

MCA PROGRAM OUTCOMES

PO1	Computing Knowledge	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
PO2	Problem Analysis	Identify, formulate, research literature, and solve complex Computing problems reaching substantiated conclusions using fundamental principles of Mathematics, Computing sciences, and relevant domain disciplines.
PO3	Design & Development	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO4	Research & Development	User research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO5	Prompt Tool Usage	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
PO6	Ethical Practices	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.
PO7	Life Long Learning	Recognize the need, and have the ability, to engage in independent learning for continual development as a Computing professional.
PO8	Professional Skills	Demonstrate knowledge and understanding of computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO9	Communication Skills	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
PO10	Societal Contribution	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO11	Teamwork & Leadership	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO12	Innovation & Sustainability	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.





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Sr. No	Subject Name	Course Outcome	Co Number
1	PPR501MJ:PythonProgramming	To learn and apply basic constructs of python such as data, operations, conditions, loops, data type	CO501.1
		To understand advance concepts of python and apply it for solving the complex problems.	CO501.2
		To develop Python programs that incorporate OOPS concept, regular expressions and multithreading for complex problem-solving and performance enhancement.	CO501.3
		To implement various types of database operations in MongoDB.	CO501.4
		To develop comprehensive web applications using Django Framework.	CO501.5
2	DSA502MJ: Data Structure and Algorithms	Implement linear data structures and its various real time applications	CO502.1
		Demonstrate linked list data structure and its types	CO502.2
		Demonstrate dynamic linear data structures like stack, queue and analyze their various applications	CO502.3
		Implement techniques of Non-Linear data structures like Tree and Graph	CO502.4
		Demonstrate and compare various approaches of Searching, Sorting, Hashing and Heaps.	CO502.5
3	ADB503MJ: Advanced DBMS	Demonstrating the concept of fundamentals of relational database systems include: data models, database & DDBS architectures, and ER features.	CO503.1
		Understand the concepts of transaction concurrency control, Query Processing and Security aspects	CO503.2
		Apply SQL &NoSQL development tools on different types of Schemas.	CO503.3
		Demonstrate database design and Computation techniques for parallel and distributed database Technology.	CO503.4
		Implement Real Time applications using Database tools.	CO503.5
4	BST504MJ: Business Statistics	Understand the role and importance of statistics in business decision-making.	CO504.1
		Apply measures of central tendency and dispersion to summarize data.	CO504.2
		Understand basic probability concepts and rules.	CO504.3



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		Apply correlation and regression techniques to analyze relationships between variables	CO504.4
		Apply time series analysis techniques to forecast business trends.	CO504.5
5	SEP505MJ : Software Engineering and Project Management	Apply concepts, principles of software engineering to develop comprehensive Software Requirement Specification.	CO505.1
		Use software engineering analysis and design modelling technique to represent systems.	CO505.2
		Illustrate Software Project Management models for effective plan, manage and enhance projects.	CO505.3
		Implement Agile methodologies to enhance project adaptability and responsiveness to changing requirements.	CO505.4
		Employ Agile tools effectively to manage, navigate and facilitate collaboration and streamline project workflows in software development.	CO505.5
6	FCC510MJ: Fundamentals of Cloud Computing	Describe the concepts of Cloud Computing, Dockers and Container.	CO510.1
		Explore the various Cloud Service Models and Deployment Models.	CO510.2
		Implement concepts, hypervisors, virtual machines, VMware, Microsoft Hyper-V, and Open-Source Virtualization Manager.	CO510.3
		Describe the Cloud Architecture and relate Cloud to SOA along with SLA management, cloud bursting strategies.	CO510.4
		Compare different Cloud Platforms – AWS, GCP, and IBM Cloud.	CO510.5
7	WDE511MJ: Web Development	Design appropriate user interfaces by implementing new features of HTML5	CO511.1
		Design user interfaces and implement CSS3 features	CO511.2
		Demonstrate the concept of responsive web design and its importance	CO511.3
		Build Dynamic web pages using server-side PHP programming	CO511.4
		Develop and deploy web application	CO511.5
8	FDS512MJ: Fundamental of Data Science	Understand the core concepts, techniques and methodologies used in data science	CO512.1
		Apply Computational Mathematics concepts to solve data related problems effectively.	CO512.2



		Apply the principles of data collection, cleaning, and preprocessing.	CO512.3
		Perform exploratory data analysis using Numpy and Pandas to derive insights from datasets.	CO512.4
		Apply the strategies for visualizing the data.	CO512.5
9	ICE513MJ: Introduction to Cyber Security	Understanding the knowledge of cybercrimes, cyber security and cyber-attacks, vulnerabilities, techniques	CO513.1
		Illustrate the security aspects of social media, network platforms and ethical aspects associated with use of social media	CO513.2
		Articulate the importance of personal data theft, financial frauds and identify data privacy and security	CO513.3
		Apply existing legal framework and laws on cyber security.	CO513.4
		Understand the need of information security, standards and polices	CO513.5
10	PBP506MJP: Practical based on Python and DS	Demonstrate Basics of Python and OOPs concepts.	CO506.1
		Demonstrate CRUD Operation using MongoDB.	CO506.2
		Design and Develop web application using DJango.	CO506.3
		Implement Linear data structure like stack, queue and Linked list and demonstrate various searching and sorting techniques	CO506.4
		Implement various operation of non-Linear data structure like Tree and Graph	CO506.5
11	MPR541MRP - Mini Project	Apply knowledge of software engineering principles and methodologies in designing and implementing the project	CO541.1
		Demonstrate the ability to develop a functioning software application or solution that meets specified requirements and objectives	CO541.2
		Design comprehensive documentation that includes project requirements, design specifications, implementation details, testing strategies, and user manuals	CO541.3
12	Indian Knowledge system (IKS)	Understand about Indian philosophy, Culture, knowledge in different domains.	CO1
		Explore the ethical and moral perspectives within Indian philosophical and spiritual traditions.	CO2
		Understand Indian knowledge system and apply in current area and applications.	CO3



		Understand the basics of Indian ethics and values	CO4
		Explore the Indian traditions and their application in modern contexts.	CO5
13	JPR551MJ: Java Programming	Apply the concept of Object-Oriented Programming to map and solve simple real world problem	CO551.1
		To design and develop robust, efficient, multithreaded and scalable Java applications using the collection framework, multithreading, and exception handling.	CO551.2
		To develop Web application for solving real life problem using Servlet	CO551.3
		To develop Web application for solving real life problem using JSP, JDBC	CO551.4
		To develop robust web applications using Spring MVC	CO551.5
14	OTE552MJ : Optimization Techniques	Understand and formulate linear programming models to solve optimization problems in various business contexts.	CO552.1
		Apply sequential models to make informed decisions in dynamic and uncertain environments.	CO552.2
		Utilize Markov chains and simulation techniques to model	CO552.3
		Apply PERT/CPM techniques to plan, schedule, and control projects effectively, including managing replacement decisions.	CO552.4
		Apply decision-making processes and strategic interactions using decision theory and game theory frameworks.	CO552.5
15	STQ553MJ: Software Testing and Quality Assurance	Understand the role of software quality assurance in contributing to the efficient delivery of software solutions.	CO553.1
		Understand specific software tests with well-defined objectives and targets.	CO553.2
		Apply the software testing techniques in commercial environments.	CO553.3
		Construct test strategies and plans for software testing.	CO553.4
		Demonstrate the usage of software testing tools for test effectiveness, efficiency, and coverage.	CO553.5
16	RMW554MJ: Research Methodology	Understand the basic concepts, purposes, and significance of research methodology in academic and professional contexts.	CO554.1
		Apply various research designs and their appropriateness for different types of research questions and objectives	CO554.2
		Apply suitable data collection and sampling methods to gather reliable and valid data for research studies.	CO554.3



		Use appropriate statistical tools and techniques to demonstrate research data and interpret the results effectively.	CO554.4
		Apply skills in writing clear, coherent, and well-structured research reports that effectively communicate research findings.	CO554.5
17	CCM560MJ: Cloud Computing Management and Security	Understand and describe the fundamentals of Cloud Management, Security Concepts, and Quality services.	CO560.1
		Understand and explain the concept of Cloud Database and File System with Cloud Database Services.	CO560.2
		Demonstrate Security Concepts in AWS and security services.	CO560.3
		Recognize the Cloud Backup and Disaster Recovery strategies.	CO560.4
		Use and understand the various Cloud Compute Services.	CO560.5
18	JS561MJ: JavaScript	Utilize Basic JavaScript concepts for writing simple Java script program.	CO561.1
		Design and develop simple application using build-in objects and browser object Model	CO561.2
		Implement the concepts of OOPs , event handling and Asynchronous JavaScript for developing simple real life problem solving web application	CO561.3
		Create interactive web page of application for problem solving	CO561.4
		Demonstrate server-side and client-side aspects of web applications using Node.js and React	CO561.5
19	MLT562MJ: Machine Learning Techniques	Describe the workflow of a machine learning project, including data pre-processing, model training, evaluation, and deployment.	CO562.1
		Apply the various algorithms of supervised and learning	CO562.2
		Apply the various algorithms of supervised and learning	CO562.3
		Apply the fundamental algorithms in semi-supervised and reinforcement learning.	CO562.4
		Apply real-world applications of supervised and unsupervised learning across diverse domains.	CO562.5
20	ECS563MJ: Essentials of Cyber Security	Understand the importance of cyber security practices, understand how to secure a network against intrusion tactics, understand types cyber-crime attacks	CO563.1
		Understand how data is sent and received over a network, Incidence response, Disaster Recovery	CO563.2
		Identify common risks, threats, and vulnerabilities, as well	CO563.3

		as techniques to mitigate them	
		Evaluate risk and identify security management tools, apply cyber security technologies	CO563.4
		Understand digital forensics and its needs	CO563.5
21	ECS564MJ: Essentials of Cloud Computing and Security	Describe the concepts of Cloud Software Security Fundamentals.	CO564.1
		Discuss and Classify different Programming Environments.	CO564.2
		Define Emerging Trends in Cloud Computing.	CO564.3
		Discuss Resource pooling, Sharing and Provisioning.	CO564.4
		Demonstration of various applications in cloud computing.	CO564.5
22	AWD565MJ: Advance Web Development	Implement a Web Server in Node	CO565.1
		Apply Typescript features such as decorators, generics, and modules for creating reusable and maintainable code	CO565.2
		Implement concepts and methods of Angular	CO565.3
		Implement Angular services, dependency injections and Asynchronous operations	CO565.4
		Develop website using Next.js	CO565.5
23	PBI566MJ: Power BI	Demonstrate the concepts and importance of data modelling, data source, data cleaning, data transformation in Power BI.	CO566.1
		Analyse data relationships and model data using DAX	CO566.2
		Assess the interactivity of visualizations using slicers, filters, and drill through features.	CO566.3
		Use M Queries to extract, transform, and load data from various sources.	CO566.4
		Examine Power BI solutions that solve real-world business problems as outlined in case studies.	CO566.5
24	EIS567MJ: Essentials of Information Security	Understand the fundamental concepts of cybersecurity, including its importance and various threats in cyberspace.	CO567.1
		Understand the vulnerable to threats in systems	CO567.2
		Design and Apply the need for security architecture and its relevance to systems, service continuity and reliability	CO567.3

		Ability to describe the various auditing tools that can be used in cybersecurity management	CO567.4
		Identifies the needs of users in the field of developing information systems and building secure computer networks.	CO567.5
25	PBJ555MJP: Practical based on Java	Demonstrate fundamental concepts of Java	CO555.1
		Design and implement classes and objects in Java, applying principles of inheritance, polymorphism, encapsulation, and abstraction	CO555.2
		Establish database connectivity using JDBC, execute SQL queries, handle result sets, and manage database transactions from Java applications	CO555.3
		Develop dynamic web applications using Java Servlets and JSP	CO555.4
		Use spring MVC framework to build web application.	CO555.5
26	MPR581MRP - Mini Project	Apply knowledge of software engineering principles and methodologies in designing and implementing the project	CO581.1
		Demonstrate the ability to develop a functioning software application or solution that meets specified requirements and objectives	CO581.2
		Design comprehensive documentation that includes project requirements, design specifications, implementation details, testing strategies, and user manuals	CO581.3
27	OBE601MJ : Organizational Behaviour	Understand how individual behaviour influences organizational performance and culture	CO601.1
		Apply emotional intelligence and stress management strategies to improve workplace well-being and effectiveness.	CO601.2
		Apply group dynamics and decision-making models to enhance teamwork and organizational outcomes.	CO601.3
		Analyse and apply motivational theories to improve employee's performance and organizational success.	CO601.4
		Understand and adapt emerging trends in organizational behaviour and culture in a changing work environment.	CO601.5
28	DAA602MJ : Design and Analysis of Algorithm	Understand the fundamental concepts of algorithm analysis and complexity.	CO602.1
		Apply Divide and Conquer strategies to solve problems	CO602.2
		Apply Greedy algorithms and other optimization techniques to solve real-world problems.	CO602.3

		Apply advanced algorithmic strategies like Backtracking and Dynamic Programming with real-world applications	CO602.4
		Understand NP-Completeness, polynomial-time reductions, and emerging algorithmic trends	CO602.5
29	CAS610MJ: Cloud API's and Services	Understand cloud API concepts, including design, authentication, integration, and best practices for interacting with cloud services	CO610.1
		Integrate and interact with various cloud APIs (e.g., AWS, Google Cloud, Azure) to utilize services like storage, compute, machine learning, and databases	CO610.2
		Integrate and deploy machine learning models using cloud-based AI APIs to solve real-world problems efficiently	CO610.3
		Understand and implement scalable, event-driven applications using serverless computing and microservices architecture	CO610.4
		Apply learned concepts to real-world industry problems through a hands-on capstone project, demonstrating practical expertise	CO610.5
30	MAD611MJ : Mobile Application Development	Design the user interface, build a functional Android application using Android Studio.	CO611.1
		Enhance user experience by using interactive tools such as Intents, Adapters, Dialogs, Menus, and Notifications in Android applications.	CO611.2
		Implement data storing and retrieval methods in android using SQLite and Firebase in Android applications	CO611.3
		Create interactive cross-platform mobile applications using React Native.	CO611.4
		Design and build scalable cross-platform mobile apps using Flutter and Dart.	CO611.5
31	TAB612MJ: Tableau	Apply data connection, preparation, and visualization techniques in Tableau for effective analysis.	CO612.1
		Apply data management techniques in Tableau to clean, integrate, optimize, and manage data sources for effective visualization and analysis.	CO612.2
		Apply dashboard design and optimization techniques in Tableau to create interactive and shareable visualizations	CO612.3
		Apply advanced calculations and analytics techniques to enhance Tableau visualizations.	CO612.4
		Apply Tableau Server installation, configuration, and management techniques for efficient data sharing, maintenance, and collaboration.	CO612.5



32	EPS613MJ: End -Point Security	Understand and apply the principles of authentication, access control, and data protection on endpoints.	CO613.1
		Implement and configure endpoint protection measures and control	CO613.2
		Use endpoint security tools and techniques to manage, monitor, and analyze endpoint threats.	CO613.3
		Apply best practices for securing various types of endpoints, including workstations, mobile devices, and IoT devices.	CO613.4
		Develop and implement endpoint security policies and strategies for an organization.	CO613.5
33	CMM614MJ : Cloud Migration and Management	Understand Fundamental Concepts of Cloud Migration	CO614.1
		Apply Different Cloud Migration Strategies and Best Practices.	CO614.2
		Analyze Cloud Governance Frameworks and Compliance Strategies.	CO614.3
		Evaluate Cloud Service Providers Based on Quality of Service, Pricing, and Reliability	CO614.4
		Assess Emerging Trends and Innovations in Cloud Migration.	CO614.5
34	MSD615MJ: MERN Stack Development	Build scalable and efficient server-side applications using Node.js and integrate them with MERN stack	CO615.1
		Design schemas, perform CRUD operations, and integrate with Node.js applications using MongoDB	CO615.2
		Develop RESTful APIs, implement middleware, and handle authentication for secure web applications using Express.js	CO615.3
		Create dynamic, interactive, and state-managed single-page applications (SPAs) with efficient UI components using ReactJS	CO615.4
		Integrate MongoDB, Express, React, and Node.js, and develop, deploy scalable MERN applications.	CO615.5
35	DEL616MJ: Deep Learning	Understand the fundamentals of deep learning, neural network architectures, optimization techniques, and deep learning frameworks.	CO616.1
		Develop proficiency in applying Convolutional Neural Networks (CNNs) and Vision Transformers (ViTs) for image classification, object detection, and image segmentation.	CO616.2
		Use RNNs, LSTMs, GRUs, and Transformers for NLP tasks like sentiment analysis, machine translation, and text summarization.	CO616.3



		Design and implement advanced deep learning models, including generative models, reinforcement learning, and hyperparameter optimization techniques.	CO616.4
		Apply deep learning to real-world problems, culminating in a capstone project involving end-to-end model development, deployment, and ethical considerations.	CO616.5
36	EH617MJ : Ethical Hacking	Describe the phases of hacking, hacker types, and ethical/legal aspects of cybersecurity.	CO617.1
		Perform reconnaissance, footprinting, and scanning using Nmap, Google Dorking, and Shodan.	CO617.2
		Exploit vulnerable machines using Metasploit and demonstrate privilege escalation techniques.	CO617.3
		Understand and Appreciate the role of Cryptography in Cybersecurity.	CO617.4
		Exploit web applications and learn to crack the passwords	CO617.5
		Understand the current and emerging trends in Ethical Hacking	CO617.6
37	ERP618MJ: Enterprise Resource Planning (ERP)	Describe the fundamental concepts of ERP and analyze the growth and evolution of ERP systems.	CO618.1
		Demonstrate an understanding of related technologies and evaluate their integration with ERP systems.	CO618.2
		Categorize the functionalities of core ERP modules and demonstrate how they support business processes.	CO618.3
		Examine the ERP implementation life cycle and assess the success and failure factors.	CO618.4
		Outline current trends in ERP and foresee their impact on future organizational structures and processes.	CO618.5
38	EC619MJ: E-Commerce	Understand and Apply Different E-Commerce Business Models	CO619.1
		Design and Manage E-Commerce Websites	CO619.2
		Understand the Digital Marketing Strategies for E-Commerce	CO619.3
		Analyze E-Commerce Data and Make Strategic Decisions	CO619.4
		Navigate Security, Legal, and Ethical Challenges in E-Commerce	CO619.5
39	SMM620MJ : Social Media Marketing	Explain the principles of Marketing, Digital Marketing, and Social Media Marketing	CO620.1
		Define social media marketing goals and strategy setting necessary to achieve successful online campaigns	CO620.2
		Explain the concepts and significance of Social Media and Search Engine Optimization (SEO).	CO620.3



		Compare various channels of social media through which it operates, and its role in marketing strategy	CO620.4
		Describe the significance and function of content management in social media marketing with reference to IT Act	CO620.5
40	IED621MJ: Innovation and Entrepreneurship Development	Demonstrate the ability to generate innovative business ideas and recognize viable entrepreneurial opportunities	CO621.1
		Develop a comprehensive business plan and formulate strategies to achieve business goals effectively.	CO621.2
		Identify appropriate financing options and develop strategies to scale a business sustainably.	CO621.3
		Apply legal knowledge and ethical considerations to make informed business decisions and navigate challenges in entrepreneurship.	CO621.4
		Leverage emerging technologies to create innovative solutions and enhance business growth.	CO621.5
41	PBE603MJP: Practical based on Electives IV and V Practical Based on Cloud APIs, Services, Migration and Management	Apply cloud services using API's/SDK's of providers like AWS, Azure, and GCP.	CO603.1
		Understand and implement cloud migration strategies for transitioning applications, databases, and workloads from on-premise to cloud environments using different tools.	CO603.2
		Develop and Implement strategies for managing and monitoring cloud resources.	CO603.3
		Apply automation techniques for infrastructure provisioning and scaling using cloud-native and third-party tools.	CO603.4
		Assess and compare cloud deployments by analyzing performance, cost efficiency, reliability, and scalability to optimize operational effectiveness and decision-making.	CO603.5
42	PBE603MJP: Practical based on Electives IV and V Practical Based on MAD and MERN Stack Development	Design user interfaces and functional components for both mobile and web applications using Android Studio, ReactJS, React Native, and Flutter.	CO603.1
		Implement dynamic and interactive features in mobile and web applications using tools and concepts like Intents, Adapters, Menus, Notifications in Android, and state management, routing, and UI events in ReactJS/React Native.	CO603.2
		Develop secure backend services and RESTful APIs using Node.js and Express.js, including integration of middleware, authentication mechanisms, and server-side logic for both mobile and web environments.	CO603.3
		Perform data handling operations such as CRUD, real-time synchronization, and cloud storage by integrating SQLite, Firebase, and MongoDB across full-stack and	CO603.4



		mobile applications.	
		Build and deploy scalable full-stack and cross-platform applications by integrating technologies like MERN stack, React Native, and Flutter.	CO603.5
43	PBE603MJP: Practical based on Electives IV and V Practical Based on Tableau and Deep Learning	Import, clean, and visualize data using Tableau to uncover patterns and trends.	CO603.1
		Develop interactive dashboards and storyboards to present analytical insights.	CO603.2
		Apply Convolutional Neural Networks (CNNs) and Vision Transformers (ViTs) to solve image classification and object detection problems	CO603.3
		Analyze the performance of RNNs, LSTMs, and Transformer models for NLP tasks	CO603.4
		Create and evaluate deep learning models for real-world problems	CO603.5
44	PBE603MJP: Practical based on Electives IV and V Practical Based on End-Point Security and Ethical Hacking	Describe types of threats to end-point systems and their countermeasures.	CO603.1
		Configure and implement endpoint security tools such as antivirus, firewall, and encryption.	CO603.2
		Use ethical hacking tools (e.g., Nmap, Wireshark, Metasploit, Google Dorking, Shodan etc.) to identify vulnerabilities.	CO603.3
		Conduct vulnerability assessments and penetration testing in simulated environments.	CO603.4
		Recommend and implement security best practices based on test results to strengthen system defences.	CO603.5
45	RP641RP: Research Project	Demonstrate a clear understanding of research concepts, processes, and methodologies, including literature review and research proposal development.	CO641.1
		Compare and contrast quantitative and qualitative research approaches, identify a research interest area, and apply suitable research design.	CO641.2
		Develop strong academic writing and presentation skills for effectively communicating research findings	CO641.3
46	IPW681FP: Internship/Project Work (FP/OJT)	Implement solutions by applying programming skills, development methodologies, and relevant tools in real-world contexts.	CO618.1
		Evaluate and refine software solutions through comprehensive project planning, requirement analysis, design, implementation, testing, and documentation	CO618.2
		Assess and troubleshoot complex problems through practical project implementation, refining problem-solving strategies	CO618.3





		Design and present project goals, methodologies, results, and conclusions effectively to peers, faculty, and external stakeholders.	CO618.4
		Innovate and create original software solutions that meet specific requirements and constraints, fostering creativity and problemsolving skills.	CO618.5
41	MOO682MJ: MOOC-I and MOO683MJ : MOOC-II	Identify and choose suitable online courses relevant to their field of study from NPTEL, SWAYAM, or other platforms	
		Manage their own learning pace and complete MOOC modules independently using self-discipline and time management.	
		Use the knowledge gained from online courses to solve real-world problems in the domain of computer applications.	
		Connect interdisciplinary concepts learned through MOOCs with academic or project work for better understanding and innovation.	
		Present key learnings from the MOOC experience through reports or discussions and apply them to enhance job readiness.	

Course Outcome





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