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 2024-2025 onwards)

Semester-II				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
3	Core	DATA MINING AND WAREHOUSING	VCSC21	4
3	Core	ADVANCED JAVA PROGRAMMING	VCSC22	4
3	Elective	CLOUD COMPUTING	VCSE23	3
3	Elective	INTERNET OF THINGS	VCSE24	3
3	Practical	DATA MINING LAB USING R	VCSL21	3
3	Practical	ADVANCED JAVA LAB	VCSL22	3
3	SEC - I	STATISTICAL TOOLS	VCSSE21	2

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

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 JAVA PROGRAMMING

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.
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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.

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2. https://www.tutorialspoint.com/java/index.htm
3. https://onlinecourses.nptel.ac.in/noc19_cs84/preview

CLOUD COMPUTING

Course Objectives:

The main objectives of this course are to:

- Gain knowledge on cloud computing, cloud services, architectures and applications.
- Enable the students to learn the basics of cloud computing with real-time usage
- How to store and share in and from the cloud?

Unit:1 INTRODUCTION

INTRODUCTION Cloud Computing Introduction, From, Collaboration to cloud, Working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services.

Unit:2 CLOUD COMPUTING

CLOUD COMPUTING FOR EVERYONE Centralizing email communications, cloud computing for the community, collaborating on schedules, collaborating on group projects and events, cloud computing for corporations, mapping, schedules, managing projects, and presenting on the road.

Unit:3 CLOUD SERVICES

USING CLOUD SERVICES Collaborating on calendars, Schedules and task management, exploring online scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets, and databases.

Unit:4 OUTSIDE THE CLOUD

Evaluating webmail services, evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating online groupware, collaborating via blogs and wikis.

Unit:5 STORING AND SHARING

STORING AND SHARING Understanding cloud storage, evaluating online file storage, exploring online bookmarking services, exploring online photo editing applications, exploring photo sharing communities, and controlling it with web-based desktops.

Unit:6 Contemporary Issues

Expert lectures, online seminars –webinars

Text Books

1. Michael Miller, "Cloud Computing", Pearson Education, NewDelhi, 2009.

Reference Books

1. Anthony T. Velte, "Cloud Computing: A Practical Approach", 1st Edition, Tata McGraw- Hill Education Private Limited, 2009.

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

1. https://nptel.ac.in/courses/106/105/106105167/
2. https://www.tutorialspoint.com/cloud_computing/index.htm
3. https://www.javatpoint.com/cloud-computing-tutorial

INTERNET OF THINGS

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

STATISTICAL TOOLS

Objectives:

- Understand the difference between descriptive & inferential statistics.
- Understand the importance of sample size calculations and the required input parameters.
- Analyze data more quickly and more accurately.
- Ability to use the statistical tools for analysis.

UNIT 1

Introduction- Descriptive and Inferential Statistics-Variables and types of data- Data Collection and sampling technique-Uses and Misuses of Statistics

UNIT 2

Organizing data-Histogram, Frequency Polygon and Ogives-other types of graph-Measures of Central Tendency

UNIT 3

Classical Test statistics: Z-test, T-test, F-tests and Goodness of fit test

UNIT 4

Correlation and Regression- Scatter Plots-Analysis of Variance: one-way analysis of variance-Two-way analysis of variance

Unit 5

Statistics Packages: SPSS,MS-EXCEL,SAS,R-Programming, MiniTab

Text Book(s):

1. Allan G. Bluman, Elementary Statistics, 1992.
2. Dr. M.J de Smith, Statistical Analysis Handbook, 2014.
3. ARice, John. Mathematical Statistics and Data Analysis. Duxbury Press, 2006.
4. Statistics in a NutShell-Sarab Boslaugh & Paul Andrew Watters