


**MCA Course Outcome List (2020 Pattern)**

Course Code	Course Name	Code	Course Outcome(CO)
	<b>FY MCA SEM I</b>		
310901	Discrete Mathematics and Statistics	C101.1	Solve real world problems logically by using set and induction approaches
		C101.2	Describe and implement relations and functions.
		C101.3	Apply logical reasoning to solve a variety of problems
		C101.4	Apply statistical concepts to solve basic problems.
		C101.5	Solve the problems of Discrete Distributions and Continuous Distributions.
		C101.6	Explain various Descriptive Statistical concepts
310902	Data Structures and Algorithms	C102.1	Explain the Complexity of Algorithms & fundamentals of Data Structures.
		C102.2	Describe representation & application of Linked List
		C102.3	Write programs that uses stacks, queues.
		C102.4	Apply nonlinear data structure trees to solve mathematical problems.
		C102.5	Explain representations & the applications of graphs.
		C102.6	Implement different searching and sorting algorithms.
310903	Object Oriented Programming	C103.1	Explore the basics of Object Oriented Programming
		C103.2	Apply the object oriented concepts such as classes , objects, functions and data abstraction.
		C103.3	Create applications on OOP techniques like Inheritance , Polymorphism and operator overloading.
		C103.4	Use OOP concept like Virtual Function, Friend Function , Static Function, this pointer
		C103.5	Implement function templates and eception handling
		C103.6	Explain fundamentals of file handling.
310904	Software Engineering & Project Management	C104.1	Choose and apply appropriate lifecycle model of software development
		C104.2	Analyze software requirements by applying various modelling techniques
		C104.3	Describe principles of agile development, discuss the SCRUM process and distinguish Agile process model from other process models

		C104.4	Describe project schedule and cost estimation
		C104.5	Understand IT project management through life cycle of the project and future trends in IT Project Management
		C104.6	Define ethics and understand its importance in project leadership.
310905	Information Systems and Engineering Economics	C105.1	Understand the need, usage and importance Management Functions, Organisational structure and Information Systems
		C105.2	Understand the Information Systems, Project Management, Managing Data resources, Knowledge Management, Business Process Integration and Enterprise Systems.
		C105.3	Understand the Management Information Systems Applications using in an Organization.
		C105.4	Elaborate Managerial Decision Making Models and applying to Business Intelligence
		C105.5	Implement the basic Accounting concepts in the banking and financial applications
		C105.6	Apply the basic concepts of cost accounting in real world problem
310906	Data Structures and Algorithms Laboratory	C106.1	Implement elementary data structures such as Arrays, linked lists
		C106.2	Implement representation & application of Linked List
		C106.3	Demonstrate practical knowledge on the applications of stacks, queues
		C106.4	Implement nonlinear data structure trees to solve mathematical problems.
		C106.5	Implement representations & the applications of graphs.
		C106.6	Implement different searching and sorting algorithms.
310907	OOP Laboratory	C107.1	Implement the basics of Object Oriented Programming using C++
		C107.2	Implement the object oriented concepts such as classes, objects, functions and data abstraction using C++
		C107.3	Implement applications on OOP techniques like Inheritance and Polymorphism
		C107.4	Implement Use OOP concept like Virtual Function, Friend Function, Static Function, this pointer using C++
		C107.5	Implement function templates and exception handling using C++
		C107.6	Implement fundamentals of file handling using C++
310908	Python Programming Laboratory	C108.1	CO1: Explain the basic concepts of python.
		C108.2	CO2: Implement the basics of python concepts like control flow statements, operators as well as utilize the data structures like dictionaries, tuples and sets.
		C108.3	CO3: Understand the various concepts of functions, modules and strings in python
		C108.4	CO4: Apply concept of functions, modules and strings handling in Python
		C108.5	CO5: Discuss object oriented programming concepts
		C108.6	CO6: Demonstrate the use of object oriented concepts.

310909	Business Communication Lab	C109.1	Apply business communication strategies and principles to prepare effective communication for domestic and international business situations
		C109.2	Identify ethical, legal, cultural, and global issues affecting business communication.
		C109.3	Utilize analytical and problem solving skills appropriate to business communication.
		C109.4	Participate in team activities using collaborative work skills.
		C109.5	Select appropriate organizational formats and channels used in developing and presenting business messages.
		C109.6	Communicate via electronic mail, Internet, and other technologies
		C109.7	Deliver an effective oral business presentation
310910	Audit Course 1(AC1) Options: AC1-I Foreign Language	C110.1	Have ability of basic communication
		C110.2	Have the knowledge of Japanese script
		C110.3	Get introduced to reading , writing and listening skills
		C110.4	Will develop interest to pursue professional Japanese Language course.
	<b>FY MCA SEM II</b>		
310912	Database Management System	C112.1	Design E-R Model for given requirements and convert the same into database tables.
		C112.2	Use database techniques such as SQL & PL/SQL.
		C112.3	Use modern database techniques such as NOSQL.
		C112.4	Explain transaction Management in relational database System.
		C112.5	Describe different database architecture and analyses the use of appropriate architecture in real time environment.
		C112.6	Students will be able to use advanced database Programming concepts Big Data – HADOOP
310913	Computer Network	C113.1	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies.
		C113.2	Demonstrate design issues, flow control and error control.
		C113.3	Analyze data flow between TCP/IP model using Application, Transport and Network Layer protocols.
		C113.4	Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.
		C113.5	Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.
		C113.6	Demonstrate different routing and switching algorithms.
310914	Java Programming	C114.1	Describe the core concept of Java programming

		C114.2	Discover the need for working with the multithreading and file handling
		C114.3	Illustrate the purpose of applet and AWT in Java programming
		C114.4	Indicate the use of database connectivity using Java Programming
		C114.5	Articulate the networking concepts in Java
		C114.6	Implement Java Servlet and JSP concept in Java
310915	Operating Systems	C115.1	Understand the basics of Linux commands and program the shell of Linux.
		C115.2	Develop various system programs for the functioning of operating system.
		C115.3	Implement basic building blocks like processes, threads
		C115.4	Develop various system programs for the functioning of OS concepts in user space like concurrency control and file handling in Linux.
		C115.5	Implement page replacement algorithm.
		C115.6	Develop the system program for the functioning of OS concepts in kernel space like embedding the system call in any Linux kernel.
310916 (A)	Mobile Computing	C116A.1	Describe the concept and technique of Wireless telephony.
		C116A.2	Explain the concept of wireless networking.
		C116A.3	Describe data management issue of mobile wireless network.
		C116A.4	Discuss the mobile operating system.
		C116A.5	Design Android mobile application.
		C116A.6	Manage database and features of mobile application.
310916 (B)	Artificial Intelligence	C116B.1	Describe the modern view of AI as the study of agents that receive precepts from the Environment and perform actions
		C116B.2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
		C116B.3	Describe the use of various search techniques
		C116B.4	Develop knowledge of decision making methods
		C116B.5	Explain about AI techniques for logical planning
		C116B.6	Explain the concept of Expert systems
310916 (C)	Cyber Security	C116C.1	Analyze and evaluate the cyber security needs of an organization.
		C116C.2	Conduct a cyber security risk assessment
		C116C.3	Measure the performance and troubleshoot cyber security systems.
		C116C.4	Implement cyber security solutions.

		C116C.5	Be able to study cyber security, information assurance, and cyber/computer forensics software/tools
		C116C.6	Identify the key cyber security vendors in the marketplace
310916 (D)	Block Chain	C116D.1	Understand the structure of a block chain and why/when it is better than a simple distributed database;
		C116D.2	Analyze the incentive structure in a block chain based system and critically assess its functions, benefits and vulnerabilities;
		C116D.3	Explain Nakamoto consensus. Describe differences between proof-of-work and proof-of-stake consensus.
		C116D.4	Understand what constitutes a “smart” contract, what are its legal implications and what it can and cannot do, now and in the near future,
		C116D.5	Attain awareness of the new challenges that exist in monetizing businesses around block chains and smart contracts,
		C116D.6	State-of-the-art, open research challenges, and future directions.
310917	Database Management System Laboratory	C117.1	Design E-R Model for given requirements and convert the same into database tables.
		C117.2	Use database techniques such as SQL & PL/SQL.
		C117.3	Use modern database techniques such as NOSQL.
		C117.4	Explain transaction Management in relational database System.
		C117.5	Describe different database architecture and analyses the use of appropriate architecture in real time environment.
		C117.6	Students will be able to use advanced database Programming concepts Big Data – HADOOP
310918	Operating System Laboratory	C118.1	Understand the basics of Linux commands and program the shell of Linux.
		C118.2	Develop various system programs for the functioning of operating system.
		C118.3	Implement basic building blocks like processes, threads
		C118.4	Develop various system programs for the functioning of OS concepts in user space like concurrency control and file handling in Linux.
		C118.5	Implement page replacement algorithm.
		C118.6	Develop the system program for the functioning of OS concepts in kernel space like embedding the system call in any Linux kernel.
310919	Java Programming Laboratory	C119.1	Describe the core concept of Java programming
		C119.2	Discover the need for working with the multithreading and file handling
		C119.3	Illustrate the purpose of applet and AWT in Java programming
		C119.4	Indicate the use of database connectivity using Java Programming

		C119.5	Articulate the networking concepts in Java
		C119.6	Implement Java Servlet and JSP concept in Java
310920	Project Based Learning-I (Mini Project- I)	C120.1	Able to analyze and solve problems by applying programming knowledge
		C120.2	Prepare requirements and Design Documents
		C120.3	Develop Inter-personal and leadership qualities
		C120.4	Demonstrate system with results and interpretation
		C120.5	Describe software testing methods
		C120.6	Design and develop technical documentation
310921	Audit Course-2	C121.1	Have ability of basic communication
		C121.2	Have the knowledge of Japanese script.
		C121.3	Get introduced to reading , writing and listening skills
		C121.4	Will develop interest to pursue professional Japanese Language course
	<b>SY MCA SEM I</b>		
410901	Data Science	C201.1	Explain flow process for data science problems.
		C201.2	Elaborate data preprocessing and warehouse.
		C201.3	Utilize various classification techniques for commercially available datasets.
		C201.4	Implement association rule mining for commercially available datasets
		C201.5	Apply standard clustering methods for commercially available datasets.
		C201.6	Compare appropriate data visualization method for effective visualization of data.
410902	Web Technologies	C202.1	Design web-based application using client-side Technology.
		C202.2	Develop the structure of web sites using XML components.
		C202.3	Analyze current client-side web technologies: JavaScript in detail.
		C202.4	Apply recent client-side web technologies: Angular JS in detail.
		C202.5	Apply the server side technologies for web development
		C202.6	Create the effective web applications for business functionalities using <u>ASP.NET</u>
410903	Cloud Computing	C203.1	Understand the different Cloud Computing environment
		C203.2	Use appropriate data storage technique on Cloud
		C203.3	Analyze virtualization technology
		C203.4	Develop and deploy applications on Cloud
		C203.5	Apply security in cloud applications

		C203.6	Use advance techniques in Cloud Computing
410904 A	Big Data Analytics (Elective II)	C204A.1	Understand big data analytics concepts
		C204A.2	Solve big data problems using Hadoop
		C204A.3	Apply different Supervised learning and Unsupervised Learning algorithms
		C204A.4	Understand different data visualization techniques
		C204A.5	Understand Hadoop Architecture
		C204A.6	Solve Complex real world problems in various applications like recommender systems, social media applications, etc
410904 B	Machine Learning (Elective II)	C204B.1	Understand basic concepts of Machine Learning.
		C204B.2	Understand classification concepts.
		C204B.3	Apply different regression and generalization techniques.
		C204B.4	Apply various logic Based and algebraic algorithms for real world applications.
		C204B.5	Use probabilistic models for machine learning
		C204B.6	Understand trends In Machine Learning
410904 C	Object Oriented Analysis and Design (Elective II)	C204C.1	Analyse software requirements for real world applications
		C204C.2	Apply static modelling design to applications
		C204C.3	Explain Component, Deployment and Package diagrams
		C204C.4	Apply dynamic modelling design to applications.
		C204C.5	Describe software Architecture
		C204C.6	Explain various software design patterns
410904 D	Internet of Things (Elective II)	C204D.1	Understand general concepts of Internet of Things (IoT)
		C204D.2	Analyze various M2M and IoT architectures
		C204D.3	Implement an architectural design for IoT for specified requirement
		C204D.4	Analyze applications of IoT in real time scenario
		C204D.5	Analyze the challenges of IoT architectures.
		C204D.6	Recognize various devices, sensors and applications
410905	Software Testing And Quality Assurance	C205.1	Illustrate different approaches of quality management, assurance, and quality standard to software system.
		C205.2	Design test plan, test cases and defect repository using real world applications
		C205.3	Apply the concept of white box and block box testing techniques.
		C205.4	Show the use of various testing types.
		C205.5	Demonstrate the test automation concepts and recent automation tools

		C205.6	Apply software testing automation concepts using open source Selenium
410906	Web Technologies Lab	C206.1	Design web-based application using client-side Technology.
		C206.2	Develop the structure of web sites using XML components.
		C206.3	Analyze current client-side web technologies: JavaScript in detail.
		C206.4	Understand recent client-side web technologies: Angular JS in detail.
		C206.5	Understand current server-side web technologies and uses.
		C206.6	Analyze ASP.NET in detail.
410907	##Computer Laboratory	C207.1	Implement white box and block box testing techniques for any software systems
		C207.2	Create Test plan and test cases using case studies
		C207.3	Apply automation testing using tools
		C207.4	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
		C207.5	Design and develop machine learning model for a real time applications
		C207.6	Implement an architectural design for IoT for specified requirement
410908	Data Science Laboratory	C208.1	Describe framework of any Data Analytics Tool
		C208.2	Write basic applications using the fundamentals of any Data Analytics Tool
		C208.3	Apply Modeling techniques using any Data Analytics Tool
		C208.4	Implement Mining techniques using any Data Analytics Tool
		C208.5	Employ data analysis using graphs.
		C208.6	Implement Data Visualization
410909	Project Based Learning II (Mini Project II)	209.1	Identify the real life problem from societal need point of view
		209.2	Choose and compare alternative approaches to select most feasible one
		209.3	Analyze and synthesize the identified problem from technological perspective
		209.4	Design the reliable and scalable solution to meet challenges
		209.5	Inculcate the habit of lifelong learning
		209.6	Design and develop technical documentation
410910	*Audit Course-3	210.1	Apply language to communicate confidently and clearly in the Japanese language
		210.2	Understand and use Japanese script to read and write
		210.3	Apply knowledge for next advance level reading, writing and listening skills
		210.4	Develop interest to pursue further study, work and leisure
	<b>SY MCA SEM II</b>		
410912	Major Project with Industrial Internship	212.1	Learn team work and professionalism.



		212.2	Apply SDLC to project
		212.3	Apply communication and presentation skills
		212.4	Recognize the importance of documentation.
410913	Seminar on Major Project	213.1	Analyze recent topic or emerging trends
		213.2	Summarize literature survey
		213.3	Identify, understand and discuss current real-world issues.
		213.4	Suggest future scope for the topic
		213.5	Use professional ethics
		213.6	Develop proficiency in presentation skills and written communication