MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001 (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: **COMPUTER SCIENCE AND ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU

Program: M Tech Computer Science and Engineering

COURSE ARTICULATION MATRIX (STUDY SCHEME: 2018)

Subject	S Code	Semester	Credit	Duration (Hrs)	L T P	COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	MCSCE1-101	1	3	38	3 0 0	CO1	To understand the basic notions of discrete and continuous probability.	3									
						CO2	To understand the methods of statistical inference, and the role that sampling distributions play in those methods		1					1		1	
						CO3	To be able to perform correct and meaningful statistical analyses of simple to moderate complexity.			3			2				
						CO4	Applications of Mathematics in various fields of Computer science and engineering.				3	1			1		1

ADVANCED DATA STRUCTURES	MCSCE1-102	1	3	38	3 0 0	CO1	Understand the implementation of symbol table using hashing techniques			3			1				1
						CO2	Develop and analyze algorithms for red-black trees, B-trees and Splay trees.			3		2				1	1
						CO3	Develop algorithms for text processing applications.				2					3	2
						CO4	Identify suitable data structures and develop algorithms for computational geometry problems	3			1					3	
RESEARCH METHODOLOGY AND IPR	MRMIP0-101	1	2	28	2 0 0	CO1	Understand research problem formulation, analyze research related information, Follow research ethics		3				2			3	
						CO2	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.	3		3		2				1	1
						CO3	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.		3		2		3	3		1	2
						CO4	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.		3	2	2					3	1
ADVANCED	MCS	1	2	60	0 0 4	CO1	To implement Binary search tree and AVL trees	3		1							3

						CO2	To implement insertion and deletion in AVL trees.	3		1							3
						CO3	To implement Red-Black Trees and various operations in m-way search trees.	3		2							3
						CO4	To implement various algorithms.	3		2							3
MACHINE LEARNING	MCSCE1-156	1	3	38	3 0 0	CO1	Extract features that can be used for a particular machine learning approach in various IOT applications	3		1							3
						CO2	To compare pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.							1		1	2
						CO3	To mathematically analyze various machine learning approaches and paradigms.	1	2				2			2	3
						CO4	To learn various trends of machine learning techniques.	1		3		1					1
WIRELESS SENSOR NETWORKS	MCSCE1-157	1	3	38	3 0 0	CO1	Describe and explain radio standards and communication protocols for wireless sensor networks			3	1		1			3	
						CO2	Explain the function of the node architecture and use of sensors for various applications.	3	1	3							1
						CO3	Be familiar with architectures, functions and performance of wireless sensor networks systems and platforms.		1	3	2						2
						CO4	To understand various security issues.	3	1		2					3	
INTROD UCTION	MCSCE1-	1	3	38	3 0 0	CO1	Able to demonstrate knowledge of the fundamental principles of intelligent systems and would be able to analyses and compare the	3		1						1	

							relative merits of a variety of AI problem solving techniques.										
						CO2	To understand the basic concepts of Basic concepts of graph and tree search	1		3							3
						CO3	To learn knowledge representation.						2				1
						CO4	To learn recent trends in Fuzzy logic, Knowledge Representation.	2									2
DATA SCIENCE	MCSCE1-159	1	3	38	3 0 0	CO1	Explain how data is collected, managed, and stored for data science.	1		3			1			1	
						CO2	Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists	3		3		2				2	1
						CO3	Implement data collection and management scripts using MongoDB	2		3						1	2
						CO4	To learn applications of data science.	3			2					3	1
DISTRIBUTED SYSTEMS	MCSCE1-160	1	3	38	3 0 0	CO1	Design trends in distributed systems.	1		2						1	
						CO2	To learn distributed databases.					1	1		2		
						CO3	To understand the concept of distributed query optimization.		1							1	
						CO4	To understand the concept of parallel databases.	2		3	1	1				3	2
ADVANCED WIRELESS AND	MCSCE1-161	1	3	38	3 0 0	CO1	Demonstrate advanced knowledge of networking and wireless networking and understand various types of wireless networks, standards, operations and use cases.	2		3			2			1	2

						CO2	Be able to design WLAN, WPAN, WWAN, Cellular based upon underlying propagation and performance analysis.	2		3		1					1
						CO3	Demonstrate knowledge of protocols used in wireless networks and learn simulating wireless networks	2	1		1		1			3	
						CO4	Design wireless networks exploring trade-offs between wire line and wireless links	3		3		2					1
MACHINE LEARNING LAB.	MCSCE1-162	1	2	60	0 0 4	CO1	To implement supervised machine learning (regression) algorithms.		3		2					1	
						CO2	To implement supervised machine learning (classification) algorithms.	3			2					3	
						CO3	To implement unsupervised machine learning algorithms.	3		3			2			1	
						CO4	To implement dimensionality reduction and PCA.			3		1					
WIRELESS SENSOR NETWORKS LAB.	MCSCE1-163	1	2	60	0 0 4	CO1	To learn Introduction to Network Simulators	1	3				2			1	
						CO2	To learn TCL Scripting and trace file formats of network simulators.	1		3		1				1	
						CO3	Create different simulation scenarios by varying MAC protocols.	3			1		1			3	
						CO4	To implement and compare various routing protocols	1		3		2					1
INTRODUCTION TO INTELLIGENT SYSTEMS	MCSCE1-164	1	2	60	0 0 4	CO1	To implement simple artificial neural network and neural network with back propagation.	1		3			2			1	
						CO2	To implement recurrent neural network and fuzzy neural network.		1			1					1
						CO3	To implement iterative deepening search and Hill Climbing Algorithm.	1	2	3			1			1	

						CO4	Implementation of optimization genetic algorithm	1		3		2					1
DATA SCIENCE LAB.	MCSCE1-165	1	2	60	0 0 4	CO1	To learn basics of R	1	2	3			1			3	
						CO2	To learn basic Statistics and Visualization	2		3		2					1
						CO3	To learn K-Means Clustering and association rules.	1	1	3							2
						CO4	To learn linear regression and implement other classifiers.	1	2	1							1
DISTRIBUTED SYSTEMS LAB.	MCSCE1-166	1	2	60	0 0 4	CO1	To install database packages.	1									
						CO2	To create and manage database objects and security.		1							2	
						CO3	Implement Partitioning on the database tables.	2		2							2
						CO4	Implement various Transaction concurrency control methods.	2			1	1					1
ADVANCED WIRELESS AND MOBILE NETWORKS LAB.	MCSCE1-167	1	2	60	0 0 4	CO1	Setup & Configuration of Wireless Access Point (AP)		3				2			1	
						CO2	Study of WLAN, Bluetooth Protocol and Applications	1	2	3		1					2
						CO3	To study GSM modem and SMS client-server application	1	1	3			1				2
						CO4	To Implement J2ME Program for Mobile Node Discovery	1		3		2				2	1
ADVANCED ALGORITHMS	MCSCE1-204	3	2	45	3 0 0	CO1	Analyze the complexity/performance of different algorithms.	3	3				2				
						CO2	Determine the appropriate data structure for solving a particular set of problems.	1									

						CO3	Categorize the different problems in various classes according to their complexity						1					
						CO4	Students should have an insight of recent activities in the field of the advanced data structure.	3				2			3		1
SOFT COMPUTING	MCSCE1-205	2	3	45	3 0 0	CO1	Identify and describe soft computing techniques and their roles in building intelligent machines	3					2			1	3
						CO2	Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.	3		3		2			1	2	
						CO3	Apply genetic algorithms to combinatorial optimization problems.	3	1			1					
						CO4	Evaluate and compare solutions by various soft computing approaches for a given problem.	3				2				2	3
ADVANCED ALGORITHMS LAB.	MCSCE1-268	2	2	60	0 0 4	CO1	To implement Dijkstra's algorithm	3	3	1			2			1	
						CO2	To implement Floyd-Warshall algorithm	2									2
						CO3	To find inverse of a triangular matrix using divide and conquer strategy.	3					1				2
						CO4	To convert base (decimal/hexa) representation to modulo representation.					2			3		1
SOFT COMPUTING LAB.	MCSCE1-269	2	2	60	0 0 4	CO1	To implement string and array operations in Python	3	3				2				
						CO2	To study neural network toolbox	3				2			3		1
						CO3	To study fuzzy logic toolbox		1			1					
						CO4	To perform operations on fuzzy sets.	3				2					1

Data Preparation and Analysis	MCSCE1-270	2	3	45	3 0 0	CO1	Able to extract the data for performing the Analysis.	3	1	3	1					1	
						CO2	Able to clean data like inserting missing values.	2		2	1					1	
						CO3	To do exploratory analysis	2		3	1						2
						CO4	To apply visualization techniques.	2	1	3	1				1		1
SECURE SOFTWARE DESIGN AND ENTERPRISE COMPUTING	MCSCE1-271	2	3	45	3 0 0	CO1	Differentiate between various software vulnerabilities		2						3		1
						CO2	Software process vulnerabilities for an organization	2		1			1			1	
						CO3	Monitor resources consumption in a software.				3			1			1
						CO4	Interrelate security and software development process	2		2		1				1	
COMPUTER VISION	MCSCE1-272	2	3	45	3 0 0	CO1	Developed the practical skills necessary to build computer vision applications.		3				2				1
						CO2	To have gained exposure to object and scene recognition and categorization from images.					2					
						CO3	To extract features from data.		1								1
						CO4	To perform pattern analysis.	3								1	
HUMAN AND	MCSCE1-	2	3	45	3 0 0	CO1	Understand the structure of models and theories of human computer interaction and vision.		3				2				1

						CO2	Design an interactive web interface on the basis of models studied.	1			2						
						CO3	To study Mobile Ecosystem.		1								1
						CO4	To Study designing Web Interfaces.									1	
GPU COMPUTING	MCSCE1-274	2	3	45	3 0 0	CO1	Understand the structure of models and theories of human computer interaction and vision.		3				2				1
						CO2	Design an interactive web interface on the basis of models studied.	1			2						
						CO3	To study Mobile Ecosystem.		1								1
						CO4	To Study designing Web Interfaces.									1	
MOBILE APPLICATION AND SERVICES	MCSCE1-382	3	3	45	3 0 0	CO1	Identify the target platform and users and be able to define and sketch a mobile application		3				2				1
						CO2	Understand the fundamentals, frameworks, and development lifecycle of mobile application platforms including iOS, Android, and PhoneGap	1			2						
						CO3	Design and develop a mobile application prototype in one of the platform (challenge project)		1								1
						CO4	To Study recent trends.									1	

COMPILER FOR HPC	MCSCE1-274	3	3	45	3 0 0	CO1	Familiar with the structure of compiler		3							1
						CO2	Parallel loops, data dependency and exception handling and debugging in compiler.	1			2					
						CO3	To study concurrency analysis									1
						CO4	To Study recent trends.	3				2			1	
OPTIMIZATION TECHNIQUES	MCSCE1-384	3	3	45	3 0 0	CO1	Formulate optimization problems.		2							1
						CO2	Understand and apply the concept of optimality criteria for various types of optimization problems.	1			1					
						CO3	Solve various constrained and unconstrained problems in Single variable as well as multivariable.									1
						CO4	Apply the methods of optimization in real life situation.	2				2			1	
GPU Computing Lab	MCSCE1-280	2	2	60	004	Co1	Implement efficient algorithms for common application kernels, such as matrix multiplication				1					1
						CO2	Given a problem, implement an efficient and correct code to solve it, analyze its performance, and give convincing written and oral presentations explaining the achievements.					1			1	
						CO3	Describe common GPU architectures and programming models.			1						

						CO4	Define terminology commonly used in parallel computing, such as efficiency and speedup.	1									
Digital Forensics Lab	MCSCE1-281	2	2	60	004	Co4	Apply a solid foundational grounding in computer networks, operating systems, file systems, hardware, and mobile devices to digital investigations and to the protection of computer network resources from unauthorized activity	2			1						
						Co3	Identify and document potential security breaches of computer data that suggest violations of legal, ethical, moral, policy, and/or societal standards			1						2	
						Co2	Cite and adhere to the highest professional and ethical standards of conduct, including impartiality and the protection of personal privacy					1					1
						Co1	conduct digital investigations that conform to accepted professional standards and are based on the investigative process: identification, preservation, examination, analysis, and reporting							1			
Human and Computer Interaction Lab	MCSCE1-279	2	2	4	004	Co4	Demonstrate skills to collaborate in a team for justifying identified problems and to write interface related reports as per the standards.					1					
						Co3	Evaluate user interfaces using Heuristic Evaluation and Thinking aloud Test.						1			1	
						Co2	Design user interfaces according to the standards			1							
						Co1	Analyze and identify usability issues in User interfaces..	1									1

DIGITAL FORENSICS	MCSCE1-275	2	3	45	300	Co1	Understand relevant legislation and codes of ethics	1					3	1			2
						Co2	Computer forensics and digital detective and various processes, policies and procedures	1		1	3					1	
						Co3	E-discovery, guidelines and standards, E-evidence, tools and environment	1		3		1			3		1
						Co4	Email and web forensics and network forensics.	1		3			1				1
DATA PREPARATION AND ANLYSIS LAB	**MCSCE1-276**	2	2	60	004	Co1	Learn pre-processing method for multi-dimensional data	3		3	1	1				1	
						Co2	Practice on data cleaning mechanisms	2		3	1	1				1	
						Co3	Learn various data exploratory analysis	2		3	1	1					2
						Co4	Develop the visualizations for clusters or partitions	2		3	1	1					1
Secure Software Design & Enterprise Computing Lab	**MCSCE1-277**	2	2	60	004	Co1	Learn various authentication methods	1		3		1				1	
						Co2	Practice on debugging.	1		3	1	1				1	
						Co3	Set up their own Private cloud storage	1		3		1					2

						Co4	Learn Rhapsody Tool.	1		3		1					2