Maharshi Karve Stree Shikshan Samstha's

# K. B. Joshi Institute of Information Technology

(*Approved by Govt. of Maharashtra, *NAAC Accredited) (Affiliated by S.N.D.T. Women's University, Mumbai)

## Faculty: Science & Technology

## Program Outcome Document

## Program: Master of Computer Science


**Dr.Swati Sayankar**
**Principal(O)**

**Prof.Rupali Saraf**
**IQAC Coordinator**

# Program 3: Master Of Computer Science
# Program Code: 124

### Master of Computer Science[ M Sc C.S.]

**Program Objectives**

- To prepare highly trained software professionals needed by the industry
- To inculcate research culture that will make them ready for competent world.
- To impart knowledge of latest trends in IT Industry
- To prepare them for Industry 4.0 Revolution

**Program Specific Outcome**

This Program will enable students

- To get knowledge of algorithm and various programming languages
- To make career in Cyber Security and digital Forensics
- To understand research methodologies and promote for the research
- To understand the Big data analytics, Artificial intelligence, Internet of Things and image processing
- To develop various mobile applications/apps using Android programming
- To develop various multimedia applications

## SEMESTER-I

**Subject: Operating Systems**
**Subject Code: 1101**

**Course Objectives:**

- To understand components of Operating system and Operating-System Services.
- To study Process Management and Process Coordination.
- To understand the concept of Deadlock.
- To understand the concepts and implementation Memory management policies and virtual memory.
- To introduce students about file management, I/O management and Disk Management.
- To discuss Distributed File Systems and Distributed Coordination.
- To study the need of Protection and Security in operating systems using different tools.

**Course Outcome:**
**Students will be able to:**

- Describe Computer System Organization and role of operating system in their

management policies.
- Understand the OS components System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems.
- Understand the Processor management policies and CPU scheduling of processes.
- Estimate the requirement for process synchronization and coordination handled by the operating system.
- Understand types of Distributed File System and Distributed Coordination.
- Identify the different security tools in operating systems such as Cryptography, User Authentication, Implementing Security Defenses etc.

**Subject: Software Engineering and Project Management**
**Subject Code: 1102**

**Course Objectives:**
- To introduce the students to the Software Project and Project Planning.
- To define the Goal and Scope of the Software Project.
- To understand the need of the SRS, need of software requirement analysis and specification.
- To be successful professionals in the field with fundamental knowledge of software engineering
- To improve strong communication and interpersonal skills, as well as professional and ethical principles when working as members and leaders of multidisciplinary teams.

**Course Outcomes:**
Students will be able to:
- Students can learn how to apply the software engineering lifecycle by demonstrating applicability in communication, Software planning, Software analysis, Software design and deployment.
- Students can learn how to work as an individual and as part of a multidisciplinary team to develop and deliver quality software
- Ability to understand about different Testing Methodologies.
- Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software development lifecycle.

**Subject: Data Structures and Analysis of Algorithm**
**Subject Code: 1103**
**Course Objective:**
- To introduce the fundamental concept of data structures.
- To emphasize the importance of data structures in developing and implementing efficient algorithms.
- To develop effective software engineering practice, emphasizing such principles as decomposition.
- Focusing on procedural abstraction, and software reuse.

**Course Outcome:**
Students will be able to:

- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
- Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs.
- Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs.
- Demonstrate different methods for traversing trees.
- Compare and contrast the benefits of dynamic and static data structures implementations.
- Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack.
- Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.

**Subject: Cyber Security**
**Subject Code: 1104**

**Course Objectives**

- To highlight the importance of cyber security
- To focus on the cyber security threats and vulnerabilities
- To understand the Intrusion detection and prevention techniques
- To understand cryptography
- To introduce them to Cyber law and Cyber Forensics

**Course Outcome**

This course will enable the students :

- To understand the importance of Cyber security
- To understand intrusion detection and prevention techniques
- To understand cryptography
- To understand cyber space, cyber law and cyber forensics

**Subject: Data Communications & Networking**
**Subject Code: 1105**

**Course Objective**:

- To Build an understanding of the fundamental concepts of computer networking.
- To give knowledge ofprotocols, Inter Networking and reference Models.
- To make them understand design issues in Layers of OSI.
- To Introduce the concepts of Collison, Congestion and Routing.
- To get Knowledge of Data Communication with Encoding, Multiplexing and Switching.
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**Course Outcomes:**

After completing this course the student will be able to:

- Understand basic computer network technology.
- Understand different protocols and Network Models.
- Explain various Layers of OSI and TCP/IP reference model.
- Understand the functions and responsibilities of various layers like Framing, Flow Control, and Routing etc.

- Identify the different types of Networks and network topologies
- Implement Error detection and correction techniques.

**Subject: Operating Systems Lab**
**Subject Code: 1201**

**Course Objectives:**
- To demonstrate installation of Operating System on VM
- To understand file system and file commands
- To understand UNIX operating system with its features and functions
- To exercise and practice Unix commands, Process operations and Network commands
- To introduce programming with BASH shell

**Course Outcome:**
After successful completion of Operating System Lab sessions students will be able to:
- Install Operating System on virtual machine.
- Understand file system and file commands
- Work in Unix shell environment
- Write and test Unix commands
- Construct programs in BASH shell

**Subject: Data Structure Lab**
**Subject Code:1202**
Objectives:
- To understand classification of DS
- To study different data structures like Stack, Queue, Tree, Graph
- To study implementation and applications of Data structures
- To study various searching and sorting methods

Outcome
After completion of Lab session, the student will able to
- Handle basic operations on Data Structures like Arrays, stack and queue.
- Implement working of Linked list using pointers.
- Build real time applications of linked list.
- Suggest appropriate use of all types of DS.
- Understand the implementation of Tree and Graph in practical

## Semester II

**Subject: Web Technology**
**Subject Code: 2101**
**Course Objective:**
- On completion of this course, a student will be familiar with Dynamic web programming.
- Student able to develop a web application using HTML5,Jquery,Angular JS, PHP,AJAX.
- Students will gain the skills and project-based experience.
- Students are needed for entry into web application and development careers.

**Course Outcome:**

- Students are able to develop a dynamic webpage by the use of HTML5, Jquery, Angular JS, PHP,XML.
- Students will be able to write a well formed / valid XML document.
- Students will be able to connect a web program Angular JS , PHP.
- Students will be able to write a front end /back end side web application using PHP, Angular JS, Jquery ,and xml.

**Subject: Computer Organization and Architecture**
**Subject Code: 2102**
**Course Objectives**:

- To understand the basic concepts of Computer, building blocks of computer.
- To understand the concept of Memory Organization.
- Understand the concept of Data Representation and Arithmetic Algorithms.
- To explain different types of Input and Output devices.
- To understand the concept of System Organization.
- Summarize the Processor Organization and Architecture.

**Course Outcome:**
Students will be able to:

- Students understand the concept of computer and its Architecture.
- Students understand the concept of Memory Organization as internal memory and external memory.
- Exemplify in a better way the I/O devices.
- Define binary data representation, two's complement representation ,Floating-point representation and Integer Data computation .
- Students learn the concept about CPU Architecture.
- Students understand how to use the computer in communication

**Subject: Database Management Systems**
**Subject Code: 2103**
**Course Objectives:**

- To present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.
- To develop an understanding of essential DBMS concepts such as: database security,integrity, concurrency
- To understand file organization and indexing
- To Understand query and transaction

**Course Outcome:**
After successful completion of this course, students will be able to:

- Describe the fundamental elements of relational database management systems
- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- Design ER-models to represent simple database application scenarios
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.

- Improve the database design by normalization.
- Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.

**Subject: Design & Analysis of Algorithms**
**Subject Code: 2104**
**Course Objectives**

- Analyze the asymptotic performance of algorithms.
- Write algorithms using heap, sorting techniques.
- Demonstrate a various sorting and analysis techniques.
- Students are able to learn how to design dynamic programming.
- Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.

**Course Outcomes**

- Students are able to analysis the process.
- Students are able to write programing using divide and conquer technique.
- Students are Clear the idea about heap process.
- Enhancement of programming strategy using backtracking, branch & bound and greedy methods.
- Students are able to check out performance of the program using algorithm.

**Subject: Web Technology Lab**
**Subject Code: 2201**
**Course Objective:**

- On completion of this course, a student will be familiar with client server architecture and able to develop a web application using HTML5,Jquery,Angular JS, PHP,AJAX technologies To create fully functional website/web application.

**Course Outcome:**

- Students are able to develop a dynamic webpage by the use of HTML5,Jquery,Angular JS, PHP,AJAX .
- Students will be able to write a well formed / valid XML document. ·
- Students will be able to connect a PHP program to a DBMS and perform insert, update and delete operations on DBMS table. ·
- Students will be able to write a Jquery, Angular JS front end technology.

**Subject: DBMS Lab**
**Subject Code: 2202**
**Course Objectives:**

- To introduce structured query language
- To teach oracle
- To make student understand table design and table manipulation
- To introduce concepts of normalization
- To introduce Procedures and functions
- To make student understand PL/SQL execution.

**Course Outcome:**

- Students are able to write query in SQL.
- Able to create database and table.

- Implement the operations on database like insertion, deletion, updating, searching etc.
- Able to write and define Constraints.
- Alter Table and Fields.
- Can join two tables with different join operations
- Understand the normalization and its Types.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.

## Semester II - Elective

## Elective I(Option 1)

**Subject: Software Testing and Tools**
**Subject Code: 2111**

**Course Objectives:**

- Expose the students to different software testing tools and techniques.
- Students are able to get the idea about Software Testing Methodology.
- Describe the software testing processes.
- Students gaining knowledge about Automation Testing Approach.
- Enhancement of agile technique.

**Course Outcomes:**

- Students are able to implementation of software matrices in software design, coding, testing and implementation phase.
- Students can understand the Automation Testing Approach.
- Using agile technique more chances to improvement of software developing phase.
- Students are able to learn software validation / verification process and different Testing aspects.
- Students are able to create/prepare test plan.

## Elective I(Option 2)

**Subject: BIG DATAANALYTICS**
**Subject Code: 2112**

**Course Objective:**
Students will try to learn:

- To introduce students to Big Data analytics.
- To explain to students the different tools of analyzing Big data such as Hadoop, Map Reduce.
- To understand the concept of PIG, execution modes of PIG.
- To introduce students to the concept of Hadoop Ecosystem.
- To introduce students to Data Analytics with R Machine Learning.

**Course Outcome:**
Students will be able to:

- Understand the concept of Big data and compare the Digital data and big data for various applications.

- Ability to understand fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce.
- Ability to understand Hadoop Ecosystem, introduction of PIG and Hive.
- Ability to understand and apply scaling up R machine learning techniques and associated computing techniques and technologies.

## Elective I(Option 3)

**Subject:Computer Graphics**
**Subject Code:2113**
**Course Objectives**

- To give insight of Computer graphics applications
- To teach various algorithms and Modelling techniques

**Course Outcomes**

At the end of the course Student will be able

- To learn Computer Graphics applications
- To learn various algorithms required for Computer Graphics
- To learn Modelling transformations

## Elective I(Option 4)

**Subject: Enterprise Recourse Planning**
**Subject Code: Elective I (2114)**
Course Objectives

- To introduce students with fundamental concepts in Enterprise Resource Planning.
- To build understanding of ERP architecture, Implementation and modules
- To gain knowledge of various ERPs with case studies e.g. Supply Chain Management and Customer Relationship Management
- To make students understand the different ERP related Technologies

Course Outcomes
After successful completion of course students will able to:

- Understand fundamental concepts of ERP
- Implement various Modules like finance, Human Recourse, Marketing etc.
- Explain ERP architecture
- Understand supply chain management, ERP methodologies.
- Gain the knowledge of who is order winner and order qualifiers
- Manage ERP integration and Security Issues.
- Practically implement case studies

## Semester III

**Subject: Object Oriented Programming with Java**
**Subject Code: 3101**

**Course Objective:**

- Programming in the Java programming language,
- Knowledge of object-oriented paradigm in the Java programming language,
- The use of Java in a variety of technologies and on different platforms.
- Knowledge of web programming using jsp ,servlet.

**Course Outcome:**

- Summarize the strengths and weaknesses of Java programming and the basic concepts of object-oriented programming.
- Identify Java code utilities in applets, Java packages, and classes.
- Student can be write GUI Programming and Multithreading.
- Write Java code using JDBC, for connect java to database.
- Student can be write advanced java programming.
- Student can be gaining web server knowledge.

**Subject: Data Warehousing & Data Mining**
**Subject Code: 3102**
**Course Objective:** Students will try to learn

- To identify the concept of Data warehousing and Data mining.
- To introduce the student about Data Design and Data representation.
- To explain various Data mining Algorithms for respective applications.
- To study about Spatial and web data mining.
- To understand data mining primitives, Languages and system architectures.

OUTCOME: Students will be able to:

- Students understand Data warehousing fundamentals and data mining principles
- Design data warehousing with dimensional modeling and OLAP operations.
- Understand the different data mining algorithms to solve real world problems.
- Students understand spatial and temporal mining.
- Develop Applications and trends in data mining

**Subject: Research Methodology**
**Subject Code:3103**
**Course Objectives**

- To understand the objectives, types and methods of research
- To study various Sampling methods
- To understand statistics in research
- To learn hypotheses techniques

**Course Outcomes**

At the end of the course Student will be able

- To understand the objectives of research, its types and methods
- To define research problem and study techniques involved in defining it
- To understand Sampling design, its types, sample size determination
- To learn Measurement and Scaling Techniques in Research
- To understand various hypotheses testing techniques

**Subject: Mobile Application Development using Android Programming**
**Subject Code: 3104**

**Course objectives:**

- To introduce fundamentals of Android operating system, Android Software Development platform, its versions and features
- To make students understand Android Programming with knowledge of designing UI, data management, intent objects.
- To develop Android applications
- To develop messaging and location based services.

**Course Outcomes:**

After successful completion of this course, students will be able to:

- Understand and implement fundamentals of Android operating systems
- Use Android software development platform
- Develop software with reasonable complexity on mobile platform
- Deploy software to mobile devices
- Understand the security issues & debugging

**Subject: Object Oriented Programming with Java Lab**

**Subject Code:3201**

**Course Objective:**

- Covers software design, implementation, and testing using Java.
- Introduces object-oriented design techniques and problem solving.
- Emphasizes development of secure, well-designed software projects that solve practical real-world problems.

**Course Outcome:**

- Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
- Read and make elementary modifications to Java programs that solve real-world problems.
- Students are write a java program using jsp and servlet.
- Document a Java program using Javadoc.
- Students are write a code using GUI and JDBC packages.

**Subject: Android Programming Lab**
**Subject Code: 3202**

**Course objectives:**

- To introduce basics of Android operating system, Android development Environment, APIs and UI components
- To apply Java Programming in Android application development
- To demonstrate communication between Intents
- To introduce SQLite Programming for handling databases
- To explain Treads and advanced concepts in App development
- To learn development of Mobile applications

**Course Outcomes:**

After successful completion of this course, students will be able to:

- Install and configure Android application development tools.
- Design and develop user Interfaces for the Android platform.
- Demonstrate the communication between Intents.
- Develop an app to demonstrate Database Usage
- Handle programming with SQLite
- Develop mobile applications

## Semester III- Electives

### Elective II(Option 1)

**Subject: Image Processing**
**Subject Code:3121**
**Course Objectives:**

- To explain basic principles of Digital image processing.
- To introduce students to Image enhancement in spatial domain.
- To study Image Enhancement in the Frequency Domain like smoothening, sharpening and homomorphic filtering.
- To introduce students to Image Segmentation and image data compression.
- To explain Image Morphological Operation and Basic Morphological Algorithms.

**Course Outcome:**

**Students will be able to:**

- Understand the general terminology of digital image processing.
- Evaluate the techniques for Image enhancement in spatial domain.
- Evaluate the methodologies for image segmentation, restoration etc
- Interpret the Image compression standards.
- Understand the Morphological operation like Dilation erosion , Opening & Closing, Hit or Miss Transform.

### Elective II(Option 2)

**Subject: Digital Forensics (MSc CS Sem-III)**
**Subject Code:3122**
**Course Objectives**

- To introduce the concept of Digital Forensics

- To study importance of Digital evidence
- To study network forensics
- To study system investigation
- To study various laws along with Computer laws

**Course Outcomes**

At the end of the course Student will be able

- To learn cybercrime and its types
- To understand Initial response and forensic duplication
- To understand Preserving and Recovering Digital Evidence
- To learn network forensics
- To learn system investigation
- To give insight of various Bodies of law

## Elective II(Option 3)

**Subject: Geographical Information System**

**Subject Code:3123**

**Course Objective:**

- Introduction to GIS is designed to provide the students with an understanding of the methods and theories of spatial analysis.
- that will allow students to apply GIS knowledge and skills to everyday life and their chosen careers.
- Interpretation of GIS –maps, non-cartographic output, spatial multimedia, decision support.
- Introduction of remote sensing techniques.
- Developing applications using :Global Positioning Systems (GPS):

**Course Outcome:**

- Students will learn how to compile, analyze, and present geospatial data while emphasizing the value of visual communication.
- Students will learn these basic geospatial concepts using industry standard GIS technology.
- Students able to get knowledge of GPS.
- Students are gaining skills of remote sensors technology.

## Elective II(Option 4)

**Subject: Internet of Things**
**Subject Code: 3124**

Course Objectives:

- To introduce basic characteristics, design and blocks of IoT
- To understand difference between IoT and M2M(Machine to Machine)
- To learn various challenges in design, development and security of IoT
- To gain knowledge of various real-time applications of IoT
- To understand IoT applications and Embedded systems
- To learn implementation of IoT with Python

Course Outcome:

After Successful completion students will able to

- Understand basic characteristics, design and blocks of IoT
- Differentiate between IoT and M2M(Machine to Machine)
- Identify challenges in design, development and security of IoT. Also students will able to provide solutions over challenges.
- Understand domain specific applications of IoT
- Design IoT applications and Embedded systems
- Develop IoT tools using Python

## Elective II(Option 5)

**Subject: MULTIMEDIAAPPLICATIONS (ELECTIVE II)**
**Subject Code: 3125**

**Course Objective:**

Students will try to learn:

- To understand the concept of Multimedia.
- To understand the different standards available for Audio ,Video and Image compression.
- To introduce the student about Multimedia Network Applications.
- To explain various networking aspects used for multimedia applications.
- To explain the student about Framework for Multimedia standards.

**Course Outcomes:**

Students will be able to:

- Understand the concept of multimedia and technical aspects of multimedia.
- Develop various file formats for Audio, Video and image.
- Apply various networking protocols for multimedia applications.
- To evaluate the framework for multimedia applications.
- To evaluate the multimedia application for its optimum performance.

# Semester IV

**Subject: Research Seminar (MSc CS Sem-IV)**
**Subject Code:4101**

**Course Objectives**

- To apply the knowledge of research methodology in research
- To define research problem and give solution to it by way of research

**Course Outcomes**

At the end of the course Student will be able

- To explore various areas of research
- To define research problems
- To find solutions to problem through research
- To present research paper with applying research principles
- To develop presentation skills

**Subject: Internship Projects**

**Subject Code:4102**

**Course Objective:**

- A practice-oriented and 'hands-on' working experience in the real world or industry, and to enhance the student's learning experience.
- An opportunity to develop a right work attitude, self-confidence, interpersonal skills and ability to work as a team in a real organizational setting.
- An opportunity to further develop and enhance operational, customer service and other life-long knowledge and skills in a real world work environment.
- Pre-employment training opportunities and an opportunity for the company or organization to assess the performance of the student and to offer the student an employment opportunity after his/her graduation, if it deems fit.

**Course Outcome:**

- Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s.
- Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course;
- Communicate and collaborate effectively and appropriately with different professionals in the work environment through written and oral means;
- Exhibit critical thinking and problem solving skills by analyzing underlying issue/s to challenges;
- Recommend ideas to improve work effectiveness and efficiency by analyzing challenges and considering viable options;
- Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders;
- Exhibit professional ethics by displaying positive disposition during internship.