MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA0151001 (PUNJAB), INDIA

(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)

Department: **Computational Sciences**
Program: MCA

COURSE ARTICULATION MATRIX (STUDY SCHEME: 2020)

Computer Networks	MCAPS1-1001	1	4	4	3104	CO1	Understand basic computer network technology, data communication system and its components and differences between each networking technologies.	1	2	3	0	1	2	3	0	0	0	0
						CO2	Demonstrate advanced network technologies and different types of network topologies, protocols, layers ,OSI model and TCP/IP.	1	1	3	0	1	2	3	0	0	0	0
Relational database management system	MCAPS1-1002	1	4	4	3104	CO1	Understand the fundamental elements of database management systems, architecture of dbms, data models and normalization.	1	3	2	0	0	0	0	0	0	0	0
						CO2	Learn the operations for making and using databases with help of SQL and PL/SQL.	1	2	3	0	2	2	3	0	0	0	0

Object Oriented Programming Using C++	MCAPS1-103	1	4	4	3104	CO1	Learn the basic concepts of object oriented programming and its features.	2	3	2	0	2	2	3	0	0	0	0
						CO2	. Understand the file handling operations, exception handling and templates.	2	3	2	0	2	2	3	0	0	0	0
Computer Organisation and Architecture	MCAPS1-104	1	3	3	3003	CO1	Examine the operation of the major building blocks of a computer system	1	1	3	0	1	2	3	0	0	0	0
						CO2	Design and organization of modern digital computers & basic assembly language	1	3	2	0	2	3	2	0	0	0	0
Business Communication	MCAPS1-105	1	2	2	2002	CO1	Make student conversant with fundamentals of communication, help them honing oral, written and non0verbal communication skills and to transform their communication abilities.	1	1	3	3	0	0	0	2	0	0	0
Relational Database Management System Lab	MCAPS1-1016	1	2	4	0042	CO1	Develop Schema and database and execute the various SQL operations on these.	1	3	2	0	0	3	2	0	0	0	0
						CO2	Implement all the PL/SQL operations	2	3	2	0	0	3	2	0	0	0	0

Object oriented programming using C++ Lab	MCAPS1-107	1	2	4	0042	CO1	Implement the concept of class,object and polymorphism	3	2	2	0	2	3	2	0	0	0	0
						CO2	Implement inheritance ,constructors and destructors.	3	2	2	0	2	3	2	0	0	0	0
Business Communication and Soft Skills Lab	MCAPS1-108	1	2	2	0004	CO1	To demonstrate his/her ability to write error free while making an optimum use of correct Business Vocabulary & Grammar	1	1	3	3	0	0	0	2	0	0	0
						CO2	To demonstrate verbal and non0verbal communication ability through presentations	1	1	3	3	0	0	2	2	0	0	0
Data Structures	MCAPS1-201	2	4	4	3104	CO1	Learn to choose appropriate data structures and algorithms and use it to design solution for a specific problem	3	2	2	0	2	3	2	0	0	0	0
						CO2	Execute the operations of hashing to retrieve data from data structure	3	2	2	0	2	2	3	0	0	0	0
Operating System	MCAPS1-202	2	4	4	3104	CO1	Describe the architecture in terms of functions performed by different types of operating systems.	2	2	3	0	0	0	3	0	0	0	0
						CO2	Analyze the performance of different algorithms used in design of operating system components	3	2	2	0	0	3	2	0	0	0	0

Discrete Mathematics	MCAPS1-**203**	2	3	3	3003	CO1	Represent computing data using various mathematical notions.	1	3	1	0	1	0	3	0	0	0	0
						CO2	Describe various mathematical operations and formulas used to solve computing problems.	1	3	1	0	1	0	3	0	0	0	0
Data Structures Lab	MCAPS1-204	2	2	4	0002	CO1	Be able to design and analyze the time and space efficiency of the data structure	3	2	1	0	1	3	2	0	0	0	0
						CO2	Be capable to choose the appropriate data structure for development of software systems.	3	2	2	0	1	3	2	0	0	0	0
Operating System Lab	MCAPS1-205	2	2	4	0002	CO1	Install & configure different operating systems.	1	2	3	0	0	0	3	0	0	0	0
						CO2	Illustrate programs/ scripts for different scheduling algorithms.	3	2	2	0	1	2	3	0	0	0	0
Data Warehousing and Data Mining	MCAPD1-211	2	3	3	3000	CO1	1. Understand operational database, data ware housing, need of database to meet industrial needs.	1	2	3	0	0	2	3	0	0	0	0
						CO2	1. Understand the knowledge about data mining, decision tree, generic algorithms and Fuzzy set approach.	1	1	3	0	2	1	3	0	0	0	0

Business Intelligence and Digital Marketing	MCAP1-212	2	3	3	3 0 0 0	CO1	. Understand the role of business intelligence and digital marketing within an organization	1	1	3	0	2	0	3	0	0	0	0
						CO2	1. Analyse and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.	1	2	3	0	2	0	3	0	0	0	0
Software Testing and Quality Assurance	MCAPD1-213	2	3	3	3 0 0 0	CO1	Understand Software Metrics and Analyse different approaches to software testing and quality assurance.	1	2	3	0	0	0	2	0	3	0	0
						CO2	Understand the concept of test management and development of CMM	1	2	3	0	0	0	2	0	3	0	0
Programming in Java	MCAPD1-221	2	3	3	3 0 1 0	CO1	Learn the advanced features of Java	1	2	3	0	2	2	3	0	0	0	0
						CO2	Work with the JDBC technology and learn Java Generics and the development of Projects	1	3	2	0	2	2	3	0	0	0	0
Programming in Java Lab	MCAPD1-222	2	2	4	0 0 0 2	CO1	Learn Java Generics and develop Projects.	3	2	2	0	2	2	3	0	0	0	0
						CO2	1. Learn the advanced features of Java and write the programs to solve the specific problem.	3	2	2	0	2	2	3	0	0	0	0

Programming with Python	MCAPD1-223	2	3	3	3000	CO1	Understand Python environment, data types, operators, functions, familiarization of control, loops.Use Python to read and write files and Work with the Python standard library.	3	2	1	0	1	2	3	0	0	0	0
						CO2	Articulate the concepts of OOPs by writing programs using the data structures like lists, dictionaries, tuples and sets.	3	2	2	0	1	2	3	0	0	0	0
Programming with Python Lab	MCAPD1-224	2	2	4	0002	CO1	Develop logic of various programming problems using numerous data types and control structures of Python.	3	2	2	0	2	3	2	0	0	0	0
						CO2	Write the programs to show the concepts of OOPs and various data structures.	3	2	2	0	2	3	2	0	0	0	0
Artificial Intelligence	MCAPS1-301	3	4	4	3010	CO1	Understand the basics of AI, applications of AI, and various searching techniques.	2	3	1	0	2	2	3	0	0	0	0
						CO2	Understand the concept of knowledge representation, predicate logic and transform the real life information in different representations and solve basic AI based problems.	1	3	2	0	2	2	3	0	0	0	0

Design and Analysis of Algorithm	MCAPS1-3021	3	4	4	3001	CO1	Understand the algorithm ,Time and space complexity of an algorithm and identify P, NP and NP0complete problems.	0	0	0	0	0	1	1	0	0	0	0
						CO2	Apply various algorithms(graph, Searching & sorting, Geometric and Text Pattern Matching)	1	0	2	0	0	0	0	0	1	0	0
Information and Network Security	MCAPS1-3033	3	3	3	3000	CO1	Apply Symmetric Encryption techniques.	1	3	2	0	2	0	3	0	0	0	0
						CO2	Understand the security requirements of Confidentiality, Integrity &Availability.	1	2	3	0	2	0	2	0	0	0	3
Design and Analysis of Algorithm Lab	MCAPS1-3044	3	2	4	0004	CO1	Apply Searching and Sorting Algorithm	3	2	2	0	2	3	2	0	0	0	0
						CO2	Apply graph and Text Pattern Matching algorithm	3	2	2	0	2	3	2	0	0	0	0
Lamp Technologies	MCAPD1-3111	3	3	3	3000	CO1	Understand brief introduction to the open0source technologies	1	3	2	0	3	0	2	0	0	0	0
						CO2	Understand interactive sessions enabling students to enhance their skills in contributing and implementing their technical knowledge.	2	3	2	1	3	0	2	1	0	0	0

Database Administration	MCAPD1-313	3	3	3	3000	Co1	Learn install and configure various database packages.	1	2	2	0	0	0	2	0	0	0	0
						CO2	Learn Database backup and recovery and perform database tuning and optimization	1	2	3	0	0	0	3	0	0	0	0
Cloud Computing	MCAPD1-315	3	3	3	3000	CO1	To understand the basic concepts Cloud Computing.	1	3	2	0	3	0	2	0	0	0	0
						CO2	Compare and evaluate the virtualization technologies.	1	3	2	0	3	0	2	0	0	0	0
Lamp Technologies Lab	MCAPD1-312	3	2	4	0004	CO1	Correlate the Linux, Apache, MySQL and PHP for building an application.	1	3	2	0	2	2	3	0	0	0	0
						CO2	Implement application using JSP technology	3	2	2	0	2	3	2	0	0	0	0
Database Administration Lab	MCAPD1-314	3	2	4	0004	CO1	Design, model and install any database management systems by using Oracle database as sample	1	3	2	0	1	2	3	0	0	0	0
						CO3	Compare and contrast by examining the database systems and new trends in data storage, data retrieval and maintenance techniques	1	3	2	0	1	2	3	0	0	0	0

Cloud Computing Lab	MCAPD1-316	3	2	4	0004	CO1	Design and Implement applications on the Cloud	1	3	2	0	3	0	2	0	0	0	0
Theory of Computation	MCAPS1-401	4	4	4	3010	CO1	Define deterministic and nondeterministic finite automata ,properties of regular languages and context free grammar	1	1	2	0	1	1	3	0	0	0	0
						CO4	Design Turing machine ,Pushdown Automata to recognize the given language	1	2	2	0	1	1	3	0	0	0	0
Current Trends and Technologies	MCAPS1-402	4	3	3	3000	CO1	Understand the concept of cloud computing, neural networks,edge routers and Grid computing.	1	3	2	0	3	2	2	0	0	0	0
						CO3	Recognize the concept of emerging technologies ,virtualisation and Fog and IOT computing.	1	3	2	0	2	2	2	0	3	0	0
Software Project	MCAPS1-403	4	3	6	0006													

Seminar	MCAPS1-404	4	1	2	0102	CO1	To improve the mass communication	1	2	3	3	0	0	0	2	0	0	0
						CO2	To enhance the understanding skills of students.	1	2	3	3	0	0	0	2	0	0	0
Big data	MCAPD1-411	4	4	4	3010	CO1	Model and implement efficient big data solutions for various application	2	3	2	0	3	0	2	0	0	0	0
						CO2	Analyze methods and algorithms, to compare and evaluate them with respect to time and space requirements.	3	2	2	0	1	3	2	0	0	0	0
Big Data Lab	MCAPD1-412	4	1	2	0002	CO1	Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications	1	1	3	0	0	0	3	0	0	0	0
						CO2	Ability to integrate machine learning libraries and mathematical and statistical tools with modern technologies like hadoop and mapreduce.	1	2	3	0	3	2	2	0	0	0	0
Dot Net Framework	MCAPD1-413	4	4	4	3010	CO1	To know about basic goals of the .NET Framework	3	2	2	0	1	2	3	0	0	0	0
						CO2	Develop secured web application	3	3	2	0	1	2	2	0	0	0	0

Dot Net Framework Lab	MCAPD1-414	4	1	2	0002	CO1	1. Create user interactive web pages using ASP.Net.	3	2	2	0	2	3	2	0	0	0	0
						CO2	Performing Database operations for Windows Form and web applications.	2	3	2	0	0	2	3	0	2	0	0
Mobile Computing and Android	MCAPD1-415	4	4	4	3010	CO1	Understand the basics of Android,Views,Resources,Intents,Activities and connecting app to the internet	3	2	2	0	1	3	2	0	0	0	0
						CO2	Implement the user navigation controls,themes and styles,retrieving data via SQLite and publishing the APK.	2	3	2	0	2	3	2	0	0	0	0
Mobile Computing and Android Lab	MCAPD10416	4	1	2	0002	CO1	Installing Android Studio and working with layouts ,views,resources,JSON,background tasks,menus and Screen Navigation	1	3	2	0	2	3	2	0	0	0	0
						CO2	Implementing the connection to the internet and Data saving,retrieving and loading.	1	3	2	0	2	3	2	0	0	0	0
Soft Computing	MCAPD10417	4	4	4	3010	CO1	Examine the useful search techniques; learn their advantages, disadvantages and comparison.	1	2	3	0	2	2	3	0	0	0	0
						CO2	To understand the features of neural network and its applications	1	2	3	0	3	0	2	0	0	0	0

Soft Computing Lab	MCAPD10418	4	1	2	0002	CO1	Determine the use of Genetic algorithm to obtain optimized solutions to problems	3	2	2	0	0	3	2	0	0	0	0
						CO2	Apply artificial neural networks and fuzzy logic theory for various problems	1	3	2	0	2	2	3	0	0	0	0
Machine Learning	MCAPD10421	4	3	3	3000	CO1	To learn the basic concepts, techniques and applications of machine learning	1	3	2	0	3	0	2	0	0	0	0
						CO2	To have a thorough understanding of the Supervised and Unsupervised learning techniques	1	2	3	0	3	0	2	0	0	0	0
Machine Learning Lab	MCAPD10422	4	1	2	0002	CO1	Design Java/Python programs for various Learning algorithms.	3	2	2	0	2	3	2	0	0	0	0
						CO2	Identify and apply Machine Learning algorithms to solve real world problems	1	3	2	0	2	3	2	0	0	0	0

Computer Graphics	MCAPD10423	4	3	3	3000	CO1	Understand the basics of computer graphics,Visual Display Devices and 2 D Graphics	1	2	3	0	2	0	3	0	0	0	0
						CO2	Implement the scan conversion algorithms and understand # 0Dimensional Graphics.	1	3	2	0	2	2	3	0	0	0	0
Computer Graphics Lab	MCAPD10424	4	1	2	0002	CO1	Practical applications of graphics, Program development and basic animations without using graphical software.	1	3	2	0	0	2	3	0	0	0	0
						CO2	Implementation of various scan & clipping algorithms	1	2	3	0	0	3	2	0	0	0	0
Fog Computing and Internet Of Things	MCAPD10425	4	3	3	3000	CO1	To understand Fog Computing technology and its architecture	1	3	2	0	3	0	2	0	0	0	0
						CO2	To gain practical know0how about various use0cases of fog computing.	1	3	2	0	3	0	2	0	0	0	0

Fog Computing and Internet of Things Lab	MCAPD10426	4	1	2	0002	CO1	Implement an architectural design for IoT for specified requirement	1	3	2	0	3	2	2	0	0	0	0