



**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: **BCA-MCA Dual Degree**

**COURSE ARTICULATION MATRIX (STUDY SCHEME: 2020)**

Subject	S C o d e	S e m e s t e r	C r e d i t	D u r a t i o n ( H r s )	L S T P	C O s	Statement	P S O 1	P S O 2	P S O 3	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8
Communicative English	B M C A S 1 - 1 0 1	1	4	4	3 0 1 0	C O 1	Students should be comfortable with both verbal & written communications	3	1	2	3	0	0	0	0	0	0	0

Introduction to Information Technology	B M C A S 1 - 1 0 2	1	4	4	3 0 1 0	C O 1	Understand the basics of Computer Languages, Computer Network and Communication, Operating System, Word processing and number system	1	3	2	2	0	0	3	0	2	0	0
						C O 2	Define the memory types, input/output devices, storage devices, computer generations, Internet Applications and Presentation Graphics Software	2	3	1	2	2	0	3	0	1	0	0
Computer Organization	B M C A S 1 - 1 0 3	1	4	4	3 0 1 0	C O 1	Understand the Instruction types, logic circuits and sequential circuits.	1	3	1	0	0	3	2	0	0	0	0
						C O 2	Define the components of computer and CPU architecture.	1	3	1	0	0	3	2	0	0	0	0
Programming in C Language	B M C A S 1 - 1 0 4	1	4	4	3 0 1 0	C O 1	Understand the logic building used in Programming.	2	3	1	0	1	2	3	0	0	0	0
						C O 2	Convert the algorithms into computer programs using C language.	1	3	1	0	1	2	3	0	0	0	0

Human Values and Professional Ethics	B H U M A 0 0 0 0 3	1	4	4	3 0 1 0	CO1	Discriminate between valuable and superficial in the life.	3	2	0	0	0	0	0	0	0	0	0
						CO2	Evaluate an ethical life and profession ahead.	1	2	3	0	0	0	0	0	0	0	0
Lab on Introduction to Information Technology	B M C A S 1 — 1 0 5	1	2	4	0 0 0 4	CO1	Students can learn how to perform presentation skills.	3	1	2	3	2	0	2	0	0	0	0
Lab Programming in C Language	B M C A S 1 — 1 0 6	1	2	4	0 0 0 4	CO1	Able to write algorithms for solving various real life problems.	2	3	1	0	1	3	2	0	0	0	0
						CO2	Students should be able understand the logic building used in programming	2	3	1	0	0	3	2	0	0	0	0

Database management System	B M C A S 1 — 2 0 1	2	4	4	3 0 1 0	CO1	Design ER0models to represent simple database application scenarios	2	3	1	0	1	3	2	0	0	0	0
						CO2	Understand the basic concepts of databases and data models.	2	3	1	0	0	3	2	0	0	0	0
Computer network	B M C A S 1 — 2 0 2	2	4	4	3 0 1 0	CO1	Understand Brief description about Computer networking Technologies and their applications and differences of each networking Technologies.	2	3	1	0	3	2	2	0	0	0	0
						CO2	Learn the advanced network technologies that can be used to connect different networks,Layers and Models.	2	3	1	0	0	2	3	0	0	0	0
Management Information System	B M C A S 1 — 2 0 3	2	4	4	3 0 1 0	CO1	Evaluate the role of information systems in today's competitive business environment.	1	3	1	0	1	1	3	0	0	0	0
						CO2	Identify managerial risks related to information system organization processing and utilizing.	1	3	2	0	2	2	3	0	1	0	0

Object Oriented Programming Using C++	B M C A S 1 — 2 0 4	2	4	4	3 0 1 0	C O 1	To create computer based solutions to various real world problems using C++.	2	3	1	0	1	3	2	0	0	0	0
						C O 2	To learn various concepts of object oriented approach towards problem solving.	1	3	1	0	1	3	2	0	0	0	0
Operating System	B M C A S 1 — 2 0 5	2	3	3	3 0 0 0	C O 1	Understand the types of operating system and CPU scheduling algorithms.	1	3	1	0	0	1	3	0	0	0	0
						C O 2	Understand the concept of process, Memory Management Techniques, Disk Scheduling, Secondary Storage structure and Deadlock.	2	3	1	0	1	2	3	0	0	0	0
DBMS Lab	B M C A S 1 — 2 0 6	2	2	4	0 0 0 4	C O 1	Populate and query a database using SQL DML/DDDL commands	1	3	1	0	2	1	3	0	0	0	0
						C O 2	Able to understand various queries and their execution	1	2	1	0	1	2	3	0	0	0	0

C++ Lab	B M C A S 1 — 2 0 7	2	2	4	0 0 0 4	C O 1	To learn programming from real world examples	2	3	1	0	2	3	2	0	0	0	0
						C O 2	To create computer based solutions to various real world problems using C++	2	3	1	0	2	3	2	0	0	0	0
Software Engineering	B M C A S 1 — 3 0 1	3	4	4	3 0 1 0	C O 1	Understand the phases and activities involved in the conventional software life cycle models	1	3	1	0	1	0	2	0	3	0	0
						C O 2	Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	2	3	2	0	0	0	2	0	3	2	2
Data Structures	B M C A S 1 — 3 0 2	3	4	4	3 0 1 0	C O 1	Summarize searching and sorting techniques and describe arrays, stack, queue and linked list operation.	2	3	1	0	2	3	2	0	0	0	0
						C O 2	Understand basics of data structure ,algorithms ,complexity and tree and graphs concepts.	1	3	1	0	2	3	2	0	0	0	0



Data Structures Lab	B M C A S 1 — 3 0 5	3	2	4	0 0 0 4	C O 1	Implement the Searching, Sorting, array and Queue Operations algorithms	2	3	1	0	2	3	2	0	0	0	0
						C O 1	Implement the algorithms for link list, stack and tree operations.	2	2	1	0	2	3	2	0	0	0	0
Java Lab	B M C A S 1 — 3 0 6	3	2	4	0 0 0 4	C O 1	Implement Core Java concepts.	2	3	1	0	0	2	3	0	0	0	0
						C O 2	Identify and fix defects and common security issues in code	1	2	1	0	0	2	3	0	0	0	0
Android Application Development	B M C A S 1 — 4 0 1	4	4	4	3 0 1 0	C O 1	Understand the basics of Android, Views, Resources, Intents, Activities and connecting app to the internet	2	3	1	0	2	2	3	0	0	0	0
						C O 2	Implement the user navigation controls, themes and styles, retrieving data via SQLite and publishing the APK.	2	3	1	0	2	2	3	0	0	0	0
Software Project Management	B M C A S 1 — 4 0 2	4	4	4	3 0 1 0	C O 1	Understand the concept of Process Planning, effort estimation and quality planning	1	3	1	0	0	0	2	0	3	0	0
						C O 2	Understand the principal tasks of software project managers, and basic concepts in software projects	2	3	1	0	0	0	2	0	3	0	0



Linux Operating System	B M C A S 1 — 4 0 3	4	4	4	3 0 1 0	C O 1	Learn to operate Linux Operating Systems.	2	3	1	0	2	1	3	0	0	0	0
						C O 2	Understanding various services on the Linux operating system.	2	3	1	0	0	1	2	0	0	0	0
Discrete Mathematics	B M C A S 1 — 4 0 4	4	4	4	3 0 1 0	C O 1	Understand the basic principles of sets and operations in sets.	1	2	1	0	0	1	3	0	0	0	0
						C O 2	Model problems in Computer Science using graphs and trees.	2	2	1	0	0	1	3	0	0	0	0
Android Application Development Lab	B M C A S 1 — 4 0 5	4	2	4	0 0 0 4	C O 1	Installing Android Studio and working with layouts ,views,resources,JSON,background tasks,menus and Screen Navigation	2	3	1	0	2	3	2	0	0	0	0
						C O 2	Implementing the connection to the internet and Data saving,retrieving and loading.	2	3	1	0	2	3	2	0	0	0	0
Linux Operating System Lab	B M C A S 1 — 4 0 6	4	2	4	0 0 0 4	C O 1	Installation & administration of Linux operating system	1	3	1	0	0	2	3	0	0	0	0
						C O 2	Implementing various services on the Linux operating system.	2	3	1	0	0	2	3	0	0	0	0

Latest Trends in IT	B M C A S 1 — 5 0 1	5	4	4	3 0 1 0 1	CO1	Recognize the concepts of emerging technologies, demonstrate computing and interpret Soft computing concepts.	1	3	1	0	3	2	2	0	0	0	0
						CO2	Critically analyze case studies to derive the best practice model to apply when developing and deploying parallel, distributed, cloud and IoT and fog based applications	2	3	1	0	3	2	2	0	0	0	0
Artificial Intelligence	B M C A S 1 — 5 0 2	5	4	4	3 0 1 0 1	CO1	Understand the basics of AI, applications of AI, and various searching techniques.	2	3	1	0	3	1	2	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.	2	3	1	0	3	1	2	0	0	0	0

Object Oriented Analysis and Design using UML	B M C A S 1 — 5 0 3	5	4	4	3 0 1 0	C o 1	Learn the basic of OO analysis and design skills and Describe about UML and distinguish about GRASP and coding,testing	2	3	1	0	2	3	2	0	0	0	0
						C O 2	Learn the UML design diagrams and apply design patterns	2	3	1	0	2	3	2	0	0	0	0
Web Application Development	B M C A S 1 — 5 0 4	5	4	4	3 0 1 0	C O 1	Understand the skills in client0side web application development using HTML	2	3	1	0	2	3	2	0	0	0	0
						C O 2	Create a web application using web programming patterns based on data analytics to enhance the front end user experience.	2	3	1	0	2	3	2	0	0	0	0
UML Lab	B M C A S 1 — 5 0 5	5	2	4	0 0 0 4	C O 1	Understand the Case studies and design the Model..	1	3	1	0	1	3	2	0	0	0	0
						C O 2	Understand how design patterns solve design problems.	1	3	1	0	1	3	2	0	0	0	0

Web Application Development Lab	B M C A S 1 — 5 0 6	5	2	4	0	C	Analyze a web page and identify its elements and attributes.	1	3	1	0	1	2	3	0	0	0	0
					0	C	Create web pages using Cascading Style Sheets	1	3	1	0	1	2	3	0	0	0	0
Computer Graphics	B M C A S 1 — 6 0 1	6	4	4	3	C	To Explain the basic concepts used in computer graphics.	2	3	1	0	1	1	3	0	0	0	0
					0	C	To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping	2	3	1	0	1	1	3	0	0	0	0
Network Security	B M C A S 1 — 6 0 2	6	4	4	3	C	Understand the network security threats & services	1	3	1	0	3	3	3	0	0	0	0
					0	C	Implement Hashing and Digital Signature techniques & system level security applications	1	3	1	0	3	3	3	0	0	0	0
Soft Computing	B M C A S 1 - 6 0 3	6	4	4	3	C	Gain a basic understanding of neural network theory and fuzzy logic theory.	1	2	1	1	2	2	3	0	0	-	0
					0	C	Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications	1	2	1	1	2	2	3	0	0	0	0

Computer Graphics Lab	B M C A S 1 — 6 0 4	6	2	4	0 0 0 4	C O 1	To apply various graphics algorithms in programs.	2	3	1	0	2	2	3	0	0	0	0
Soft computing lab	B M C A S 1 — 6 0 5	6	2	4	0 0 0 4	C O 1	Describe human intelligence and AI	1	2	1	0	3	2	2	0	0	0	0
						C O 2	Manipulation of graphics, Program development and basic animations without using graphical software	2	3	1	0	2	2	3	0	0	0	0
Project Implementation	B M C A S 1 - 6 0 6	6	2	4	0 0 0 4	C O 1	Understand project characteristics and various stages of a project	1	1	3	0	2	2	0	3	0	0	0
						C O 2	Understand the conceptual clarity about project organization and feasibility analyses.	1	1	3	0	2	2	0	3	0	0	0

