Subject Wise CLO-PLO Mapping

Computing Courses

Information Technology Skills (SOC-115)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Apply basic proficiency in computer and ability to use commonly used computer applications such as Word, Excel, PowerPoint.	C	3	1
To make professional level presentations.	C	3	1
Lab			
Follow instructions to cultivate proficiency in essential applications such as Word, Excel, and PowerPoint.	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Computer Programming (SOC-116)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain standard coding conversions along with problem solving techniques and analytical thinking.	C	3	1
Analyze the ability to write, execute and debug computer programs using control structures, loops, arrays and functions.	C	4	2
Design and implement algorithms to solve real world problems	C	4	3
Lab			
To equip students with foundational programming skills and logical problem-solving abilities, enabling them to design and implement procedural programs effectively.	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Engineering Technology (Foundation) Courses

Object Oriented Programming (SOT-125)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the basic principles of object-oriented design in terms of software reuse and managing complexity	C	2	1
Analyze the characteristics of an object-oriented programming language: data abstraction and information hiding, inheritance, and dynamic binding of the messages to the methods	C	4	2
Achieve solving and programming skills with extensive programming tasks	C	4	3
Lab			
To equip students with foundational programming skills and logical problem-solving abilities, enabling them to design and implement procedural programs effectively.	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Data Structure and Algorithms (SOT-232)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the fundamentals of data structures such as lists, queues, trees etc.	C	2	1
Compare tradeoff in the design and implementation of the data structures.	C	4	2
Apply the concept of algorithm in solving real world problems.	C	4	3
Lab			
Follow the instructions to implement computer programs and algorithms.	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Development Life Cycle (SOT-126)

Course Learning Outcomes	Domain	BT Level	PLO
Describe the processes related to the software development lifecycle.	C	1	1
Identify various Agile process models.	C	2	1
Evaluate different software process models (e.g., Waterfall, Agile, Scrum) and their suitability for various project scenarios.	C	3	2
Collaborate in a team to execute a complete software development project, applying all SDLC concepts from requirements to delivery.	C	5	4

Software Requirements and Design (SOT-233)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Describe various software architectural styles.	C	1	1
Use software modeling techniques for requirements analysis and requirements presentation.	C	3	3
Develop user stories and use cases to represent software requirements.	C	3	3
Lab			
Follow the instructions to effectively analyze user requirements, design system architecture, and create detailed software specifications	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Database Systems (SOT-235)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain fundamental database concepts.	C	2	1
Apply conceptual, logical and physical data schemes using different data models.	C	3	2
Apply functional dependencies and resolve database anomalies by normalizing database tables	C	3	1

Apply structured query language ((SQL) For Database definition and manipulation in any DBMS	C	3	3
Lab			
Follow the instructions to implement database system queries and operations	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Testing Technologies (SOT-243)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Describe software testing and quality assurance model.	C	1	1
Recognize the suitable testing technique for a defined scenario.	C	2	2
Apply the identified technique and compile the findings of software testing activity.	C	3	3
Develop and execute test cases based on systematic testing strategies through automated testing tools.	C	4	3
Lab			
Follow the instructions to analyze complex software testing scenarios, formulate effective testing strategies, and evaluate testing outcomes.	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Configuration Management Technologies (SOT-124)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Demonstrate the importance of Software Configuration Management in the software lifecycle	C	2	1
Implement continuous integration (CI) principles using tools such as Jenkins, enabling automated testing and efficient software commits.	C	4	5
Utilize bug reporting systems (e.g., Jira) to report, prioritize, and resolve software issues, fostering problem-solving skills.	C	2	4
Discuss the process of change management, change tracking, prioritization, and resolution.	C	2	1
Analyze and troubleshoot issues related to source management and Cl processes.	C	4	2
Lab			
Follow the instructions to apply advanced techniques in version control systems (e.g., Git, SVN) including branching, committing, and merging, ensuring effective source code management.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Engineering Technology Breadth Courses

Web Development Technologies (SOT-241)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			

Describe the architecture of web applications.	C	1	1
Develop accessible and user-friendly graphical user interfaces.	C	3	3
Manipulate data from database and web applications.	C	3	3
Develop a web application.	C	3	3
Apply best practices for designing, developing and deploying web applications.	C	3	2
Lab			
Follow the instructions to proficiently develop responsive, feature-rich websites and applications using contemporary web technologies.	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Operations and Maintenance (SOT-242)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Discuss the concepts related to build, deploy and maintain systems.	C	2	1
Managing release and building pipeline.	C	2	3
Investigate software change and systematically incorporate and test.	C	3	4
Lab			
Follow the instructions to analyze, evaluate, and apply advanced techniques in software operations demonstrating effective problem-solving skills and critical thinking	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Project Management (SOT-352)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain principles of the project lifecycle and how to identify opportunities to work with learners on relevant and appropriate project scenarios.	C	2	1
Evaluate the issues around project management and its application in the real world.	C	3	2
Analyze project management techniques to initiate, plan, execute and evaluate a project that includes key tasks, critical path, dependencies and a realistic timeline.	C	4	3
Present strategies for gaining confidence in managing projects through simple project planning examples.	C	4	10
Use of modern tools for applying software project management practices.	C	4	5
Lab			
Follow the instructions to create comprehensive project plans outlining objectives, tasks, timelines, and resource allocation, ensuring clear project roadmaps.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Information Security (SOT-353)

Course Learning Outcomes	Domain	BT Level	PLO

Describe the fundamental working of computer networks with layered architecture.	C	1	1
Describe functions of various networking protocols.	C	2	1
Describe different internetworking devices and their functions within a network.	C	1	1
Analyze IP address requirements for a network.	C	3	2

Breadth Electives Courses

Software Quality Assurance and Quality Control (SOT-2xx/SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Discus fundamental software quality assurance concepts.	C	2	1
Apply software inspections and walkthroughs for quality assessment.	C	3	3
Plan and manage Software Quality Assurance (SQA) processes effectively.	C	4	2
Lab			
Follow the instructions to conduct software inspections effectively to identify defects and assess software quality.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Modelling Technologies (SOT-2xx/SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Discuss the software modeling and UML fundamentals.	C	2	1
Apply data modeling techniques and tools effectively.	C	3	3
Evaluate Model-Driven Development and emerging trends critically.	C	4	4
Lab			
Follow the instructions to implement data modeling techniques effectively in practical scenarios.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Agile Software Development (SOT-2xx/SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Demonstrate an understanding of agile development philosophies and methodologies.	C	2	1
Apply agile team-based practices used to create and deliver products.	C	3	3
Develop out a small team-based web development project using Scrum practices.	C	5	9
Lab			
Follow the instructions to deeply learn the Agile principles and values, and apply them to software development processes.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Mobile Application Development (SOT-2xx/SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Describe the architecture of mobile applications.	C	1	1
Produce Mobile Application using provided assets with basic functionality.	C	5	3
Make Mobile application that uses hardware and software resources like sensors and configuration etc. and evaluate functionality.	C	5	2
Lab			
Follow the instructions to develop mobile applications, focusing on design, implementation, and testing for various platforms.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Artificial Intelligence Technologies (SOT-2xx/SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain what is Al, its applications and use cases and how it is transforming our lives, What Al realistically can--and cannot—do.	C	1	1
How to spot opportunities to apply Al to problems in your surroundings.	C	3	2
Lab			
Follow the instructions to implement artificial intelligence algorithms and techniques for data processing and analysis.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Engineering Technology Depth Courses

Operating Systems (SOT-244)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Demonstrate the characteristics of different structures of the Operating Systems and identify the core functions of the Operating Systems.	C	2	1
Demonstrate the knowledge in applying system software and tools available in modern operating systems.	C	3	3
Analyze and evaluate the algorithms of the core functions of the Operating Systems and explain the major performance issues with regard to the core functions.	C	4	2
Lab			
Follow the instructions to implement database system queries and operations while considering operating systems concepts, including process management, file systems, and memory management.	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Computer Networking Technologies (SOT-354)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Describe the fundamental working of computer networks with layered architecture.	C	1	1
Describe functions of various networking protocols.	C	2	1
Describe different internetworking devices and their functions within a network.	C	1	1
Analyze IP address requirements for a network.	C	3	2
Lab			
Follow the instructions to optimize networking technologies using OS concepts effectively.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Engineering Technology Depth Elective Courses

Digital Image Processing (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Analyze working of low-level image processing algorithms.	C	1	1
Design image filter in the time and frequency domain.	C	2	3
Lab			
Follow the instructions to propose robust methodologies to design applications of image processing.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Big Data Analytics (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Provide fundamental information to get insight into the challenges with big data.	C	1	1
Demonstrate techniques for storing and processing large amounts of structured and unstructured data.	C	2	1
Application of big data concepts to get valuable information on market trends.	C	3	2
Implement and deploy a sample project for extracting useful information from a mid-sized dataset.	C	4	3
Lab			
Follow the instructions to grasp fundamental concepts of Big Data, including volume, velocity, variety, and veracity, and comprehend the challenges associated with processing large and diverse datasets.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Internet of Things (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Discuss the application areas of IOT.	C	2	1
Identify the Components that forms part of loT Architecture.	C	4	2
Evaluate the appropriate protocol for communication between loT.	C	6	3

Implement and deploy a sample project for extracting useful information from a mid-sized dataset.	C	4	3
Lab			
Follow the instructions to setup the connections between devices and setup.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Natural Language Processing (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Discuss the application areas of IOT.	C	2	1
Identify the Components that forms part of loT Architecture.	C	4	2
Evaluate the appropriate protocol for communication between loT.	C	6	3
Implement and deploy a sample project for extracting useful information from a mid-sized dataset.	C	4	3
Lab			
Follow the instructions to setup the connections between devices and setup.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Mobile and wireless Networks (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Know the basic concepts of wireless networks 1G, 2G, 3G, 4G.	C	1	1
Discuss the different wireless multiple access techniques, CDMA design, WCDMA, WSN, MANET etc.	C	2	2
Lab			
Follow the instructions to demonstrate the wireless networks using different tools.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Embedded Systems (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Demonstrate knowledge and understanding of the fundamental principles of embedded system design, explain the process and apply it.	C	3	2
Interface different peripherals with microcontrollers and design embedded systems based on microcontrollers (AVR, STM, Raspberry Pi).	C	4	3
Analyze the different aspects of (RTOs) like scheduling algorithms, resource sharing, tasks, timing latency etc.	C	4	4
Lab			
Follow the instructions to know the concepts of embedded systems, including microcontrollers, microprocessors, memory systems, and real-time operating systems.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5

Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Metrics (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explains how quantitative and empirical methods are applied to software engineering problems.	C	2	1
Presents the fundamentals of measurement, experimentation, data collection and analysis.	C	3	2
Critically evaluate and discuss different software matrices participants and learners of different applications in the real world with course.	C	3	3
Have a working knowledge of software size measurement (Function Point counting, etc.).	C	4	4
Lab			
Follow the instructions to apply quantitative and empirical methods to analyze software engineering problems.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Simulation and Modeling (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the model classification at different levels.	C	1	1
Analyze complex engineering systems and associated issues (using systems thinking and modelling techniques).	C	3	6
Apply advanced theory-based understanding of engineering fundamentals and specialist bodies of knowledge in the selected discipline area to predict the effect of engineering activities.	C	4	2
Analyze the simulation results of a medium sized engineering problem.	C	4	4
Lab			
Follow the instructions to analyze software engineering problems using system analysis methods.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Deep Learning (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Apply deep learning techniques to solve complex problems in various domains.	C	3	3
Analyze and evaluate the performance of deep learning models, considering factors like accuracy and efficiency.	C	4	2
Apply advanced theory-based understanding of engineering fundamentals and specialist bodies of knowledge in the selected discipline area to predict the effect of engineering activities.	C	4	2
Demonstrate effective communication of deep learning solutions through presentations and reports.	C	5	10
Lab			
Follow the instructions to evaluate the performance of deep learning models using appropriate metrics and analysis techniques	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Multimedia and Animation (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Demonstrate the multimedia and animation principles and elements.	C	2	1
Proficiently use multimedia authoring tools for interactive content creation.	C	3	3
Apply animation techniques for engaging multimedia with focus on user experience.	C	3	4
Lab			
Follow the instructions to implement animation techniques for creating visually engaging multimedia with a focus on user experience in practical projects.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Game Application Development (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain game development, components, and history.	C	2	1
Proficiently use Unity for 2D and 3D game development.	C	3	3
Apply game physics, optimization, and monetization.	C	3	4
Lab			
Follow the instructions to implement game physics, optimization, and monetization strategies in practical game development scenarios.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Software Testing & Implementation (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the role of software implementation and testing in the software development life cycle.	C	2	1
Demonstrate proficiency in software implementation best practices, including coding style, error handling, documentation, and modular programming.	C	3	3
Lab			
Follow the instructions to comprehend software testing fundamentals and techniques, including test planning, automation, and quality assurance processes.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Agent Based Software Engineering (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the principles and methodologies of agent-based software engineering, including modelling, analysis, and design techniques	C	2	1
Describe the foundations of agent communication and knowledge sharing, including knowledge level communication among software agents and Knowledge Interchange Format (KIF).	C	2	6

Analyze and evaluate agent-based system architectures, organizational structures, and standards such as FIPA (Foundation for Intelligent Physical Agents).	C	4	2
Lab			
Follow the instructions to demonstrate effective knowledge sharing and communication among software agents within an agent-based system	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Machine Learning (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain working of supervised and unsupervised machine learning algorithms.	C	2	1
Develop a solution for problems using machine learning algorithms.	C	3	3
Design a solution and conduct experiments for a real-life machine learning problem after surveying the literature.	C	5	4
Lab			
Follow the instructions to implement and evaluate machine learning models using appropriate algorithms and techniques.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Real Time Systems (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Design and analyze real-time systems to meet specified timing requirements.	C	4	1
Implement real-time operating systems and understand their impact on system performance.	C	3	2
Evaluate the reliability and fault tolerance mechanisms in real-time systems.	C	5	3
Lab			
Follow the instructions to implement, and analyze real-time applications to meet specified timing constraints.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Human Computer Interaction (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the context of HCI and different measures for evaluation.	C	2	1
Apply the principles of good design for people from the perspective 1of age and disabilities.	C	3	6
Evaluate the usability of a medium size software user interface.	C	5	4
Lab			

Follow the instructions to know the fundamental principles and theories related to Human-Computer Interaction, including user-centred design, usability, and user experience (UX) design.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

E-Business (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
List strategic and operational skills for the implementation of an E-business.	C	1	1
Demonstrate the characteristics assumed by businesses supported by technology in the context of the new economy.	C	2	3
Identify the many advantages offered by the Internet as a business promotion channel and generator of opportunities, understanding the different marketing activities through it.	C	3	5
Investigate the importance of social networks in the e-business strategy.	C	3	4
Start business online.	C	3	12
Lab			
Follow the instructions to learn the fundamental concepts and models of e-business, including electronic commerce, online marketing, digital payment systems, and online business strategies.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Management Information Systems (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Articulate concepts of information technology management, basic hardware/software and collaboration systems with use of related tools.	C	1	1
Access and apply technology to solve common business problems by database and network design.	C	2	2
Demonstrate and suggest effective business solutions for different business process like CRM, ERP, Social Media Information Systems (SMIS).	C	2	4
Explain in details of ethical aspects of information technology use in the organization, security and privacy related issues.	C	3	8
Lab			
Follow the instructions to demonstrate a solid understanding of Management Information Systems, including their role in organizations, components, and their integration with business processes.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Cloud Computing (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Define cloud computing and explain essential characteristics, history, the business case for cloud, and the emerging technologies enabled by cloud.	C	1	1

Describe the cloud service models, cloud deployment models, and cloud infrastructure.	C	2	2
Investigate emerging Cloud related trends including Hybrid Multi-cloud, Microservices, Serverless, Cloud Native, DevOps, and Application Modernization.	C	4	3
Lab			
Follow instructions to deploy and manage cloud computing solutions, incorporating scalable and secure infrastructure, optimizing resource allocation, and ensuring high availability and reliability of cloud-based services.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Computer Graphics (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Comprehend the structure of modern computer graphics systems	C	1	1
Explain the basic principles of implementing computer graphics fundamentals.	C	2	2
Develop design and problem-solving skills with applications to computer graphics.	C	3	3
Lab			
Follow the instructions to understand the fundamental concepts of computer graphics, including rasterization, vector graphics, image processing, and rendering algorithms.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Data Warehousing & Mining (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Effective designing of data schemas for a warehouse environment.	C	1	1
Writing the OLAP queries in a data warehouse.	C	2	2
Basic techniques for both supervised and unsupervised knowledge discovery.	C	3	3
Use of software package techniques for mining.	C	2	5
Lab			
Follow the instructions to comprehend data warehousing concepts, including data integration, ETL (Extract, Transform, Load) processes, and multidimensional data modeling.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Cloud Application Development (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the key concepts of discrete Structures such as Sets, Permutations, relations, graphs, and Trees.	C	2	1
Apply formal logic proofs, logical reasoning to real problems.	C	3	2
Analyze and Address Security and Compliance in Cloud Development.	C	4	6

Lab			
Follow the instructions to comprehend knowledge to configure and deploy virtual machines, containers, or cloud services on a chosen cloud platform (e.g., AWS, Azure, Google Cloud).	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Social Network Analysis (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Define key SNA concepts such as nodes, edges, and centrality.	C	2	1
Apply SNA techniques to real-world scenarios.	C	4	6
Lab			
Follow the instructions to understand data preprocessing techniques to prepare the collected data for network analysis.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Design and Analysis of Algorithms (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Apply mathematical principles to algorithm design.	C	3	1
Evaluate algorithm efficiency and time complexity.	C	3	2
Analyze the correctness of algorithms.	C	4	2
Lab			
Follow the instructions to explore advanced data structures for algorithm design.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Digital Forensic (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the origins of forensic science.	C	2	1
Explain the difference between scientific conclusions and legal decision-making.	C	4	8
Explain the role of digital forensics and the relationship of digital forensics to traditional forensic science, traditional science and the appropriate use of scientific methods	C	5	3
Lab			
Follow the instructions to investigate Windows systems, analyze registry entries, and interpret Windows artifacts.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Computer organization and Architecture (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the functionality of major components of a computer system like CPU, control unit, memory, I/O and storage.	C	2	2

Discuss the principles of instruction set design including RISC architectures and basic assembly programming.	C	2	3
Identify pipelining and parallelism features applied in single processor, multiple processors and multicore architectures.	C	2	4
Lab			
Follow the instructions to demonstrate a deep concept of Computer Architecture principles through Effective problem-solving and analysis.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Visual Programming (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Use the different elements of a visual programming language as building blocks to develop correct, coherent programs.	C	1	3
Program using the fundamental software development process, including design, coding, documentation, testing and debugging.	C	3	3
Analyze problems, develop conceptual designs that solve those problems, and transform those designs to Visual Programs.	C	4	3
Lab			
Follow instructions to comprehend visual programming concepts and techniques to construct interactive applications, demonstrating analytical thinking and problem-solving abilities through the thoughtful design and implementation of user-friendly interfaces and functionalities.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Formal Methods in Software Engineering (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Describe the costs and benefits of formal methods.	C	1	1
Construct formal models of sequential software systems.	C	2	3
Implement sequential software systems based on formal Models.	C	3	3
Verify attributes of formal models.	C	3	4
Demonstrate formal correctness of simple procedure.	C	4	4
Lab			
Follow the instructions to analyze and model complex software systems using formal methods and Z notation.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Distributed Database Systems (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Demonstrate basic understanding of Distributed Database Systems principles.	C	2	1
Apply normalization techniques for optimizing distributed databases.	C	3	3

Evaluate and compare security mechanisms in Distributed Database Systems.	C	4	5
Lab			
Follow the instructions to implement Fragmentation and Allocation techniques in Databases.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Navigational Aids (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Analyze and critique different types of navigational aids.	C	4	2
Apply user interface design principles to create effective navigational models.	C	3	3
Evaluate navigation systems for usability and accessibility.	C	5	6
Lab			
Follow the instructions to comprehend the fundamental principles and theories governing user interface design, including usability, accessibility, and user experience.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Business Process Automation (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the importance of Business Process Automation (BPA) in modern business.	C	2	1
Identify and describe various BPA tools and technologies.	C	2	4
Lab			
Follow the instructions to describe the automated workflows to improve business processes.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Data Security and Encryption (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Implement Advanced Encryption Algorithms for Data Protection.	C	4	2
Design Robust Access Control Policies and Authentication Mechanisms.	C	3	3
Evaluate Security Threats and Implement Countermeasures.	C	5	6
Lab			
Follow the instructions to design and implement Access Control Measures in a Secure Environment.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Artificial Neural Networks (SOT-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Demonstrate the fundamentals of neural networks in AI.	C	2	1
Explain how simple ANNs can be designed.	C	2	1
Apply ANN for classification Problems.	C	3	3

Apply deep learning algorithms to real-world problems.	C	3	3
Analyze results from deep learning to select appropriate Solutions.	C	4	6
Lab			
Follow the instructions to analyze and optimize neural network performance critically.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Interdisciplinary Technology Elective Courses

Robotics (SOI-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
State the basic components of robotics, classification of robots and their applications	C	1	1
Explain about various types of sensory devices their working and applications.	C	2	1
Apply basic transformations related to the movement of manipulator	C	3	2
Lab			
Follow the instructions to design a robot mechanism to meet kinematics requirements and to write simple programs.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Digital Electronics (SOI-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
To identify and explain fundamental concepts of digital logic design including basic and universal gates, number systems, binary coded systems, basic components of combinational and sequential circuits.	C	2	1
To demonstrate the acquired knowledge to apply techniques related to the design and analysis of digital electronic circuits including Boolean algebra and multivariable Karnaugh map methods.	C	3	1
To analyze small-scale combinational and sequential digital circuits	C	4	2
Lab			
To Construct and analyze the small-scale combinational and sequential digitals circuit.	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Bioinformatics (SOI-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Discuss fundamentals of Genomics and Transcriptomics with respect to bioinformatics.	C	1	1
Describe the structure, classification and functions of protein & DNA.	C	2	2

Compare protein sequences.	C	4	1
Carryout research to retrieve DNA and Protein sequences.	C	3	4
Lab			
Follow the instructions to develop proficiency in programming languages (such as Python, R, or Perl) and computational tools, applying them to analyze biological data, sequence analysis, and data visualization.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Agricultural Technologies (SOI-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
To comprehend the technology in agriculture and its software engineering challenges.	C	2	1
Apply precision farming principles using GPS, GIS, and automated equipment.	C	3	2
Analyze and implement decision support, data analytics, and machine learning in agriculture.	C	4	3
Lab			
Follow the instructions to demonstrate the utilization of precision farming tools, GPS, GIS, and automated equipment for data collection and analysis.	C	2	1
Practice the experiment as per requirement using modern tools.	P	5	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Financial Technologies (SOI-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Analyze financial transactions using double-entry accounting.	C	3	2
Prepare and interpret financial statements accurately.	C	4	3
Apply accounting principles to special accounting topics.	C	5	6

Health, safety and Environment (SOI-3xx)

Course Learning Outcomes	Domain	BT Level	PLO
Demonstrate safety standards must be maintained in compliance with regulatory requirements and engineering limits.	C	2	1
Demonstrate an understanding of workplace injury prevention, risk management and incident investigations.	C	2	1
Discuss the acute and chronic health effects of exposures to chemical, physical and biological agents in the workplace	C	2	1
Explain the policies, procedures and equipment needed to deal with hazardous materials.	C	3	1

Humanities and Social Science Courses

Islamic Studies (SOH-111)

Course Learning Outcomes	Domain	BT Level	PLO
Recite Holy Quran with correct pronunciation.	C	1	11
Apply understanding of basic concepts of teaching of Islam (faith, pillars, Dawit, preaching and Seerat).	C	3	11

Produce Compilation of the Holy Quran and Basic Concepts of Hadith.	A	2	11
Present Islam as a code of life.	A	3	9

Ideology and constitution of Pakistan (SOH-121)

Course Learning Outcomes	Domain	BT Level	PLO
Learn about the History and Ideology of Pakistan.	C	1	1
Get knowledge about the political and administrative structure of Pakistan.	C	2	1
Get familiarity about the political transitions in Pakistan.	C	2	1

Professional Practices (SOS-231)

Course Learning Outcomes	Domain	BT Level	PLO
Describe and classify the individual attitude and organizational behavior.	C	1	6
Debate and recognize conflicts in an ethical way at national and international level.	C	4	8

Communication Skills (SOE-234)

Course Learning Outcomes	Domain	BT Level	PLO
Comprehend basic communication skills to achieve communicative competence for their professional career.	C	2	2
Produce reader-oriented technical documents that support an effective work atmosphere.	A	2	2
Present such verbal and non-verbal techniques and personality grooming traits that cater to the requirements of the corporate sector.	A	3	7

Technical Writing (SOE-351)

Course Learning Outcomes	Domain	BT Level	PLO
Comprehend technical writing, its characteristics and referencing and differentiate between technical & academic writing.	C	2	7
Write effective technical documents based on reader-based principles and clear writing style.	A	2	7
Prepare and Present report writing skills using a standard word processing software along with a referencing tool and other interpersonal skills.	A	3	9

Functional English (SOE-112)

Course Learning Outcomes	Domain	BT Level	PLO
Know Public Speaking, The Art of Creating a Power Point Presentation, Interacting with the Opposite Gender, Classroom Etiquettes and Teachers' Expectations.	A	2	10
Discuss articles, Prepositions, Homophones, Punctuation, Tenses in English Grammar	C	2	10

Natural Science Courses

Applied Calculus (SOQ-113)

Course Learning Outcomes	Domain	BT Level	PLO
To discuss the concept of integration and differentiation upon function and its applications.	C	2	3
To analyze the concept of integration and differentiation upon function through graphs.	C	4	3
To analyze the concept of different kind of series and their convergence	C	4	3

Applied Physics (SON-114)

Course Learning Outcomes	Domain	BT Level	PLO
Theory			
Explain the fundamental physical principles.	C	2	1
Apply these principles, together with logical and mathematical reasoning, to situations of the physical world.	C	3	2
Analyze different physical problems using the laws of physics.	C	4	2
Lab			
Follow instructions to identify the knowledge of constructing basic circuits and demonstration of relevant theorems using different electronic components.	C	2	1
Practice the experiment as per requirement using modern tools.	P	4	5
Ability to communicate effectively; orally as well as in writing.	A	2	10

Probability and Statistics (SOQ-122)

Course Learning Outcomes	Domain	BT Level	PLO
Explain the importance of probability and statistics.	C	2	2
Apply probabilities related to both discrete	C	3	2
Compare and analyze data sets using descriptive statistics.	C	4	3

Discrete Structures (SOQ-123)

Course Learning Outcomes	Domain	BT Level	PLO
Explain the key concepts of discrete Structures such as Sets, Permutations, relations, graphs and Trees.	C	2	1
Apply formal logic proofs, logical reasoning to real problems.	C	3	2
Apply discrete structures into other computing problems such as formal specifications, databases and artificial intelligence.	C	3	2

Interdisciplinary Electives (Social Sciences) Courses

Sociology (SOI-2xx)

Course Learning Outcomes	Domain	BT Level	PLO
Analyze sociological theories and their application to real-world social phenomena.	C	4	1
Examine social inequalities and their impact on various societal groups.	C	3	2
Evaluate the influence of culture and social institutions on individual and collective behavior.	C	5	3

Critical Thinking (SOI-2xx)

Course Learning Outcomes	Domain	BT Level	PLO
Analyze complex engineering problems using critical thinking skills.	C	4	2
Evaluate and synthesize information from various sources for engineering solutions.	C	5	3
Critically assess the ethical and societal implications of engineering decisions.	C	5	6

Organizational Behaviour (SOI-2xx)

Course Learning Outcomes	Domain	BT Level	PLO
Explain key organizational behavior theories and concepts.	C	2	1
Apply organizational behavior theories to analyze workplace issues.	C	3	2
Evaluate the effectiveness of organizational behavior interventions.	C	5	3

Professional Psychology (SOI-2xx)

Course Learning Outcomes	Domain	BT Level	PLO
Discuss foundational psychological theories and concepts.	C	2	1
Analyze and evaluate psychological research critically.	C	4	2
Adhere to ethical guidelines in psychology.	C	3	3
Communicate psychological concepts effectively.	C	4	10

Interdisciplinary Electives (Management) Courses

Technopreneurship (SOI-361)

Course Learning Outcomes	Domain	BT Level	PLO
Show understanding of the basic principles, rules, regulations and laws of technology entrepreneurship.	C	2	1
Develop an outlook towards the latest trends and issues related to technology entrepreneurship.	C	1	12

Economics (SOI-2xx)

Course Learning Outcomes	Domain	BT Level	PLO
Apply engineering economic analysis techniques to evaluate project feasibility and make investment decisions.	C	3	1
Analyze the time value of money and its implications for engineering projects and investments.	C	4	2
Evaluate the economic and environmental impact of engineering solutions, considering factors such as sustainability and ethical considerations.	C	5	3

Leadership (SOI-2xx)

Course Learning Outcomes	Domain	BT Level	PLO
Define the nature of leadership and its fundamental theories.	C	1	1
Compare and contrast various leadership styles.	C	3	2
Identify the elements of effective team building and group dynamics.	C	3	2
Analyze various conflict resolution methods and their applications.	C	4	3

Marketing (SOI-2xx)

Course Learning Outcomes	Domain	BT Level	PLO
Identify some of the basic approaches to formulating a marketing strategy in order to participate effectively when working with marketing policy coordinators.	C	4	2
Use an understanding of marketing and the market driven enterprise to differentiate market.	C	2	2
Identify key stages of the market planning process in order to create marketing plans through development of key sections common to most plans.	C	4	2

Financial Accounting (SOI-2xx)

Course Learning Outcomes	Domain	BT Level	PLO
Develop and understand the nature and purpose of financial statements in relationship to decision making.	C	2	2
Develop the ability to use the fundamental accounting equation to analyze the effect of business transactions on an organization's accounting records and financial statements.	C	3	2
Develop the ability to use a basic accounting system to create (record, classify, and summarize) the data needed to solve a variety of business problems.	C	3	2
Develop the ability to use accounting concepts, principles, and frameworks to analyze and effectively communicate information to a variety of audiences.	C	3	2
Develop the ability to use accounting information to solve a variety of business problems.	C	3	2
Develop the ability to interact well with team members	A	3	9

Non-Credit Course

Teaching of Holy Quran with Translation (QS-xxx)

Course Learning Outcomes	Domain	BT Level	PLO
Demonstrate Proficiency in Tajweed and Quranic Translation.	C	2	2
Apply Quranic Interpretation Skills.	C	3	2
Evaluate Ethical and Social Implications of Quranic Teachings	C	5	9