

**DEPARTMENT OF COMPUTER SCIENCE**  
**M.Sc. Teaching Plan for the Academic Year 2023-2024**  
**Semester II**

**Programme Educational Objectives (PEOs)**

<b>PEO</b>	<b>Upon completion of UG Degree Programme, the graduates will be able to:</b>
<b>PEO – 1</b>	apply appropriate theoretical knowledge to participate in activities that support humanity and economic development nationally and globally, developing as leaders in their fields of expertise.
<b>PEO – 2</b>	pursue lifelong learning and continuous improvement of the knowledge and skills with the highest professional and ethical standards.
<b>PEO – 3</b>	inculcate practical knowledge for developing professional empowerment and entrepreneurship and societal services.

**Programme Outcomes (POs)**

<b>PO</b>	<b>Upon completion of B.Sc. Degree Programme, the graduates will be able to:</b>
<b>PO – 1</b>	utilize scientific knowledge to pursue higher studies in the relevant field.
<b>PO – 2</b>	create innovative ideas to enhance entrepreneurial skills for economic independence.
<b>PO – 3</b>	face challenging competitive examinations that offer rewarding careers.
<b>PO – 4</b>	reflect upon green initiatives and take responsible steps to build a sustainable environment.
<b>PO – 5</b>	handle ethical issues with social responsibility.
<b>PO – 6</b>	communicate effectively and collaborate successfully with peers to become competent professionals.

**Programme Specific Outcomes (PSOs)**

<b>PSOs</b>	<b>Upon completion of the B.Sc. Degree Programme, the graduates will be able to:</b>
<b>PSO – 1</b>	obtain sufficient knowledge and skills enabling them to undertake further studies in Computer Science and its allied areas on multiple disciplines linked with Computer Science.
<b>PSO - 2</b>	evaluate and apply emerging technologies in computer science to develop innovative solutions for real-world problems
<b>PSO – 3</b>	develop a range of generic skills helpful in team building, problem solving, technical ability, employment, internships, communication and societal activities.
<b>PSO - 4</b>	communicate effectively, work collaboratively, and demonstrate ethical and professional attitudes in diverse settings.
<b>PSO - 5</b>	sensitize various economic issues related to Development, Growth, International Economics, Sustainable Development and Environment

**Department** : Computer Science  
**Class** : I M. Sc Computer Science  
**Title of the Course** : Core Course III: Data Mining and Warehousing  
**Semester** : II  
**Course Code** : SP232CC1

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232CC1	6	-	-	-	5	6	90	25	75	100

### Objectives

1. Enabled the students to learn the concepts of Data Mining tasks, classification, clustering and Data Warehousing.
2. Developed the skills of using recent data mining software for solving practical problem.

### Course Outcomes

CO	Upon completion of this course, the students will be able to:	PSO addressed	Cognitive Level
CO – 1	understand the basic data mining techniques and algorithms	PSO – 1	K2 (U)
CO – 2	understand the Association rules, Clustering techniques and Data warehousing contents	PSO – 2	K2(U), K3(Ap)
CO – 3	compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining	PSO – 4	K4(An), K5 (E)
CO – 4	design data warehouse with dimensional modeling and apply OLAP operations	PSO – 5	K5(E), K6()
CO – 5	identify appropriate data mining algorithms to solve real world problems	PSO – 3	K6(C)

## Teaching plan

**Total Contact hours: 90 (Including lectures, assignments and tests)**

Unit	Module	Topic	Teaching Hours	Cognitive level	Pedagogy	Assessment/ Evaluation
I	<b>BASICS AND TECHNIQUES</b>					
	1.	Basic data mining tasks, data mining versus knowledge discovery in databases	3	K2(U)	Lecture, Discussion	Quiz, Written Assignment
	2.	Data mining issues	2	K4(An)	Debates, Analysis of Case Studies	Presentation
	3	Data mining metrics – social implications of data mining	3	K5 (E )	Problem-solving Sessions, Case Analysis	Quiz, Written Assessment
	3.	Data mining from a database perspective	2	K3(Ap)	Practical Database Queries, Case Studies	Database Project
	4.	Data mining techniques: Introduction	1	K2(U)	Lecture with PPT Interactive Sessions	Quiz, Conceptual Assignment
	5.	Statistical perspective on data mining	2	K4(An)	Data Analysis Exercises, Problem-Solving	Data Analysis Project
	6.	Similarity measures – decision trees	2	K4(An)	Algorithm Implementation, Comparative Study	Algorithm Analysis Report
	7.	Neural networks – genetic algorithms	3	K6( C)	Advanced Workshops, Model Design Exercises	Model Design and Implementation
II	<b>ALGORITHMS</b>					
	1.	Classification: Introduction	1	K1(R )	Lecture, Discussions	Quiz
	2.	Statistical –based algorithms-Regression and Bayesian - distance–based algorithms	3	K2(U)	Case Studies, Practical Examples	Written Assignment
	3.	Hamming distance - Euclidean Distance	3	K3(Ap)	Hands-on Exercises, Problem-Solving	Give problem solving exercises
	4.	Decision tree-based algorithms- Use of A Decision Tree- Decision Tree	3	K4(An)	Coding Workshops, Decision Tree Analysis	Presentation

		Induction				
	5.	Neural network–based algorithms - Neural Network Architecture-Neural Network Method in Data Mining	3	K4(An)	Interactive Sessions Neural Network Applications, Case Studies	Assignment Project Proposal  Problem-solving Assessment
	6.	Rule-based algorithms–.	2	K3(Ap)	Rule-based System Design, Exercises	Quiz, Rule-based System Design
	7	Combining Techniques	3	K5(E )	Ensemble Learning, Comparative Analysis	Seminar
<b>III</b>	<b>CLUSTERING AND ASSOCIATION</b>					
	1.	Clustering: Introduction	2	K1(R )	Lecture, Discussions	Quiz
	2.	Similarity and Distance Measures– Outliers	3	K3(Ap)	Hands-on Exercises, Problem-Solving	Ask to write a program to measure the distance
	3.	Hierarchical Algorithms - Partitional Algorithms.	3	K5(E )	Algorithm Comparison, Case Studies	Presentation
	4.	Association rules: Introduction	2	K2(U)	Lecture, Interactive Sessions	Conceptual Assignment
	5.	large item sets - basic algorithms – parallel & distributed algorithms	3	K5(E )	Comparative Analysis, Distributed Systems	Comparative Analysis
	6.	comparing approaches- incremental rules	2	K5(E )	Incremental Mining Techniques, Case Studies	Problem-solving Assessment
	7.	Advanced Association rules and Techniques - Measuring the quality of Rules.	3	K3(Ap)	Advanced Workshops, Techniques Application	Case Study Analysis
<b>IV</b>	<b>DATA WAREHOUSING AND MODELING</b>					
	1.	Data warehousing: Introduction	2	K1(R )	Lecture, Discussions	Quiz
	2.	characteristics of a data warehouse	2	K2(U)	Case Studies, Examples	Written Assignment
	3.	data marts– other aspects of data mart	3	K4(An)	Case Studies, Comparative Analysis	Presentation

	4.	Online analytical processing: introduction –OLTP & OLAP systems Data modeling	3	K2(U)	Lecture with PPT Interactive Sessions	Short test
	5.	star schema for multidimensional view –data modeling – multifact star schema or snow flake schema	3	K5(E )	Comparative Analysis, Practical Exercises	Comparative Analysis
	6.	OLAP TOOLS	2	K3(Ap)	Tool Exploration, Hands-on Workshops	Tool Evaluation
	7.	State of the market – OLAP TOOLS and the internet.	3	K4(An)	Market Analysis, Trends and Applications	Market Analysis Report
<b>V</b>	<b>APPLICATIONS OF DATA WAREHOUSE</b>					
	1.	Developing a data Warehouse: why and how to build a data warehouse	2	K3(Ap)	Lectures, Discussions	Quiz, Recall Questions
	2.	Data warehouse architectural strategies,organization issues	2	K2(U)	Case Studies, Group Discussions	Analysis of Case Studies, Conceptual Questions
	3.	design consideration – data content	2	K3(Ap)	Practical Exercises, Hands-on Activities	Data Modeling Exercise
	4.	Metadata distribution of data – tools for data warehousing	3	K3(Ap)	Demonstrations, Tool Usage	Tool-Based Assessment
	5.	Performance considerations – crucial decisions in designing a data warehouse	3	K4(An)	Problem-solving Sessions, Performance Testing Debates, Scenario Analysis	Performance Evaluation Exercise, Test Decision-making Assessment, Role-play
	6.	Applications of data warehousing and data mining in government: Introduction	3	K2(U)	Case Studies, Guest Lectures	Case Study Analysis, Presentation
	7.	National data warehouses – other areas for data warehousing and data mining	3	K4(An)	Research Projects, Industry Examples	Research Paper, Presentation

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Employability,  
Skill Development

Activities (Em/ En/SD): 1. Employability: Data Warehousing and Mining in the industry  
2. Skill Development: Hands on Data Warehouse

Provide students with a case study or simulated scenario where they need to design a data warehouse architecture. This includes considerations such as data content, metadata, distribution of data, performance, and tools selection. Allow them to use software tools to model and present their data warehouse design.

Assignment: Statistical –based algorithms, Neural Network Architecture-Neural  
Network Method in Data Mining

Seminar Topic: Applications of data warehousing and data mining, data marts

### Sample questions

#### Part A (1 Mark)

1. Which of the following is a social implication of data mining?
  - a) Increased efficiency in data storage
  - b) Improved decision making in business
  - c) potential invasion of privacy
  - d) Enhanced data visualization techniques
2. Which algorithm is primarily used for classification and prediction tasks based on historical data?
  - a) Decision Trees
  - b) Genetic Algorithms
  - c) Hierarchical Algorithms
  - d) Parallel Algorithms
3. What are the key components of a neural network architecture?
  - a) Nodes, edges, and weights
  - b) Decision nodes, root node, and leaf nodes
  - c) Heuristics, fitness functions, and chromosomes
  - d) Clusters, centroids, and outliers
4. What is the primary purpose of hierarchical clustering algorithms?
  - a) To partition data into a predetermined number of clusters
  - b) To identify outliers in the dataset
  - c) To organize data points into a tree-like structure
  - d) None of these
5. Which technique is used to find relationships between items in a transactional database?
  - a) Clustering
  - b) Decision Trees
  - c) Association Rules
  - d) Regression

**Part B (8 Marks)**

6. Discuss the major issues associated with data mining.
7. Explain about Statistical based algorithms
8. Illustrate the impact of outliers on Clustering.
9. Write about characteristics of a data warehouse.
10. Applications of data warehousing and data mining

**Part C (12 Marks)**

11. Explain the significance of data mining from a database perspective.
12. Explain the working principles of neural network-based algorithms in data mining.
13. Discuss the process of association rule mining in detail.
14. Describe the role of OLAP tools in data analysis.
15. Write about data warehouse architectural strategies and organization issues

**Head of the Department**

Mrs.J.Anto Hepzie Bai

**Course Instructor**

Dr.F.Fanax Femy

**Department** : Computer Science  
**Class** : I M. Sc Computer Science  
**Title of the Course** : Core IV: Advanced Java Programming  
**Semester** : II  
**Course Code** : SP232CC2

Course Code	L	T	P	Credits	Inst. Hours	Total Hours	Marks		
							CIA	External	Total
SP232CC2	6	-	-	5	6	90	25	75	100

### Objectives

1. Enable the students to learn the basic functions, principles and concepts of advanced java programming.
2. Learn JDBC, Servlet packages, JQuery, Java Server Pages and JAR file format.

### Course Outcomes

CO	Upon completion of this course, the students will be able to:	PSO addressed	Cognitive level
CO – 1	understand the advanced concepts of Java Programming	PSO – 1	K1 (R), K2 (U)
CO – 2	understand JDBC and RMI concepts	PSO – 2	K3 (AP), K4 (AN)
CO – 3	apply and analyze Java in Database	PSO – 4	K4 (AN), K5 (E)
CO – 4	handle different event in java using the delegation event model, event listener and class	PSO – 5	K5 (E)
CO – 5	design interactive applications using Java Servlet, JSP and JDBC	PSO – 3	K5 (E), K6 (C)



## Teaching plan

**Total Contact hours: 90 (Including lectures, assignments and tests)**

Unit	Module	Topic	Teaching Hours	Cognitive level	Pedagogy	Assessment/ Evaluation
<b>I</b>						
	1.	<b>BASICS OF JAVA:</b> Java Basics Review	3	K1(U)	Introductory session	Word Cloud
	2.	Components and event handling-Types of Exceptions	2	K2(R)	Problem solving	Simple definitions
	3.	Threading, Concurrency, Synchronization	2	K2(U)	Lecture using Chalk and talk	Diagnostic test
	4.	Networking features- java.net Package, Client and Server Programs	3	K2(U)	Interactive PPT	Quiz using slido
	5.	Content and Protocol Handlers-Network Class Overview	3	K2(U)	Computational Thinking	Evaluation essay
	6.	Java Security and the Network classes	1	K3(A)	Demonstration	Concept definitions
	7.	JavaSocket Programming-Media Techniques	2	K2(U)	Computational Thinking	Evaluation essay
	8.	Applet-Java Graphics-Basic Animation	2	K3(A)	Problem solving	Problem solving questions
<b>II</b>						
	1.	Remote Method Invocation-Introduction	4	K1(R)	Lecture using Chalk and talk	Evaluation through short test
	2.	Working of RMI-Distributed Application Architecture	4	K2(U)	Simulation	Map knowledge
	3.	Creating stubs and skeletons- Defining Remote objects- Remote Object Activation	4	K2(U)	Lecture using videos	Differentiate between various ideas
	4.	Object Serialization-Java Spaces	4	K3(A)	Spoken Tutorial	Seminar
	5.	Benefits and Limitations of Java Spaces	2	K3(A)	Inquiry Based Teaching	Prepare a sheet

III						
	8.	Java in Databases- java.sql package	3	K2(U)	PPT	Short essays
	9.	JDBC Driver- JDBC principles–JDBC API- database access- Interacting-database search	3	K1(R)	Project Based	MCQ Using Slido
	10.	Meta Data Interfaces- Stored Procedures- Extending JDBC	3	K5(E)	Flipped Classroom	Recall
	11.	Creating multimedia databases – Database support in web applications	3	K4(An)	Lecture using videos	Slip test
	12.	Components of Web Based Database Applications	3	K3(A)	Blended Learning	MCQ Using Nearpod
IV						
	8.	Java Servlets: Java Servlet and CGI programming	2	K2(U)	Context Based	Short summary
	9.	A simple java Servlet- Anatomy of a java Servlet	2	K3(A)	Lecture using videos	Concept explanations
	10.	Reading data from a client-Reading http request header- sending data to a client and writing the http response header	2	K3(A)	Computational Learning	Recall Steps
	11.	Working with cookies	3	K4(An)	PPT	Evaluation through short test
	12.	Java Server Pages: JSP Overview- Installation- JSP tags	2	K3(A)	Demonstration	Short summary
	13.	Components of a JSP page-Expressions- Script lets	2	K6(A)	Experimental Learning	Evaluation through short test
	14.	Directives- Declarations-A complete example	2	K5(E)	Demonstration	Concept explanations
V						
	8.	JAR file format creation	2	K1(R)	Demonstration	True/False
	9.	Internationalization– Locales	2	K3(A)	Lecture	Evaluation through problems

	10.	Resource Bundles	2	K3(A)	Problem solving	Recall Steps
	11.	MVC Architecture	3	K4(An)	Lecture method	MCQ
	12.	Swing Programming	2	K3(A)	Problem solving	Short essays
	13.	Swing Components: Text Fields, Buttons, Toggle Buttons, Check Boxes and Radio Buttons-	2	K2(U)	Gamification	Seminar
	14.	Advanced java Techniques	2	K5(E)	PPT	Evaluation through short test

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Skill Development

Activities (Em/ En/SD): 1. Display a message using Servlet.

2. Create an applet for a calculator application.

3. Prepare employee payslip using JSP.

Assignment :

1. Internationalization
2. Swing Components

Seminar Topic:

1. MVC Architecture
2. Object Serialization

**Sample questions (minimum one question from each unit)**

### Part A

1. Which mechanism in Java RMI is responsible for converting objects into a stream of bytes for transmission?

A) Serialization B) Marshalling C) Stubbing D) Invocation Handler

2. In the context of Java RMI, what is the purpose of stubs and skeletons?

A) Managing thread synchronization      B) Facilitating object serialization  
C) Handling remote method calls      D) Controlling network security protocols

3. Which interface in the JDBC API is used to provide metadata about a database?

A) SQLMetadata    B) DatabaseMetaData    C) DBInspector    D) JDBCInfo

4. What is the primary function of a Java Servlet?
- A) Generating client-side scripts      B) Processing HTTP requests on the server-side  
C) Rendering HTML elements      D) Managing session cookies
5. Which directive in JSP is used to import Java classes into a JSP page?
- A) <import>   B) <java>   C) <include>   D) <jsp:useBean

### **Part B**

1. Explain the working mechanism of RMI in Java for remote method invocation.
2. Discuss the concept of object serialization in Java.
3. Explain the principles of JDBC.
4. Discuss the anatomy of a Java servlet.
5. Write any five swing components.

### **Part C**

1. Explain the significance of concurrency and threading in Java applications.
2. Define stubs and skeletons in the context of RMI.
3. Explain the key components of JDBC, including drivers, connection management, executing SQL queries, and handling result sets.
4. Discuss the lifecycle of a servlet and the execution flow of a JSP page.
5. Explain the responsibilities of each component (Model, View, Controller) in the MVC pattern and discuss how it helps in achieving separation of concerns and code maintainability.

**Head of the Department**

Mrs.J.Anto Hepzie Bai

**Course Instructor**

Dr.S.Immaculate Shyla

**Department** : Computer Science  
**Class** : I M.Sc Computer Science  
**Title of the Course** : Elective Course III: Advanced Operating Systems  
**Semester** : II  
**Course Code** : SP232EC1

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232EC1	4	-	-	-	3	4	60	25	75	100

### Objectives

1. Enable the students to learn the different types of operating systems and their functioning.
2. Gain knowledge on Distributed Operating Systems

### Course Outcomes

CO	Upon completion of this course, the students will be able to:	PSO addressed	Cognitive level
CO - 1	understand the design issues associated with operating systems	PSO - 1	K1 (R), K2 (U)
CO - 2	master various process management concepts including scheduling, deadlocks and distributed file systems	PSO - 3	K3 (AP), K4 (AN)
CO - 3	prepare Real Time Task Scheduling	PSO - 2	K4 (AN), K5 (E)
CO - 4	analyze Operating Systems for Handheld Systems	PSO - 4	K5 (E)
CO - 5	analyze Operating Systems like LINUX and iOS	PSO - 5	K5 (E), K6 (C)

## Teaching plan

**Total Contact hours: 60 (Including lectures, assignments and tests)**

Unit	Module	Topic	Teaching Hours	Cognitive level	Pedagogy	Assessment/ Evaluation
I	<b>BASICS OF OPERATING SYSTEMS</b>					
	1.	Basics of Operating Systems: What is an Operating System?	1	K2(U)	Lecture, Discussion	Quiz, Concept Mapping
	2.	Main frame Systems, Desktop Systems	2	K1(R)	Lecture using Chalk, PPT	Recall steps, Concept definitions
	3.	Multiprocessor Systems – Distributed Systems, Clustered Systems	2	K3(Ap)	Lecture using Chalk and talk, Demonstration, PPT	Questioning, Discussions
	4.	Real-Time Systems, Handheld Systems	1	K5(E )	Presentation, Debate	Case Analysis, Presentation
	5.	Process: Process Scheduling, Algorithms	2	K3(Ap)	Lecture, Problem-solving exercises	Algorithm Analysis
	6	Cooperating Processes	2	K4(An)	Case Studies, Group Discussions	Critical Thinking Tasks
	7	Inter Process Communication: Shared Memory, Message Passing System.	2	K4(An)	Lecture, Group Activities	Simulation, Case Studies
II	<b>DISTRIBUTED OPERATING SYSTEMS</b>					
	1	Distributed Operating Systems: Issues – Communication Primitives	2	K2(U)	Lecture with illustrations	Check knowledge by asking questions.
	2	Deadlock – Resource-Necessary conditions for a deadlock	2	K4(An)	Lecture cum Demonstration, PPT	Evaluation through short test
	3	Resource Allocation graph	2	K3(Ap)	Lecture, Examples	Algorithm Analysis
	4	Deadlock handling strategies - deadlock detection	2	K5(E )	Lecture, Problem-solving exercises	Simulation, Case Studies

		Deadlock Avoidance - Deadlock Recovery	2	K6(C)	Lecture using Chalk and talk, Group Discussion, PPT	Evaluation through online Quiz, Home work
	6	distributed file systems –design issues – Case studies – The Sun Network File System.	2	K3(Ap)	Case Study Discussion, Presentation	Case Analysis, Presentation
<b>III</b>	<b>REAL TIME OPERATING SYSTEM (RTOS):</b>					
	1	Real time Operating Systems: Introductions	2	K2(U)	Lecture using Chalk and talk, Group Discussion	MCQ, True/False, , Concept explanations
	2	Types of Real time OS- Hard Real time - Firm Real Time- Soft Real Time Systems	2	K4(An)	Lecture with PPT, Examples	Concept Mapping
	3	Difference between Hard and Real - Advantages Disadvantages of RTOS	2	K5(E)	Lecture, Group Discussions	Critical Thinking Tasks
	4	Applications of Real Time Systems – Basic Model of Real Time System	2	K3(Ap)	Explore real- world applications of RTOS	Presentation by seminar
	5	Basic Model of Real Time System	2	K3(Ap)	Case Analysis, Presentation	Model creation
	6	Characteristics – Safety and Reliability - Real Time Task Scheduling	2	K6(C)	MS-Word Presentation	Recall
<b>IV</b>	<b>HANDHELD SYSTEMS:</b>					
	1	Features of Handheld Operating System	1	K2(U)	Lecture using PPT, Group Discussion	Formative Assessment
	2	Types of Handheld Operating Systems- Operating Systems for Handheld System	2	K6( C)	Lecture using Chalk and talk, Demonstration, PPT	Class test
	3	Requirements– Technology Overview– Handheld Operating Systems	2	K4(An)	Lecture using Chalk and talk	Discussions

	4	Palm OS - Symbian Operating System- Android OS – Architecture of android	3	K2(U)	Lecture, Case Studies	Group discussions
	5	Applications of Android OS	2	K6( C)	Program Demonstration, PPT	Problem-solving questions, home work
	6	Securing handheld systems -Advantages , Disadvantages	2	K5(E )	Lecture, Group Discussions	Critical Analysis Tasks
<b>V</b>	<b>CASE STUDIES:</b>					
	1	Case Studies: Linux System: Introduction	2	K4(An)	Group Discussion	Assignments
	2	Memory Management –Contiguous memory management	2	K4(An)	Lecture using Chalk, Group Discussion, PPT	Map knowledge, questioning
	3	paging-Segmentation	2	K3(Ap)	MS-Word presentation	Suggest idea/concept with examples.
	4	Disk Scheduling Algorithms- First Come First Serve - Shortest Seek Time First - SCAN- CSCAN Scheduling	2	K6( C)	Lecture Demonstration, PPT with examples	Problem-solving questions
	5	Managing I/O devices, Accessing Files, iOS: Architecture and SDK Framework	2	K6( C)	Lecture using Chalk and talk, Demonstration, with PPT	Asking Questions
	6	Media Layer, Services Layer , Core OS Layer , File System.	2	K5(E )	Lecture, Examples, Case Studies	Short test

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Employability

Activities (Em/ En/SD): Asking students to develop an application using Android OS.

Assignment: Deadlock Recovery, Linux OS.

Seminar Topic: Distributed file systems, Applications of Real Time System

### Sample questions

#### Part A (1 mark)

1. A -----is not a deadlock state
2. Banker's algorithm is the deadlock avoidance algorithm? (T/F)
3. \_\_\_\_\_ system call is used to create a new process.



4. The circular wait is one of the condition under which a deadlock situation can arise.  
(T/F)
5. The following one is not the operating system  
a) Linux    b)UNIX    c) Android    d) Scheduling

**Part B (8 marks)**

6. Short notes on Process.
7. Explain about Real-Time Systems.
8. Discuss about Paging? Explain
9. Elaborate about Resource Allocation Graph
10. Briefly explain about Architecture of android OS.

**Part C (12 marks)**

11. Explain about Inter Process Communication(IPC).
12. Write about Deadlock Recovery in detail
13. Discuss about Real Time Operating System.
14. Explain about Applications of Android OS
15. Explain about Disk Scheduling

**Head of the Department**

Ms. J. Anto Hepzie Bai

**Course Instructor**

Dr. F. Fanax Femy

**Department** : Computer Science  
**Class** : I M.Sc. Computer Science  
**Title of the Course** : Elective Course IV: Artificial Intelligence and Machine Learning  
**Semester** : II  
**Course Code** : SP232EC4

Course Code	L	T	P	Credits	Inst. Hours	Total Hours	Marks		
							CIA	External	Total
SP232EC4	4	-	-	3	4	60	25	75	100

### Objectives

1. Enable the students to learn the basic functions of AI, Heuristic Search Techniques.
2. Provide knowledge on concepts of Representations and Mappings and Predicate Logic.

### Course Outcomes

CO	Upon completion of this course, students will be able to:	PSO addressed	CL
CO - 1	demonstrate AI problems and techniques	PSO-1	K1, K2
CO - 2	understand machine learning concepts	PSO-1 & PSO-2	K2, K3
CO - 3	apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	PSO-1 & PSO-2	K3, K4
CO - 4	analyze the impact of machine learning on applications	PSO-1 & PSO-2	K4, K5
CO - 5	analyze and design a real-world problem for implementation and understand the dynamic behaviour of a system	PSO-2 & PSO-3	K5, K6

### Teaching plan

**Total Contact hours: 75(Including lectures, assignments and tests)**

Unit	Module	Topic	Teaching Hours	Cognitive level	Pedagogy	Assessment / Evaluation
<b>I</b>	<b>INTRODUCTION</b>					
	1	History of AI - AI Problems	1	K1(R) & K2 (U)	Brain Storming, Content Based	Questioning
	2	AI techniques - Criteria for success.	2	K1(R) & K2 (U)	Content Based	Group Discussion

	3	Problems, Problem Spaces	1	K1(R) & K2 (U)	Demonstrative, Blended Learning.	Oral Presentation
	4	Search: State space search - Production Systems -	3	K1(R) & K2 (U)	Demonstrative, Blended Learning.	JAM
	5	Problem Characteristics - Issues in design of Search	3	K1(R) & K2 (U)	Demonstrative, Blended Learning.	JAM
	6	Building AI Systems – Intelligent Agents.	2	K1(R) & K2 (U)	Demonstrative, Blended Learning.	Quiz
<b>II</b>	<b>SEARCH TECHNIQUES</b>					
	1	Heuristic Search techniques: Generate and Test	1	K1(R) & K2 (U)	Inquiry – based approach	Questioning
	2	Hill Climbing- Best-First	1	K2(U) & K3 (Ap)	Lecture Method	WordCloud
	3	Problem Reduction, Constraint Satisfaction, Means-end analysis.	3	K2(U), K3(Ap) & K4(An)	KWL	Online Quiz
	4	Knowledge representation issues: Representations and mappings -	3	K1(R) & K2 (U)	KWL	JAM
	5	Approaches to Knowledge representations -	2	K1(R) & K2 (U)	Demonstrative	Oral Presentation
	6	Issues in Knowledge representations - Frame Problem.	2	K1(R) & K2 (U)	Blended Learning	Group Discussion
<b>III</b>	<b>PREDICATE LOGIC</b>					
	1	Using Predicate logic: Representing simple facts in logic	1	K1(R) & K2 (U)	Brainstorming, Demonstrative	Questioning
	2	Representing Instance and Isa relationships	1	K2(U) & K3 (Ap)	Demonstrative, Team Teaching	Online Quiz

	3	Computable functions and predicates - Resolution - Natural deduction.	2	K1(R) & K2 (U)	Lecture Method	Slip Test
	4	Representing knowledge using rules: Procedural Vs Declarative knowledge	3	K2(U) & K3 (Ap)	Blended Learning	Oral Presentation
	5	Logic programming Forward Vs Backward reasoning	3	K1(R) & K2 (U)	Demonstrative, Lecture Method	Group Discussion
	6	Matching-Control knowledge.	2	K2(U) & K3 (Ap)	Demonstrative, Lecture Method	Group Discussion
<b>IV</b>	<b>MACHINE LEARNING</b>					
	1	Understanding Machine Learning: What Is Machine Learning?	2	K1(R) & K2 (U)	Lecture Method, Blended Learning	Brainstorming WordCloud
	2	Defining Big Data- Big Data in Context with Machine Learning	2	K1(R) & K2 (U)	Demonstrative, Lecture Method	Group Discussion
	3	The Importance of the Hybrid Cloud-Leveraging the Power of Machine Learning	2	K1(R) & K2 (U)	Demonstrative, Lecture Method	Group Discussion
	4	The Roles of Statistics and Data Mining with Machine Learning	2	K1(R) & K2 (U)	Demonstrative, Lecture Method	Descriptive answers
	5	Putting Machine Learning in Context	2	K1(R) & K2 (U)	Demonstrative, Lecture Method	Open Book Test
	6	Approaches to Machine Learning.	2	K1(R) & K2 (U)	Demonstrative, Lecture Method	Online Quiz

V	APPLICATIONS OF MACHINE LEARNING					
	1	Applying Machine Learning: Getting Started with a Strategy	1	K3(Ap)	Demonstrative, Blended Learning	JAM
	2	Understanding Machine Learning Techniques – Tying Machine Learning Methods to Outcomes –	2	K2(U)	Demonstrative, Blended Learning	Group Discussion
	3	Applying Machine Learning to Business Needs.	2	K3(Ap), K4(An), K5(Ev) & K6(Cr)	Lecture Method, Computational Thinking	Group Discussion
	4	Looking Inside Machine Learning: The Impact of Machine	2	K2(U)	Demonstrative, Blended Learning	JAM
	5	Learning on Applications-Data Preparation-	3	K3(Ap), K4(An), K5(Ev) & K6(Cr)	Demonstrative, Blended Learning	Online Assignment
	6	The Machine Learning Cycle	2	K2(U)	Lecture Method, Computational Thinking	Group Discussion

Course Focussing on Employability/ Entrepreneurship/ Skill Development: Employability

Activities (Em/ En/SD): Group Discussions after reading contents from internet.

Assignment: Representing Instance and Isa relationships

Seminar Topic: Applying Machine Learning to Business Needs.

### Sample questions

#### Part A

- Which of the following AI techniques is best suited for handling unstructured data and pattern recognition tasks?
  - State space search
  - Production Systems
  - Neural Networks
  - Intelligent Agents
- The Frame Problem refers to the challenge of determining which actions are relevant and necessary to achieve a goal within a given knowledge representation system. (True/False)

3. In logic programming, \_\_\_\_\_ reasoning starts with a goal and works backward, attempting to find premises that support the goal.
4. Which technological framework plays a crucial role in facilitating the development and deployment of machine learning solutions by providing scalable resources and accessibility?
  - a) Virtual Reality
  - b) Hybrid Cloud
  - c) Blockchain
  - d) Quantum Computing
5. \_\_\_\_\_ involves converting raw data into a structured format suitable for analysis and model training in the realm of machine learning.

#### **Part B**

6. Explain two AI problems commonly encountered in the field, providing examples for each.
7. Compare and contrast the Generate and Test approach with Problem Reduction in heuristic search techniques, highlighting their respective advantages and limitations.
8. Explain the differences between procedural and declarative knowledge representations, providing examples for each and highlighting their respective advantages in AI systems.
9. Discuss the relationship between big data and machine learning, highlighting the significance of big data in enhancing machine learning algorithms and models.
10. Explain the impact of machine learning on various applications, highlighting how it transforms and enhances the functionality and efficiency of these applications.

#### **Part C**

11. Discuss the key criteria for the success of AI systems, emphasizing their significance in the development and evaluation of intelligent agents.
12. Investigate the application and relevance of Constraint Satisfaction in problem-solving, using real-world scenarios to demonstrate its effectiveness and limitations within AI systems.
13. Analyze the application of resolution and natural deduction in predicate logic, illustrating their usage in solving complex logical problems and demonstrating their effectiveness through examples.
14. Elaborate on the convergence of statistics, data mining, and machine learning, illustrating how their integration contributes to the advancement and effectiveness of AI systems.
15. Evaluate the significance of data preparation in the context of machine learning, outlining its stages and illustrating how proper data preparation impacts the effectiveness of machine learning models.

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