POST GRADUATE COURSE OTCOMES
Name of the Programme: M.Sc. (Computer Science)

Name of the Class	Course Code	Course Title	Course Outcomes	
			SEMESTER I	
M.Sc. I	CS-501-MJ	Advanced Operating System	CO1	CO1: Understand the Operating Systems Structure with example of Unix/Linux.
			CO2	Learn the structure of files and directory in UNIX/LINUX OS.
			CO3	Use various system calls related to file subsystem.
			CO4	Learn the process control subsystem structure in UNIX/LINUX OS
			CO5	Use various system calls related to process control subsystem.
			CO6	Learn the concept of signal handling with practical implementation
			CO7	Understand the memory management policies of UNIX/LINUX OS
M.Sc. I	CS-502-MJ	Artificial Intelligence	CO1	Understand the fundamental concepts of Artificial Intelligence.
			CO2	Identify and apply appropriate search strategies for AI problem.
			CO3	Identify knowledge and represent AI algorithms using various techniques.
			CO4	Implement ideas to design and develop AI solutions for complex challenges.
			CO5	Analyse the performance of AI models and interpret their results.
			CO6	Implement ideas underlying modern logical inference systems.
			CO7	Understand recent trends and future scope of AI.
M.Sc. I	CS-503-MJ	Principles of Programming Language	CO1	Separate syntax from semantics
			CO2	Compare programming language designs
			CO3	Understand their strengths and weaknesses
			CO4	Learn new languages more quickly
			CO5	Understand basic language implementation techniques

			CO6	Learn small programs in different programming Languages
M.Sc. I	CS-504-MJP	Lab Course on CS-501-MJ (Advanced Operating System)	CO1	Understand the Operating Systems Structure with example of Unix/Linux.
			CO2	Learn the structure of files and directory in UNIX/LINUX OS.
			CO3	Use various system calls related to file subsystem.
			CO4	Learn the process control subsystem structure in UNIX/LINUX OS
			CO5	Use various system calls related to process control subsystem.
			CO6	Learn the concept of signal handling with practical implementation
M.Sc. I	CS-505-MJP	Lab Course on CS-502-MJ (Artificial Intelligence)	CO1	Understand the fundamental concepts of Artificial Intelligence.
			CO2	Identify and apply appropriate search strategies for AI problem.
			CO3	Identify knowledge and represent AI algorithms using various techniques.
			CO4	Implement ideas to design and develop AI solutions for complex challenges.
			CO5	Analyze the performance of AI models and interpret their results.
			CO6	Implement ideas underlying modern logical inference systems.
			CO7	Understand recent trends and future scope of AI.
M.Sc. I	CS-510-MJ	Advance Databases and Web Technologies	CO1	Students will get knowledge of advance database technology
			CO2	Students will be able to choose appropriate database technology as per application
			CO3	Students will learn to design responsive web application
			CO4	Students could design and implement scalable web application
M.Sc. I	CS-511-MJP	Lab Course on CS-510-MJ (Advance Databases and Web Technologies)	CO1	Students will get knowledge of advance database technology
			CO2	Students will be able to choose appropriate database technology as per application
			CO3	Students will learn to design responsive web application
			CO4	Students could design and implement scalable web application
M.Sc. I	CS-512-MJ	Cloud Computing	CO1	To understand the principles of cloud computing
			CO2	To understand the importance of virtualization and how it has helped the development of cloud computing.

			CO3	To understand the concept of cloud security.
			CO4	To design and deploy cloud infrastructure.
			CO5	To understand the concept of edge computing
M.Sc. I	CS-513-MJP	Lab Course on CS-512-MJ (Cloud Computing)	CO1	To understand the principles of cloud computing
			CO2	To understand the importance of virtualization and how it has helped the development of cloud computing.
			CO3	To understand the concept of cloud security.
			CO4	To design and deploy cloud infrastructure.
M.Sc. I	CS-514-MJ	C# .NET Programming	CO1	Understand the features of Dot Net Framework along with the features of C#
			CO2	Interpret and Develop Interfaces for real-time applications.
			CO3	Design & implement Object Oriented Programming concepts like Inheritance and Polymorphism in C# programming language.
			CO4	Design & Implement the application using multithreading & File handling
			CO5	Design and Implement Windows Application using Windows Forms & tools application using Database in C#
			CO6	Design and Implement Custom Application Using Windows Form & ADO.NET in C#
M.Sc. I	CS-515-MJP	Lab Course on CS-514-MJ (C# .NET Programming)	CO1	Understand the features of Dot Net Framework along with the features of C#
			CO2	Interpret and Develop Interfaces for real-time applications.
			CO3	Design & implement Object Oriented Programming concepts like Inheritance and Polymorphism in C# programming language.
			CO4	Design & Implement the application using multithreading & File handling
			CO5	Design and Implement Windows Application using Windows Forms & tools application using Database in C#
			CO6	Design and Implement Custom Application Using Windows Form & ADO.NET in C#
M.Sc. I	CS-531-RM	Research Methodology	CO 1	Understand of the fundamental concepts of research, including the research process, research questions, hypotheses, and variables.
			CO 2	Conduct a comprehensive literature review to identify relevant studies, synthesize existing knowledge, and identify research gaps.
			CO 3	Identify research problems, formulate research questions, and design appropriate methodologies to address these problems
			CO 4	Identify and select appropriate research designs, such as experimental, observational, survey,

				qualitative, or mixed-methods, based on the research objectives.
			CO 5	Apply appropriate data analysis methods, including statistical techniques or qualitative analysis, to draw meaningful conclusions from research data.
			CO 6	Develop a well-structured research proposal, outlining research questions, methodology, expected outcomes, and a rationale for the study.
			CO 7	Communicate research findings effectively through written reports, presentations, and academic papers.
			CO 8	Gain an appreciation for the importance of research in contributing to the advancement of knowledge in their field of study and broader society.
			CO 9	Understand the principles of research ethics and integrity and apply them in their research.
SEMESTER II				
M.Sc. I	CS-551-MJ	Design and Analysis of Algorithms	CO1	Analyze worst-case running times of algorithms using asymptotic analysis.
			CO2	Compare between different data structures. Pick an appropriate data structure for a design situation.
			CO3	Ability to design algorithms using standard paradigms like: Greedy, Divide and Conquer, Dynamic Programming and Backtracking.
			CO4	Able to Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.
			CO5	Able to compare between different data structures and pick an appropriate data structure for a design situation.
M.Sc. I	CS-552-MJ	Mobile App Development Technologies	CO 1	To provide students with a solid understanding of the mobile app development, Android operating system, its architecture, components, and the software development kit (SDK).
			CO 2	To teach students how to build Android applications from scratch, including UI design, handling user interactions, and integrating various features.
			CO 3	To learn about Android's UI components, layouts, and design principles to create visually appealing and user-friendly interfaces.
			CO 4	To know various methods of data storage in Android applications, such as using SQLite databases, shared preferences, and cloud-based solutions.

			CO 5	To empower students to independently design, develop, and deploy their Android applications using advanced android tools.
			CO 6	To understand how to utilize built-in sensors and hardware components on Android devices, such as GPS, accelerometer, Bluetooth, WiFi, Media Player and Camera, in their applications.
			CO 7	To Get knowledge of Phone Gap Programming
M.Sc. I	CS-553-MJ	Software Project Management	CO1	Learn the skills that are required to ensure successful medium and large scale software projects.
			CO2	Examine Requirements Elicitation, Project Management, Verification &Validation and Management of Large Software Engineering Projects.
			CO3	Get knowledge to select and apply project management techniques for process modeling, planning, estimation, process metrics and risk management.
			CO4	Understand the concepts, skills, tools, and techniques of software project management.
M.Sc. I	CS-554-MJP	Lab Course on CS-551-MJ (Design and Analysis of Algorithms)	CO1	Analyze worst-case running times of algorithms using asymptotic analysis.
			CO2	Compare between different data structures. Pick an appropriate data structure for a design situation.
			CO3	Ability to design algorithms using standard paradigms like: Greedy, Divide and Conquer, Dynamic Programming and Backtracking.
			CO4	Able to Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.
			CO5	Able to Compare between different data structures and pick an appropriate data structure for a design situation.
M.Sc. I	CS-555-MJP	Lab Course on CS-552-MJ (Mobile App Development Technologies)	CO1	To teach students how to build Android applications from scratch, including UI design, handling user interactions, and integrating various features.
			CO2	To learn about Android's UI components, layouts, and design principles to create visually appealing and user-friendly interfaces.
			CO3	To empower students to independently design, develop, and deploy their Android applications using advanced android tools.
M.Sc. I	CS-560-MJ	Full Stack Development-I	CO1	Learn about the benefits of using MEAN stack and how to install and configure it
			CO2	Learn advanced ES6 features in JavaScript and Typescript

			CO3	Learn about Angular architecture, components, directives, pipes, forms, routing, and services.
			CO4	Learn about the event loop, asynchronous programming, modules, packages, and streams.
			CO5	Learn about the MVC pattern, routing, HTTP requests and responses, middleware, and error handling.
			CO6	Create a full-stack MEAN stack application and deploy it to a production/local server.
M.Sc. I	CS-561-MJP	Lab Course on CS-560-MJ (Full Stack Development-I)	CO1	Describe appropriate uses for JavaScript and PHP
			CO2	Discuss, create, and debug semantically correct basic examples of dynamic web pages
			CO3	Construct individual components and entire applications using ReactJS
			CO4	Build an interactive web page using ReactJS
M.Sc. I	CS-562-MJ	Web Services	CO1	Understand the web services and SOA
			CO2	Understand Web Services Architecture.
			CO3	Understand the working of SOAP and developing SOAP Web Services using Java.
			CO4	To get acquainted with the details of web services technologies like WSDL, UDDI.
			CO5	To understand the concept of RESTful services.
M.Sc. I	CS-563-MJP	Lab Course on CS-562-MJ (Web Services)	CO1	Understand the web services and SOA
			CO2	Understand Web Services Architecture.
			CO3	Understand the working of SOAP and developing SOAP Web Services using Java.
			CO4	To get acquainted with the details of web services technologies like WSDL, UDDI.
			CO5	To understand the concept of RESTful services.
M.Sc. I	CS-564-MJ	ASP .NET Programming	CO1	Understand the features of Dot Net Framework along with the features of ASP
			CO2	Interpret and Develop Interfaces for real-time applications.
			CO3	Design & implement Object Oriented Programming concepts like Inheritance and Polymorphism in ASP programming language.
			CO4	Design & Implement the application using multithreading & File handling
			CO5	Design and Implement Windows Application using Windows Forms & tools application using Database in ASP
			CO6	Design and Implement Custom Application Using Windows Form & ADO.NET in ASP
M.Sc. I	CS-565-MJP	Lab Course on CS-564-MJ (ASP .NET Programming)	CO1	Understand the features of Dot Net Framework along with the features of ASP
			CO2	Interpret and Develop Interfaces for real-time applications.

			CO3	Design & implement Object Oriented Programming concepts like Inheritance and Polymorphism in ASP programming language.
			CO4	Design & Implement the application using multithreading & File handling
			CO5	Design and Implement Windows Application using Windows Forms & tools application using Database in ASP
			CO6	Design and Implement Custom Application Using Windows Form & ADO.NET in ASP
M.Sc. I	CS-581-OJT	On Job Training (Internship)	CO1	Enhance the knowledge related to various tools and technologies used in industry
			CO2	Improve the ability to solve complex problems independently and creatively
			CO3	Effectively utilize critical thinking and analytical skills in tackling real world challenges
			CO4	Effectively communicate and collaborate skills through interaction with team members and mentors.
			CO5	Get an experience in working on projects or related working within industry
			CO6	Develop the ability to document process, design, implementation and testing
			CO7	Familiar with specific industry domain relevant to internship
			CO8	Complete projects and tasks as per the predetermined objectives
SEMESTER III				
M.Sc. II	CS-601-MJ	Software Architecture and Design Pattern	CO1	Understand the UML basics, RUP and basics of software architecture
			CO2	Acknowledge the traits of patterns that make them helpful in solving real-world issues.
			CO3	Able to use specific frameworks as per applications need.
			CO4	Design java application using design pattern techniques
M.Sc. II	CS-602-MJ	Machine Learning	CO1	To introduce knowledge of Machine Learning.
			CO2	To demonstrate all categories of Machine learning algorithms along with implementation.
			CO3	To compose real time application using machine learning algorithms.
			CO4	Analyze the concept of neural networks for learning linear and non-linear activation functions.
M.Sc. II	CS-603-MJ	Internet of Things	CO1	Demonstrate basic concepts, principles and challenges in IoT.
			CO2	Illustrate functioning of hardware devices and sensors used for IoT.

			CO3	Analyze network communication aspects and protocols used in IoT.
			CO4	Apply IoT for developing real life applications using Ardunio programming.
			CO5	To develop IoT infrastructure for popular applications.
M.Sc. II	CS-604-MJP	Lab Course on CS-601-MJ and CS-603-MJ (Software Architecture & Design Pattern and Internet of Things)	CO1	Design java application using design pattern techniques.
			CO2	Apply IoT for developing real life applications using Ardunio programming.
			CO3	To develop IoT infrastructure for popular applications.
M.Sc. II	CS-605-MJP	Lab course on CS-602-MJ (Machine Learning)	CO1	To Get Hands on machine learning model.
			CO2	Able to estimate Machine Learning models efficiency using suitable metrics.
			CO3	Able to analysis and make decision for critical problems.
			CO4	Able to handle structured, unstructured as well as semi-structured data.
			CO5	Implement ideas to design and develop Deep learning solutions for complex problems
M.Sc. II	CS-610-MJ	Full Stack Development-II	CO1	Learn In Depth understanding of Angular framework and State Management.
			CO2	Learn using typescript effectively in Angular framework.
			CO3	Learn in-depth knowledge of NodeJS and Express JS.
			CO4	Learn advance concepts in MongoDB.
			CO5	Learn best practices to be followed when creating industry grade applications.
M.Sc. II	CS-611-MJP	Lab course on CS-610-MJ (Full Stack Development-II)	CO1	Learn In Depth understanding of Angular framework and State Management.
			CO2	Learn using typescript effectively in Angular framework.
			CO3	Learn in-depth knowledge of NodeJS and Express JS.
			CO4	Learn advance concepts in MongoDB.
			CO5	Learn best practices to be followed when creating industry grade applications.
M.Sc. II	CS-612-MJ	DevOps Fundamentals	CO1	Apply DevOps principles for collaboration, automation, and continuous improvement.
			CO2	Master version control (e.g., Git) and implement effective branching strategies.
			CO3	Design and optimize CI/CD pipelines for automated and streamlined software delivery.

			CO4	Utilize containerization (e.g., Docker) and orchestration tools (e.g., Kubernetes) for scalable deployments.
			CO5	Implement monitoring, logging, and security practices throughout the DevOps lifecycle.
			CO6	Foster effective collaboration through tools like ChatOps within cross-functional teams.
			CO7	Develop skills in incident response, troubleshooting, and problem resolution.
M.Sc. II	CS-613-MJP	Lab Course on CS-612-MJ (DevOps Fundamentals)	CO1	Demonstrate the ability to practically implement DevOps principles through hands-on assignments in version control, CI/CD, IaC, and containerization
			CO2	Develop problem-solving skills by resolving simulated incidents, enhancing the understanding of incident response and troubleshooting procedures.
			CO3	Attain a comprehensive skill set covering automation, scripting, collaboration tools, and cultural transformation
			CO4	Empowering participants to contribute to a collaborative and efficient DevOps culture.
M.Sc. II	CS-614 MJ	Soft Computing	CO1	Learn about soft computing techniques and their applications
			CO2	Analyze various neural network architectures and perceptrons
			CO3	Define the fuzzy systems
			CO4	Analyze the genetic algorithms and their applications.
M.Sc. II	CS-615-MJP	Practical on CS-614-MJ (Soft Computing)	CO1	Learn about soft computing techniques and their applications
			CO2	Analyze various neural network architectures and perceptrons
			CO3	Define the fuzzy systems
			CO4	Analyze the genetic algorithms and their applications.
M.Sc. II	CS-631-RP	Research Work-I	CO1	Independently conduct research in a specific area of computer science
			CO2	Apply appropriate research methodologies to address research problems.
			CO3	Analyze and synthesize information gathered from literature reviews, experiments, or data analysis
			CO4	Develop innovative solutions to research problems within the scope of computer science.
			CO5	Effectively present research findings through written reports, oral presentations, or poster presentations.

			CO6	Publish research work in reputable journals, present at conferences or in recognized project competitions.
SEMESTER IV			
M.Sc. II	CS-651-MJP	Full Time Industrial Training (IT)	CO1	Apply theoretical concepts learned in the classroom to solve practical problems encountered in an industrial setting.
			CO2	Demonstrate proficiency in using industry-standard tools, technologies, and methodologies relevant to their area of specialization.
			CO3	Apply analytical and problem-solving skills to address challenges encountered during the industrial training
			CO4	Collaborate effectively with team members to achieve project goals and objectives.
			CO5	Manage time and resources efficiently to complete assigned tasks and projects within the stipulated timeframe.
			CO6	Prepare a comprehensive report documenting their experience, including project details, learnings, and reflections.
M.Sc. II	CS-681-RP	Research Work-II	CO1	Independently conduct research in a specific area of computer science
			CO2	Apply appropriate research methodologies to address research problems.
			CO3	Analyze and synthesize information gathered from literature reviews, experiments, or data analysis
			CO4	Develop innovative solutions to research problems within the scope of computer science.
			CO5	Effectively present research findings through written reports, oral presentations, or poster presentations.
			CO6	Publish research work in reputable journals, present at conferences