

## **Name of Programme: Master of Computer Science (M.Sc.)**

### **Program Outcomes**

1. Students will acquire the ability to identify and formulate research problems, enabling them to contribute to the advancement of knowledge in the field of computer science
2. Identify, analyze, and synthesize scholarly literature relevant to the field of computer science.
3. Employ software development tools, software systems, and modern computing platforms.
4. Prepare for academic roles such as NET/SET/PhD.
5. Apply design and development principles when constructing software systems of varying complexities.
6. The program cultivates the ability to effectively communicate and collaborate as part of a team in multidisciplinary projects, utilizing essential skills for seamless coordination and cooperation.

### **Program Specific Outcomes**

1. Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.
2. Ability to understand the structure and development methodologies of software systems. Possess professional skills and knowledge of software design process.
3. Familiarity and practical competence with a broad range of programming language and open Source platforms.
4. Be acquainted with the contemporary issues, latest trends in technological development and There by innovate new ideas and solutions to existing problems.

### **Course Outcomes (CO's)**

#### **M. Sc. (Computer Science) (Part I) (Level-6.0) (Semester I) (NEP-2020) (Introduced from Academic Year 2023-24)**

**Title of Course: Design and Analysis of Algorithms**

**Course Code: MMT-101**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Analyze the asymptotic performance of algorithms.
2. Employ graphs to model real life problems, when appropriate. Develop algorithms that employ graph computations as key components, and analyze them.
3. Mapping of data structures like Stack, Queue and Linked List to real life problems.
4. Be familiar with advanced data structures such as balanced search trees, hash tables,

Red-Black trees, B-trees.

5. Understand Divide & Conquer approach, Greedy algorithm, Backtracking approach for algorithm design.
6. Be familiar with Branch and Bound & Dynamic programming

**Title of Course: Advanced Database Management System**

**Course Code:MMT-102**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Demonstrate an understanding of the relational data model.
2. Formulate, using SQL, solutions to a broad range of query and data update problems.
3. Use PL/SQL for handling data in a database as per the user's requirement using programming features
4. Define various cursors and its implementation along with procedure and functions.
5. To study usage and applications of parallel and distributed databases, object relational database.
6. To acquire knowledge on NoSQL databases.

**Title of Course: Practical-I**

**Course Code:MMPR-103**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. To become familiar with programming environment.
2. To implement advanced data structures
3. Apply data structures in real life problems.
4. Able to create tables and generate queries
5. To be familiar with different types of databases.

**Title of Course: Web Designing**

**Course Code:MMT-104**

**Total Credits: 02**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Understand the basics of web design
2. Gain proficiency in HTML and CSS coding languages
3. Understand the importance CSS
4. Utilize the JavaScript with websites

**Title of Course: Cyber Security**

**Course Code:MET-105**

**Total Credits: 04**

Course Outcomes: Upon successful completion of this course, the student will be able to:

- 1) Realize the need for Cyber Security
- 2) Understand the need for Security in day to day communications
- 3) Understand the vulnerabilities in the Network and Computer System
- 4) Understand the cyber law and Cyber Forensics
- 5) Understand the mobile forensics.

**Title of Course: Cloud Computing**

**Course Code:MET-106**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Deal with the fundamentals and essentials of Cloud Computing
2. Understand the basic ideas and principles in data center design; cloud management techniques and cloud software deployment considerations
3. Understand the impact of emerging technologies on cloud computing
4. Understand cloud storage technologies and relevant distributed file systems
5. Expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research
6. Anticipate and adapt to future developments in the cloud computing industry

**Title of Course: Research Methodology**

**Course Code:RM-107**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Understand the fundamental concepts and principles of research methodology in computer science
2. Identify and select appropriate research methodologies based on the research problem
3. Formulate research questions and hypotheses in the context of computer science research
4. Design and execute research studies using quantitative and qualitative approaches
5. Apply ethical considerations in conducting computer science research
6. Develop critical thinking and problem-solving skills required for computer science Research

**M. Sc. (Computer Science) (Part I) (Level-6.0) (Semester II) (NEP-2020)  
(Introduced from Academic Year 2023-24)**

**Title of Course: Advanced Java**

**Course Code:MMT-201**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. To become familiar with the features of Java Language.
2. To become comfortable with concepts such as Classes, Objects, Inheritance, Polymorphism and Interfaces.
3. To understand Database connectivity using JDBC Drivers.
4. To design application using JSP, Servlet and RMI
5. To familiar with hibernate, struts and spring framework

**Title of Course: Artificial Intelligence**

**Course Code: MMT-202**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Apply problem solving by intelligent search approach.
2. Represent knowledge using knowledge representation techniques.
3. Understand working of Artificial Neural Networks.
4. Derive solutions for problems with uncertainty using Fuzzy theory.
5. To develop a good understanding of Natural Language Processing and Genetic Algorithm

**Title of Course: Practical-II**

**Course Code: MMPR-203**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. To become acquainted with programming environment.
2. Student will be able to use advanced technology in Java such as remote method Invocation and JDBC.
3. Student will learn how to work with Java Frameworks.
4. Student will be able to develop web application using Java Servlet and Java Server Pages technology.
5. Design and develop solutions for informed and uninformed search problems in AI.

**Title of Course: Angular JS**

**Course Code:MMT-204**

**Total Credits: 02**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Understand the fundamental concepts of Angular JS and its role in web development
2. Learn how to set up a development environment for Angular JS projects

3. Gain proficiency in using directives, filters, and expressions to manipulate and display Data

**Title of Course: Image Processing**

**Course Code: MET-205**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:  
Course Outcomes:

1. Understand the basic principles and concepts of digital image processing.
2. Gain knowledge of different image representations and colour models.
3. Learn how to pre-process and enhance images using various techniques.
4. Explore image filtering techniques for noise reduction and feature enhancement.
5. Understand the concept of image segmentation and different segmentation algorithms.

**Title of Course: Block Chain Technology**

**Course Code: MET-206**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Understand the concept of Block chain Technology, transactions, block, PoW, Consensus
2. Understand the simulation of block chain technology without any central controlling or trusted agency and how bitcoin crypto currency work.
3. Understand the concept of digital currency, how it can be protected against fraud, scam, hacking and devaluation.
4. Understand the concept of bitcoin and Ethereum

**Title of Course: Internship**

**Course Code: OJT-207**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. gain industrial experience
2. learn office ethics
3. learn to work in team

**M. Sc. (Computer Science) (Part II) (Level-6.5) (Semester III) (NEP-2020)  
(Introduced from Academic Year 2024-25)**

**Title of Course: Advanced PHP**

**Course Code: MMT-301**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. To introduce students to the PHP programming language and its role in web development.
2. To enable students to write PHP code for web applications.
3. To teach students how to integrate PHP with HTML for dynamic web content.
4. To provide hands-on experience in working with PHP to interact with MySQL databases.
5. To encourage problem-solving and critical thinking through practical coding exercises.

**Title of Course: Data Science**

**Course Code: MMT-302**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Learn basic statistics required for data science.
2. Visualize the data in different forms.
3. Learn and implement different visualization tools for data science.
4. Learn, understand and apply the concepts of probability theory for data science.
5. Learn and apply various clustering techniques for data science.
6. Learn and implement data science concepts in python.

**Title of Course: Practical-III**

**Course Code: MMPR-303**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. To provide students with a basic grasp of PHP as a server-side scripting language.
2. To instruct students in PHP syntax and core language features, such as variables, data types, operators, and control structures.
3. To enable students to use PHP for web development, including creating dynamic web pages, managing forms, and interacting with databases.
4. To teach students how to connect PHP with databases like MySQL and perform CRUD operations.
5. To teach students the concept of PHP framework and integration of database system into the framework and perform CRUD (Create, Read, Update, Delete) operations.
6. To learn and implement data science concepts using python.

**Title of Course: Data Engineering**

**Course Code: MMT-304**

**Total Credits: 02**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. To introduce students to data storage systems and technologies commonly used in data engineering.
2. To enable students to design and implement databases for efficient data storage and retrieval.
3. To teach students how to optimize data storage and access patterns for performance.
4. To explore data security and privacy considerations in data engineering.
5. To provide experience in using cloud-based storage and database services.

**Title of Course: Big Data Analytics**

**Course Code: MET-305**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
2. Understanding different tools for Big Data Analytics.
3. Develop Big Data Solutions using Hadoop Eco System

**Title of Course: Machine Learning**

**Course Code: MET-306**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. To understand fundamental concepts of machine learning and its various algorithms.
2. To understand various strategies of generating models from data and evaluating them.
3. To apply ML algorithms on given data and interpret the results obtained.
4. To design appropriate ML solution to solve real world problems in AI domain.

**Title of Course: Research Project**

**Course Code: RP-307**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. find current research domains in computer science
2. identify different research journals in computer science domains
3. understand citations, impact factors, references etc.
4. identification of appropriate societal issues.
5. development of applications to address identified societal issue.

**Title of Course: Mobile Application Development**

**Course Code: MMT-401**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

- 1) Learn about the features and installation of Android and kotlin
- 2) Learn about basic programming with Android Kotlin
- 3) Develop mobile applications using database Connections
- 4) Develop simple mobile applications in Flutter using Dart language
- 5) Learn to Create a full-fledged mobile app and deploy

**Title of Course: Full Stack Development**

**Course Code: MMT-402**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Understand the unique trade-offs present in event-driven programming.
2. Create Node.js modules and express code modularity in an application.
3. Understand the core flow control patterns in Node.js and know when it is appropriate to use callbacks, event emitters or streams
4. Connect with MongoDB to perform various operations

**Title of Course: Practical-IV**

**Course Code: MMPR-403**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Understanding Web Development, Front-End Development: Teach students how to create responsive and interactive user interfaces using HTML, CSS, and JavaScript.
2. Back-End Development: Introduce students to server-side programming and database management, typically using languages like Node.js, Python, Ruby, Java, or PHP, along with frameworks like Express, Flask, or Django.
3. Database Integration: Teach students how to design, create, and manage databases, including SQL and NoSQL databases like MySQL, PostgreSQL, MongoDB, or Firebase.
4. Learn about basic programming with Android Kotlin
5. Develop mobile applications using database Connections
6. Develop simple mobile applications in Flutter using Dart language.
7. Learn to Create a full-fledged mobile app and deploy

**Title of Course: Natural Language Processing**

**Course Code: MET-404**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. To learn the fundamentals of natural language processing.
2. Understand approaches to syntax and semantics in NLP.
3. To understand the use of CFG and PCFG in NLP



4. To familiarize the concepts and techniques of Natural language Processing for analyzing words based on Morphology

**Title of Course: Agile Project Management**

**Course Code: MET-405**

**Total Credits: 04**

**Course Outcomes: Title of Course: Agile Project Management**

**Course Code: MET-405**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. Understand the principles of Agile Manifesto.
2. Learn the project management approaches.
3. Understand concept of Scrum its values and roles.
4. Apply agile project constraints and trade-offs for estimating project size and schedule.

**Title of Course: Research Project**

**Course Code: RP-406**

**Total Credits: 04**

**Course Outcomes:** Upon successful completion of this course, the student will be able to:

1. investigate and design a model for research problem identified.
2. implementation of model with appropriate software tools.
3. benchmark the experimental results.
4. writing a research article.
5. identification of appropriate societal issues.
6. development of applications to address identified societal issue.