - Block Chain Technology</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 4	<b>Total Hours</b> 60	<b>Credits</b> 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Core Paper 14 - Artificial Neural Networks and Fuzzy Systems</b>			
<b>Batch</b>	<b>Hours / Week</b>	<b>Total Hours</b>	<b>Credits</b>
2022 - 2023	5	75	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.

<b>Programme Code: 24</b>	<b>Bachelor of Artificial Intelligence and Machine Learning</b>		
<b>Title of the Paper : Core Practical 6 - Natural Language Processing Lab</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 2

### **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)**

<b>K3 to K5</b>	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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Project Work and Viva – Voce***</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 4	<b>Total Hours</b> 60	<b>Credits</b> 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	Apply the 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.



<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Skill Based Subject 1 - Cyber Security</b>			
<b>Batch</b>	<b>Hours / Week</b>	<b>Total Hours</b>	<b>Credits</b>
2022 - 2023	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)

<b>K1 - K5</b>	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.

<b>Programme Code: 24</b>	<b>Bachelor of Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Skill Based Subject 2 - Ethical Hacking</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 2	<b>Total Hours</b> 30	<b>Credits</b> 3

### Course Objectives

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

### 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
<b>Title of the Paper : Skill Based Subject 3 - Social and Ethical Issues in Artificial Intelligence</b>			
<b>Batch</b>	<b>Hours / Week</b>	<b>Total Hours</b>	<b>Credits</b>
2022-2023	2	30	3

### **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)**

<b>K1 to K5</b>	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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Elective Paper - Internet Of Things</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 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.

<b>Programme Code: 24</b>	<b>Bachelor of Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Elective Paper - Open Source Systems</b>			
<b>Batch</b>	<b>Hours / Week</b>	<b>Total Hours</b>	<b>Credits</b>
2022-2023	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 of various open source software available in the industry.
	CO2	Summarize the basic concepts of how a database stores information via tables.
	CO3	Learn how to use lists, tuples, and dictionaries in Python programs.
	CO4	Applying exception handling methods in Python programs.
	CO5	Evaluate applications by applying programming concepts to solve real-time problems.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Elective Paper - Digital Forensics</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Elective Paper - Data Analytics and Visualization</b>			
<b>Batch</b>	<b>Hours / Week</b>	<b>Total Hours</b>	<b>Credits</b>
2022-2023	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.

<b>Programme Code: 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
<b>Title of the Paper : Elective Paper - Virtual Reality</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 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)**

<b>K1 to K5</b>	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.



<b>Program Code : 24</b>	<b>B. Sc Artificial Intelligence and Machine Learning</b>		
Title of the Paper : <b>Elective Paper - Artificial Intelligence in Cyber Security</b>			
<b>Batch</b> 2022-2023	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 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.