



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**

COs, POs, PSOs Mapping

Subject: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	Subject Code: MCSCE1-101	Semester: 1st
Credit: 3	L T P 3 0 0	38Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: ADVANCED DATA STRUCTURES	Subject Code: MCSCE1-102	Semester: 1st
Credit: 3	L T P 3 0 0	38Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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	

Subject: RESEARCH METHODOLOGY AND IPR	Subject Code: MRMIP0-101	Semester: 1st
Credit: 2	L T P 2 0 0	28Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: ADVANCED DATA Structures Laboratory	Subject Code: MCSCE1-103	Semester: 1st
Credit: 2	L T P 0 0 4	60Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: MACHINE LEARNING	Subject Code: MCSCE1-156	Semester: 1st
Credit: 3	L T P 3 0 0	38Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: WIRELESS SENSOR NETWORKS	Subject Code: MCSCE1-157	Semester: 1st
Credit: 3	L T P 3 0 0	38Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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	

Subject: INTRODUCTION TO INTELLIGENT SYSTEMS	Subject Code: MCSCE1-158	Semester: 1st
Credit: 3	L T P 3 0 0	38Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	Able to demonstrate knowledge of the fundamental principles of intelligent systems and would be able to analyses and compare the relative merits of a variety of AI problem solving techniques.	3		1						1	
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

Subject: DATA SCIENCE	Subject Code: MCSCE1-159	Semester: 1st
Credit: 3	L T P 3 0 0	38Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: DISTRIBUTED SYSTEMS	Subject Code: MCSCE1-160	Semester: 1st
Credit: 3	L T P 3 0 0	38Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: ADVANCED WIRELESS AND MOBILE NETWORKS	Subject Code: MCSCE1-161	Semester: 1st
Credit: 3	L T P 3 0 0	38Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: MACHINE LEARNING LAB.	Subject Code: MCSCE1-162	Semester: 1st
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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					

Subject: WIRELESS SENSOR NETWORKS LAB.	Subject Code: MCSCE1-163	Semester: 1st
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: INTRODUCTION TO INTELLIGENT SYSTEMS LAB	Subject Code: MCSCE1-164	Semester: 1st
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Credit: 2	L T P 0 0 4	60 Hrs.
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COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: DATA SCIENCE LAB.	Subject Code: MCSCE1-165	Semester: 1st
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: DISTRIBUTED SYSTEMS LAB.	Subject Code: MCSCE1-166	Semester: 1st
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: ADVANCED WIRELESS AND MOBILE NETWORKS LAB.	Subject Code: MCSCE1-167	Semester: 1st
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: ADVANCED ALGORITHMS	Subject Code: MCSCE1-204	Semester: 2nd
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: SOFT COMPUTING	Subject Code: MCSCE1-205	Semester: 2nd
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: ADVANCED ALGORITHMS LAB.	Subject Code: MCSCE1-268	Semester: 2nd
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: SOFT COMPUTING LAB.	Subject Code: MCSCE1-269	Semester: 2nd
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: Data Preparation and Analysis	Subject Code: MCSCE1-270	Semester: 2nd
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	To implement string and array operations in Python	3	1	3	1					1	
CO2	To study neural network toolbox	2		2	1					1	
CO3	To study fuzzy logic toolbox	2		3	1						2
CO4	To perform operations on fuzzy sets.	2	1	3	1				1		1

Subject: SECURE SOFTWARE DESIGN AND ENTERPRISE COMPUTING	Subject Code: MCSCE1-271	Semester: 2nd
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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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	

Subject: COMPUTER VISION	Subject Code: MCSCE1-272	Semester: 2nd
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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	

Subject: HUMAN AND COMPUTER INTERACTION	Subject Code: MCSCE1-273	Semester: 2nd
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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	

Subject: GPU COMPUTING	Subject Code: MCSCE1-274	Semester: 2nd
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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	

Subject: GPU COMPUTING LAB	Subject Code: MCSCE1-280	Semester: 2ND
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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									

Subject: DIGITAL FORENSICS LAB	Subject Code: MCSCE1-281	Semester: 2ND
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	conduct digital investigations that conform to accepted professional standards and are based on the investigative process: identification, preservation, examination, analysis, and reporting							1			
CO2	Cite and adhere to the highest professional and ethical standards of conduct, including impartiality and the protection of personal privacy					1					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	
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						

Subject: Human and Computer Interaction Lab	Subject Code: MCSCE1-279	Semester: 2ND
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	Analyze and identify usability issues in User interfaces..	1									1
CO2	Design user interfaces according to the standards			1							
CO3	Evaluate user interfaces using Heuristic Evaluation and Thinking aloud Test.						1			1	
CO4	Demonstrate skills to collaborate in a team for justifying identified problems and to write interface related reports as per the standards.					1					

Subject: DIGITAL FORENSICS	Subject Code: MCSCE1-275	Semester: 2ND
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: DATA PREPARATION AND ANALYSIS LAB	Subject Code: MCSCE1-276	Semester: 2ND
Credit: 2	L T P 0 0 4	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: Secure Software Design & Enterprise Computing Lab	Subject Code: MCSCE1-277	Semester: 2ND
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Credit: 2	L T P 0 0 4	60 Hrs.
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COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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

Subject: MOBILE APPLICATION AND SERVICES	Subject Code: MCSCE1-382	Semester: 3rd
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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	

Subject: COMPILER FOR HPC	Subject Code: MCSCE1-383	Semester: 3rd
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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	

Subject: OPTIMIZATION TECHNIQUES	Subject Code: MCSCE1-384	Semester: 3rd
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
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	