MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12

SYLLABUS

PG - COURSES – AFFILIATED COLLEGES

Course Structure for M. Sc. Computer Science
(Choice Based Credit System)

(with effect from the academic year 2023-2024 onwards)

Semester-II				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
3	Core	DATA MINING AND WAREHOUSING	WCSM21	4
3	Core	ADVANCED OPERATING SYSTEMS	WCSM22	4
3	Core	ADVANCED JAVA PROGRAMMING	WCSM23	4
3	Elective	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	WCSE21	3
3	Elective	INTERNET OF THINGS	WCSE22	3
3	Practical	DATA MINING USING R - LAB	WCSL21	2
3	Practical	ADVANCED JAVA PROGRAMMING LAB	WCSL22	2
3	AEC - II	ENGLISH FOR COMPETITIVE EXAMS	WCSAEC2	1
3	SEC - II	WEB DEVELOPMENT USING PHP	WCSSEC2	1

Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **15 marks**
3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks and Seminar for 5 marks

The break up for internal assessment shall be:
Written test- 15 marks; Assignment -5 marks; Seminar-5 Marks Total - 25 marks

B. Scheme of External Examination
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

- **Conversion of Marks into Grade Points and Letter Grades**

S.No.	Percentage of Marks	Letter Grade	Grade Point	Performance
1	90 - 100	O+	10	Outstanding
2	80 - 89	O	9	Excellent
3	70 - 79	A+	8	Very Good
4	60 - 69	A	7	Good
5	55 - 59	B+	6	Above Average
6	50 - 54	B	5	Pass
7	0 - 49	RA	-	ReAppear
8	Absent	AA	-	Absent

- **Cumulative Grade Point Average (CGPA)**

$$\mathbf{CGPA} = \frac{\mathbf{\Sigma\,(GP \times C)}}{\mathbf{\Sigma C}}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

- **Classification**
  a) First Class with Distinction : CGPA $\geq$ 7.5*****
  b) First Class : CGPA $\geq$ 6.0
  c) Second Class : CGPA $\geq$ 5.0 and $<$ 6.0
  d) Third Class : CGPA $<$ 5.0

DATA MINING AND WAREHOUSING

Core – IV

Course Objectives:

The main objectives of this course are to:

- Enable the students to learn the concepts of Mining tasks, classification, clustering and Data Warehousing.
- Develop skills of using recent data mining software for solving practical problems.
- Develop and apply critical thinking, problem-solving, and decision-making skills.

Unit:1 BASICS AND TECHNIQUES

Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective.

Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.

Unit:2 ALGORITHMS

Classification: Introduction –Statistical –based algorithms -distance–based algorithms-decision tree-based algorithms-neural network–based algorithms–rule-based algorithms–combining techniques.

Unit:3 CLUSTERING AND ASSOCIATION

Clustering: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms - Partitional Algorithms.

Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules.

Unit:4 DATA WAREHOUSING AND MODELING

Data warehousing: introduction-characteristics of a data warehouse–data marts–other aspects Of data mart. Online analytical processing: introduction -OLTP & OLAP systems

Data modeling –star schema for multidimensional view –data modeling – multi fact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.

Unit:5 APPLICATIONS OF DATAWAREHOUSE

Developing a data WAREHOUSE: why and how to build a data warehouse –data

warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse.
Applications of data warehousing and data mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining.

Unit:6 Contemporary Issues
Expert lectures, online seminars –webinars

Text Books

1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson education,2003.
2. C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", PHI, Second Edition.

Reference Books

1. Arun K. Pujari," Data Mining Techniques", Universities Press (India) Pvt. Ltd.,2003.
2. Alex Berson, Stephen J. Smith, "Data Warehousing, Data Mining and OLAP",TMCH, 2001.
3. Jiawei Han & Micheline Kamber, Academicpress. "Data Mining Concepts & Techniques", 2001,

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.javatpoint.com/data-warehouse
2. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/
3. https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html

ADVANCED OPERATING SYSTEMS

Core – V

Course Objectives:
The main objectives of this course are to:

- Enable the students to learn the different types of operating systems and their functioning.
- Gain knowledge on Distributed Operating Systems
- Gain insight into the components and management aspects of real time and mobile operating systems.
- Learn case studies in Linux Operating Systems

Unit:1 BASICS OF OPERATING SYSTEMS

Basics of Operating Systems: What is an Operating System? – Main frame Systems –Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments –Process Scheduling – Cooperating Processes – Inter Process Communication- Deadlocks –Prevention – Avoidance – Detection – Recovery.

Unit:2 DISTRIBUTEDOPERATINGSYSTEMS

Distributed Operating Systems: Issues – Communication Primitives – Lamports Logical Clocks – Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems –design issues – Case studies – The Sun Network File System-Coda.

Unit:3 REALTIMEOPERATINGSYSTEM

Realtime Operating Systems: Introduction – Applications of Real Time Systems – BasicModel of Real Time System – Characteristics – Safety and Reliability - Real Time Task Scheduling

Unit:4 HANDHELDSYSTEM

Operating Systems for Handheld Systems: Requirements–Technology Overview– Handheld Operating Systems–Palm OS-Symbian Operating System-Android– Architecture of android– Securing handheld systems

Unit:5 CASE STUDIES

Case Studies: Linux System: Introduction – Memory Management – Process Scheduling – Scheduling Policy - Managing I/O devices – Accessing Files- iOS : Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System.

Unit:6 Contemporary Issues

Expert lectures, online seminars–webinars

Text Books

1. Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, “Operating System Concepts”, Seventh Edition, John Wiley & Sons, 2004.
2. Mukesh Singhal and Niranjan G. Shivaratri, “Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems”, Tata McGraw-Hill, 2001.

Reference Books

1. Rajib Mall, “Real-Time Systems: Theory and Practice ”,Pearson Education

India, 2006.
2. Pramod Chandra P. Bhatt, An introduction to operating systems, concept and practice, PHI, Third edition, 2010.
3. Daniel.P.Bovet&MarcoCesati,"UnderstandingtheLinuxkernel",3rdedition,O"Reilly, Neil Smyth, "iPhone iOS 4Development Essentials–Xcode", Fourth Edition, Payload media, 2011.

Related Online Contents [MOOC, SWAYAM,NPTEL, Websites etc.]

1. https://onlinecourses.nptel.ac.in/noc20_cs04/preview
2. https://www.udacity.com/course/advanced-operating-systems--ud189
3. https://minnie.tuhs.org/CompArch/Resources/os-notes.pdf

ADVANCED JAVA PROGRAMMING

Core – VI

Course Objectives:

The main objectives of this course are to:

- Enable the students to learn the basic functions, principles and concepts of advanced java programming.
- Provide knowledge on concepts needed for distributed Application Architecture.
- Learn JDBC, Servlet packages, JQuery, Java Server Pages and JAR file format

Unit:1 BASICS OF JAVA

Java Basics Review: Components and event handling–Threading concepts–Networking features – Media techniques

Unit:2 REMOTE METHOD INVOCATION

Remote Method Invocation-Distributed Application Architecture- Creating stubs and skeletons- Defining Remote objects- Remote Object Activation-Object Serialization-Java Spaces

Unit:3 DATABASE

Java in Databases-JDBC principles–database access-Interacting-database search–Creating multimedia databases – Database support in web applications

Unit:4 SERVLETS

Java Servlets: Java Servlet and CGI programming- A simple java Servlet-Anatomy of a java Servlet-Reading data from a client-Reading http request header-sending data to a client and writing the http response header-working with cookies

Java Server Pages: JSP Overview-Installation-JSP tags-Components of a JSP page-Expressions- Scriptlets – Directives - Declarations-A complete example

Unit:5 ADVANCED TECHNIQUES

JAR file format creation–Internationalization–Swing Programming–Advanced java Techniques

Unit:6 Contemporary Issues

Expert lectures, online seminars –webinars

Text Books

1. Jamie Jaworski, "Java Unleashed", SAMS Tech media Publications,1999.
2. Campione, Walrath and Huml, "The Java Tutorial", Addison Wesley,1999.

Reference Books

1. JimKeogh,"TheCompleteReferenceJ2EE",TataMcGrawHillPublishingCompanyLtd, 010.
2. DavidSawyerMcFarland,"JavaScriptAndJQuery-TheMissingManual",Oreilly Publications, 3rd Edition,2011.
3. Deitel and Deitel, "Java How to Program", Third Edition, PHI/Pearson Education Asia.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.javatpoint.com/servlet-tutorial
2. https://www.tutorialspoint.com/java/index.htm
3. https://onlinecourses.nptel.ac.in/noc19_cs84/preview

PRACTICAL III: DATA MINING USING R

Course Objectives:

The main objectives of this course are to:

- To enable the students to learn the concepts of Data Mining algorithms namely classification, clustering, regression….
- To understand & write programs using the DM algorithms
- To apply statistical interpretations for the solutions
- Able to use visualizations techniques for interpretations

LIST OF PROGRAMS

- Implement Apriori algorithm to extract association rule of data mining.
- Implement k-means clustering technique.

- Implement anyone Hierarchal Clustering.
- Implement Classification algorithm.
- Implement Decision Tree.
- Linear Regression.
- Data Visualization.

Text Books

1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson education,2003.
2. C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", PHI, Second Edition

Reference Books

1. Arun K. Pujari, "Data Mining Techniques", Universities Press (India) Pvt. Ltd.,2003.
2. Alex Berson ,Stephen J. Smith, "Data Warehousing, Data Mining and OLAP", TMCH, 2001.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.javatpoint.com/data-warehouse
2. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/
3. https://www.btechguru.com/training--it--database-management-systems--file structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html

PRACTICAL IV:ADVANCED JAVA LAB

Course Objectives:

The main objectives of this course are to:

- To enable the students to implement the simple programs using JSP, JAR
- To provide knowledge on using Servlets, Applets
- To introduce JDBC and navigation of records
- To understand RMI & its implementation
- To introduce to Socket programming

LIST OF PROGRAMS

1. Display a welcome message using Servlet.
2. Design a Purchase Order form using Html form and Servlet.
3. Develop a program for calculating the percentage of marks of a student using JSP.
4. Design a Purchase Order form using Html form and JSP.
5. Prepare a Employee pay slip using JSP.
6. Write a program using JDBC for creating a table, Inserting, Deleting records

and list out the records.

7. Write a program using Java servlet to handle form data.
8. Write a simple Servlet program to create a table of all the headers it receives along with their associated values.
9. Write a program in JSP by using session object.
10. Write a program to build a simple Client Server application using RMI.
11. Create an apple for a calculator application.
12. Program to send a text message to another system and receive the text message from the system (use socket programming).

Text Books

1. Jamie Jaworski,"Java Unleashed",SAMS Tech media Publications,1999.
2. Campione, Walrath and Huml,"TheJavaTutorial",AddisonWesley,1999.

Reference Books

1. Jim Keogh, "The Complete Reference J2EE", Tata Mc Graw Hill Publishing Company Ltd, 2010.
2. David Sawyer Mc Farland, "Java Script And JQuery-The Missing Manual", Oreilly Publications, 3rd Edition, 2011.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.javatpoint.com/servlet-tutorial
2. https://www.tutorialspoint.com/java/index.htm
3. https://onlinecourses.nptel.ac.in/noc19_cs84/preview

ENGLISH FOR COMPETITIVE EXAMS

AEC 2

Objectives:

- To help the students prepare for competitive exams
- To enable the students to learn the techniques to ace the tests
- To enable the students to learn English grammar
- To enhance the students' reading skills
- To teach the students how to answer comprehension questions
- To focus on vocabulary and its importance
- To guide the students about IELT exams
- To discuss various components of vocabulary
- To introduce a variety of reading passages to the students

Reading Comprehension

Introduction to a variety of reading passages - Key to comprehension – Tackling questions - Techniques for answering comprehension questions

Reading Skills
Skimming - Scanning - Intensive reading - Extensive reading

Vocabulary
Synonyms - Antonyms - Analogy - Sentence completion

Grammar
Basics of grammar (Parts of speech, tense form, articles, etc.) - Identifying errors

Writing
Importance of writing - Responding to the task - Coherence and cohesion – Lexical resource - Grammatical range and accuracy - Planning and preparation - Using examples - Writing general essays - Descriptive writing.

Web Development using PHP

UNIT I
Introduction to PHP as a programming Language: - Advantages of PHP, the server side architecture Decomposed, overview of PHP, history, object oriented support, benefits in running PHP as a server side script.

UNIT II
The basics of PHP: - data types, variables, constants, operators, Arrays, Conditional statements (if statement, Executing Multiple Statements, else if clause and switch statement), Iterations (for loop, while loop, controlling an array using a while loop, do while statement.

UNIT III
Functions, user defined functions, functions with arguments, built in functions (print (), includer(), header(), phpinfo()), Working with Strings.

UNIT IV
Working with forms, form elements (Text Box, Text Area, Password, Radio Button, Checkbox, The Combo Box, Hidden Field and image), adding elements to a form

UNIT V
Data base connectivity using PHP (MySQL, ODBC, ORACLE, SQL) Performing, executing Commands, different types of Data Base Operations like Insertion, deletion, update and query on data

Books for Reference:
1. Mastering PHP, WebTech Solutions, Khanna Publishing House
2. Learning PHP, Ramesh Bangia, Khanna Publishing House

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING – Elective

Course Objectives:

The main objectives of this course are to:

- Enable the students to learn the basic functions of AI, Heuristic Search Techniques.
- Provide knowledge on concepts of Representations and Mappings and Predicate Logic.
- Introduce Machine Learning with respect Data Mining, Big Data and Cloud.
- Study about Applications & Impact of ML.

Unit:1 INTRODUCTION

Introduction: AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design ofSearch.

Unit:2 SEARCH TECHNIQUES

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations - Issues in Knowledge representations - Frame Problem.

Unit:3 PREDICATELOGIC

Using Predicate logic: Representing simple facts in logic - Representing Instance and Isa relationships - Computable functions and predicates - Resolution - Natural deduction.

Representing knowledge using rules: Procedural Vs Declarative knowledge- Logic programming -Forward Vs Backward reasoning -Matching-Control knowledge.

Unit:4 MACHINE LEARNING

Understanding Machine Learning: What Is Machine Learning? - Defining Big Data - Big Data in Context with Machine Learning - The Importance of the Hybrid Cloud - Leveraging the Power of Machine Learning - The Roles of Statistics and Data Mining with Machine Learning-Putting Machine Learning in Context-Approaches to Machine Learning.

Unit:5 APPLICATIONS OF MACHINE LEARNING

Looking Inside Machine Learning: The Impact of Machine Learning on Applications – Data Preparation -The Machine Learning Cycle.

Unit:6 Contemporary Issues

Expert lectures, online seminars –webinars

Text Books

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.
2. George F Luger, "Artificial Intelligence", 4thEdition, Pearson Education Publ, 2002.

Reference Books

1. Machine Learning For Dummies ®, IBM Limited Edition by Judith Hurwitz, Daniel Kirsch.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.ibm.com/downloads/cas/GB8ZMQZ3
2. https://www.javatpoint.com/artificial-intelligence-tutorial
3. https://nptel.ac.in/courses/106/105/106105077/

INTERNET OF THINGS

Elective

Course Objectives:

The main objectives of this course are to:

- To get familiar with the evolution of IOT with its design principles.
- To outline the functionalities and protocols of internet communication.
- To analyze the hardware and software components needed to construct IOT applications.
- To identify the appropriate protocol for API construction and writing embedded code.
- To realize various business models and ethics in Internet of Things.

Unit:1 INTRODUCTION

Internet of Things: An Overview : IoT Conceptual Framework - IoT Architectural View -Technology Behind IoT - Sources of IoT - M2M Communication - Examples of IoT – Design Principles for Connected Devices : IoT/M2M Systems Layers and Designs Standardization - Communication Technologies - Data Enrichment, Data Consolidation and Device Management at Gateway

Unit:2 Design Principles for Web Connectivity :

Communication Protocols for Connected Devices – Message Communication Protocols for Connected Devices – Web Connectivity for Connected Devices – Network Using Gateway , SOAP, REST, HTTP, RESTful and WebSockets -

Internet Connectivity Principles: Internet Connectivity - Internet Based Communication – IP Addressing in the IoT – Media Access Control – Application Layer Protocols: HTTP, HTTPS, FTP, Telnet and Others

Unit:3 Data Acquiring, Organizing, Processing and Analytics :

Data Acquiring and Storage – Organising the Data – Transactions, Business Processes, Integration and Enterprise Systems – Analytics – Knowledge Acquiring, Managing and Storing Processes – Data Collection, Storage and Computing Using a Cloud Platform: Cloud Computing Paradigm for Data Collection, Storage and Computing – Everything as a Service and Cloud Service Models.

Unit:4 SENSORS AND ACTUATORS

Sensors, Participatory Sensing, RFIDs, and Wireless Sensor Networks : Sensor Technology – Wireless Sensor Networks Technology - Prototyping the Embedded Devices for loT and M2M : Embedded Computing Basics – Embedded Platforms for Prototyping.

Unit:5 Prototyping and Designing the Software for IoT Applications

Prototyping Embedded Device Software - Devices, Gateways, Internet and Web/Cloud Services Software Development – Prototyping online Component APIs and Web APIs – Security for IoT : Vulnerabilities, Security Requirements and Threat Analysis – IoT Security Tomography and Layered Attacker Model – Security Models, Profiles and Protocols for IoT – IoT Application Case Study : Design Layers, Design Complexity and Designing using Cloud PaaS – IoT / IIoT Applications in the premises, Supply – Chain and Customer Monitoring – Connected Car and its Applications and Services.

Unit:6 Contemporary Issues

Expert lectures, online seminars –webinars

Text Book

1. Raj Kamal , " Internet of Things Architecture and Design Principles", McGraw Hill, 2017

Reference Books

1. Ovidiu Vermesan and Peter Friess, "Internet of Things – From Research and Innovation to Market Deployement" , River Publishers, 2014.
2. Peter Waher, "Learning Internet of Things" ,Packt Publishing, 2015.
3. Donald Norris, "The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black", Mc Graw Hill, 2015

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://onlinecourses.nptel.ac.in/noc20_cs66/preview
2. https://www.javatpoint.com/iot-internet-of-things
3. https://www.tutorialspoint.com/internet_of_things/index.htm