SIES Graduate School of Technology

RISE WITH EDUCATION

DEPARTMENT OF COMPUTER ENGINEERING

Course Outcomes

Second Year : III SEM (REV- 2019 'C' Scheme)

Course Code:	**CSC 301**
Course:	**Applied Mathematics III**
CO-1	Understand the concept of Laplace transform and its application to solve the real integrals in engineering problems.
CO-2	Understand the concept of inverse Laplace transform of various functions and its applications in engineering problems.
CO-3	Expand the periodic function by using the Fourier series for real-life problems and complex engineering problems
CO-4	Understand complex variable theory, application of harmonic conjugate to get orthogonal trajectories and analytic functions.
CO-5	Apply the concept of Correlation and Regression to the engineering problems in data science, machine learning, and AI.
CO-6	Understand the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.

Course Code:	CSC 302
Course:	Discrete Structures and Graph Theory
CO-1	Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving.
CO-2	Ability to reason logically.
CO-3	Ability to understand relations, functions, Diagraph and Lattice.
CO-4	Ability to understand and apply concepts of graph theory in solving real world problems.
CO-5	Understand use of groups and codes in Encoding-Decoding.
CO-6	Analyze a complex computing problem and apply principles of discrete mathematics to identify solutions.

Course Code:	CSC 303
Course:	Data Structures
CO-1	Students will be able to implement Linear and Non-Linear data structures.
CO-2	Students will be able to handle various operations like searching, insertion, deletion and traversals on various data structures.
CO-3	Students will be able to explain various data structures, related terminologies and its types.
CO-4	Students will be able to choose appropriate data structure and apply it to solve problems in various domains.
CO-5	Students will be able to analyze and implement appropriate searching techniques for a given problem.
CO-6	Students will be able to demonstrate the ability to analyze, design, apply and use data structures to solve engineering problems and evaluate their solutions.

Course Code:	CSC 304
Course:	Digital Logic and Computer Architecture
CO-1	To illustrate different number systems and basic structure of computer systems.
CO-2	To demonstrate the arithmetic algorithms.
CO-3	To articulate the basic concepts of digital components and processor organization.
CO-4	To indicate the generation of control signals of computers.
CO-5	To demonstrate the memory organization.
CO-6	To describe the concepts of parallel processing and different Buses.

Course Code:	CSC 305
Course:	Computer Graphics
CO-1	Describe the basic concepts of Computer Graphics.
CO-2	Demonstrate various algorithms for basic graphics primitives.
CO-3	Apply 2-D geometric transformations on graphical objects.
CO-4	Use various Clipping algorithms on graphical objects
CO-5	Explore 3-D geometric transformations, curve representation techniques and projections methods.
CO-6	Explain visible surface detection techniques and Animation.

Course Code:	CSL 301
Course:	Data Structures Lab
CO-1	Students will be able to implement various linear and nonlinear data structures.
CO-2	Students will be able to handle operations like insertion, deletion, searching and traversing on various data structures.

Course Code:	CSL 302
Course:	Digital Logic and Computer Architecture Lab
CO-1	To discern the basics of digital components
CO-2	Design the basic building blocks of a computer: ALU, registers, CPU and memory
CO-3	To recognize the importance of digital systems in computer architecture
CO-4	To implement various algorithms for arithmetic operations.

Course Code:	CSL 303
Course:	Computer Graphics Lab
CO-1	Implement various output and filled area primitive algorithms
CO-2	Apply transformation, projection and clipping algorithms on graphical objects.
CO-3	Implementation of curve and fractal generation.
CO-4	Develop a Graphical application/Animation based on learned concept

Course Code:	CSL 304
Course:	Skill Lab : Object Oriented Programming Methodology
CO-1	To apply fundamental programming constructs.
CO-2	To illustrate the concept of packages, classes and objects.
CO-3	To elaborate the concept of strings, arrays and vectors.
CO-4	To implement the concept of inheritance and interfaces.
CO-5	To implement the concept of exception handling and multithreading.
CO-6	To develop GUI based application

Course Code:	CSM 301
Course:	Mini Project -I A
CO-1	Identify problems based on societal /research needs.
CO-2	Apply Knowledge and skill to solve societal problems in a group.
CO-3	Develop interpersonal skills to work as member of a group or leader
CO-4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO-5	Analyze the impact of solutions in societal and environmental context for sustainable development.
CO-6	Use standard norms of engineering practices
CO-7	Excel in written and oral communication.
CO-8	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
CO-9	Demonstrate project management principles during project work.

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Second Year : IV SEM (REV- 2019 'C' Scheme)

Course Code:	CSC 401
Course:	Engineering Mathematics – IV
CO-1	Apply the concepts of eigen values and eigen vectors in engineering problems.
CO-2	Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals.
CO-3	Apply the concept of Z- transformation and its inverse in engineering problems.
CO-4	Use the concept of probability distribution and sampling theory to engineering problems.
CO-5	Apply the concept of Linear Programming Problems of optimization
CO-6	Solve Non-Linear Programming Problems for optimization of engineering problems

Course Code:	CSC 402
Course:	Analysis of Algorithms
CO-1	Analyze the running time and space complexity of algorithms .
CO-2	Describe, apply and analyze the complexity of divide and conquer strategy.
CO-3	Describe, apply and analyze the complexity of greedy strategy.
CO-4	Describe, apply and analyze the complexity of dynamic programming strategy
CO-5	Explain and apply backtracking, branch and bound.
CO-6	Explain and apply string matching technique.

Course Code:	CSC 403
Course:	Database Management Systems
CO-1	Students should be able to explain the fundamentals of a database system.
CO-2	Students should be able to design and draw ER and EER diagram for the real life problem.
CO-3	Students should be able to convert conceptual model to relational model and formulate relational algebra queries.
CO-4	Students should be able to design and querying database using SQL.
CO-5	Students should be able to analyze and apply concepts of normalization to relational database design.
CO-6	Students should be able to describe the concept of transaction, concurrency and recovery.

Course Code:	CSC 404
Course:	Operating Systems
CO-1	Understand the objectives, functions and structure of OS.
CO-2	Analyze the concept of process management and evaluate performance of process scheduling algorithms.
CO-3	Understand and apply the concepts of synchronization and deadlocks
CO-4	Evaluate performance of Memory allocation and replacement policies
CO-5	Understand the concepts of file management.
CO-6	Apply concepts of I/O management and analyze techniques of disk scheduling.

Course Code:	CSC 405
Course:	Microprocessor
CO-1	Describe core concepts of 8086 microprocessor
CO-2	Interpret the instructions of 8086 and write assembly and mixed language programs
CO-3	Identify the specifications of peripheral chip
CO-4	Design 8086 based system using memory and peripheral chips
CO-5	Appraise the architecture of advanced processors
CO-6	Understanding hyperthreading technology

Course Code:	CSL 401
Course:	Analysis of Algorithms Lab
CO-1	To introduce the methods of designing and analyzing algorithms
CO-2	Design and implement efficient algorithms for a specified application
CO-3	Strengthen the ability to identify and apply the suitable algorithm for the given real-world problem.
CO-4	Analyze worst-case running time of algorithms and understand fundamental algorithmic problems

Course Code:	CSL 402
Course:	Database Management Systems Lab
CO-1	Design ER /EER diagram and convert to relational model for the realworld application. 2
CO-2	Apply DDL, DML, DCL and TCL commands 3
CO-3	Write simple and complex queries 4
CO-4	Use PL / SQL Constructs

Course Code:	CSL 403
Course:	Operating System Lab
CO-1	To gain practical experience with designing and implementing concepts of operating systems such as system calls, CPU scheduling, process management, memory management, file systems and deadlock handling using C language in Linux environment.
CO-2	To familiarize students with the architecture of Linux OS.
CO-3	To provide necessary skills for developing and debugging programs in Linux environment
CO-4	To learn programmatically to implement simple operation system mechanisms

Course Code:	CSL 404
Course:	Microprocessor Lab
CO-1	Use appropriate instructions to program microprocessor to perform various tasks
CO-2	Develop the program in assembly language for intel 8086 processor
CO-3	Demonstrate the execution and debugging of assembly and mixed language program

Course Code:	CSL 405
Course:	Skill Lab : Python Programming
CO-1	To understand basic concepts in python.
CO-2	To explore contents of files, directories and text processing with python
CO-3	To develop program for data structure using built in functions in python.
CO-4	To explore django web framework for developing python-based web application.
CO-5	To understand Multithreading concepts using python.
CO-6	To explore numpy and pandas libraries

Course Code:	CSM 401
Course:	Mini Project I – B
CO-1	Identify problems based on societal /research needs.
CO-2	Apply Knowledge and skill to solve societal problems in a group.
CO-3	Develop interpersonal skills to work as member of a group or leader
CO-4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
CO-5	Analyze the impact of solutions in societal and environmental context for sustainable development.
CO-6	Use standard norms of engineering practices
CO-7	Excel in written and oral communication.
CO-8	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
CO-9	Demonstrate project management principles during project work.

Third Year : V SEM (REV- 2019 'C' Scheme)

Course Code:	CSC 501
Course:	Theoretical Computer Science
CO-1	Identify the central concepts in theory of computation and differentiate between deterministic and nondeterministic automata, also obtain equivalence of nfa and dfa.
CO-2	Infer the equivalence of languages described by finite automata and regular expressions.
CO-3	Devise regular, context free grammars while recognizing the strings and tokens
CO-4	Design pushdown automata to recognize the language and develop an understanding of computation through machine
CO-5	Design of computational systems through Turing Machine
CO-6	Describe the concepts of decidability and undecidability.

Course Code:	CSC 502
Course:	Software Engineering
CO-1	Identify requirements, analyze and prepare models
CO-2	Plan, schedule and track the progress of the projects
CO-3	Design the software projects
CO-4	Do testing of software project.
CO-5	Identify risks, manage the change to assure quality in software projects.

Course Code:	CSC 503
Course:	Computer Network
CO-1	Demonstrate the concepts of computer networks and compare OSI-ISO model with TCP-IP model.
CO-2	Understand the concepts of data communication at physical Layer
CO-3	Explore different design issues at data link layer.
CO-4	Design the network using ip addressing and subnetting / supernetting schemes and analyze various routing protocols.
CO-5	Analyze transport layer protocols and congestion control algorithms.
CO-6	Explore different protocols at application layer

Course Code:	CSC 504
Course:	Data Warehouse and Mining
CO-1	Understand data warehouse fundamentals and design data warehouse with dimensional modelling and apply OLAP operations.
CO-2	Understand data mining principles and perform Data preprocessing and Visualization
CO-3	Identify appropriate data mining algorithms to solve real world problems.
CO-4	Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining

CO-5	Describe complex information and social networks with respect to web mining.

Course Code:	CSDLO5011
Course:	Probabilistic Graphical Model
CO-1	understand basic concepts of probabilistic graphical modelling.
CO-2	model and extract inference from various graphical models like Bayesian Networks, Markov Models.
CO-3	perform learning and take actions and decisions using probabilistic graphical models.
CO-4	represent real world problems using graphical models; design inference algorithms; and learn the structure of the graphical model from data.
CO-5	design real life applications using probabilistic graphical models.

Course Code:	CSDLO5012
Course:	Internet Programming
CO-1	Implement interactive web page(s) using HTML and CSS.
CO-2	Design a responsive web site using JavaScript
CO-3	Demonstrate database connectivity using JDBC.
CO-4	Demonstrate Rich Internet Application using Ajax.
CO-5	Demonstrate and differentiate various Web Extensions.
CO-6	Demonstrate web application using Reactive Js.

Course Code:	CSDLO5013
Course:	Advanced Database Management Systems
CO-1	Design distributed database using the various techniques for query processing .
CO-2	Measure query cost and perform distributed transaction management
CO-3	Organize the data using XML and JSON database for better interoperability
CO-4	Compare different types of NoSQL databases
CO-5	Formulate NoSQL queries using Mongodb
CO-6	Describe various trends in advance databases through temporal, graph based and spatial based databases

Course Code:	CSL 501
Course:	Software Engineering Lab
CO-1	Identify requirements and apply software process model to selected case study.
CO-2	Develop architectural models for the selected case study.
CO-3	Use computer-aided software engineering (CASE) tools.
CO-4	Identify requirements and apply software process model to selected case study.

CO-5	Develop architectural models for the selected case study.
CO-6	Use computer-aided software engineering (CASE) tools.

Course Code:	CSL 502
Course:	Computer Network Lab
CO-1	Design and setup networking environment in Linux.
CO-2	Use Network tools and simulators such as NS2, Wireshark etc. to explore networking algorithms and protocols.
CO-3	Implement programs using core programming APIs for understanding networking concepts.

Course Code:	CSL 503
Course:	Data Warehouse and Mining Lab
CO-1	Design data warehouse and perform various OLAP operations.
CO-2	Implement data mining algorithms like classification.
CO-3	Implement clustering algorithms on a given set of data sample.
CO-4	Implement Association rule mining & web mining algorithm.

Course Code:	CSL 504
Course:	Business and Communication Ethics
CO-1	Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles.
CO-2	Strategize their personal and professional skills to build a professional image and meet the demands of the industry.
CO-3	Emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations.
CO-4	Deliver persuasive and professional presentations.
CO-5	Develop creative thinking and interpersonal skills required for effective professional communication.
CO-6	Apply codes of ethical conduct, personal integrity and norms of organizational behaviour.

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Course Code:	CSM 501
Course:	MiniProject – 2 A
CO-1	Identify Methodology for solving above problem and apply engineering knowledge and skills to solve it
CO-2	Validate, Verify the results using test cases/benchmark data/theoretical/ inferences/experiments/simulations
CO-3	Analyze and evaluate the impact of solution/product/research/innovation /entrepreneurship towards societal/environmental/sustainable development
CO-4	Use standard norms of engineering practices and project management principles during project work.
CO-5	Communicate through technical report writing and oral presentation. ● The work may result in research/white paper/ article/blog writing and publication ● The work may result in business plan for entrepreneurship product created ● The work may result in patent filing.
CO-6	Gain technical competency towards participation in Competitions, Hackathons, etc.
CO-7	Demonstrate capabilities of self-learning, leading to lifelong learning.
CO-8	Develop interpersonal skills to work as a member of a group or as leaders.
CO-9	Identify Methodology for solving above problem and apply engineering knowledge and skills to solve it

Third Year : VI SEM (REV- 2019 'C' Scheme)

Course Code:	CSC 601
Course:	System Programming and Compiler Construction
CO-1	To understand the role and functionality of various system programs over application programs
CO-2	To understand basic concepts, structure and design of assemblers, macro processors, linkers and loaders.
CO-3	To understand the basic principles of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler.
CO-4	To understand the need to follow the syntax in writing an application program and to learn how the analysis phase of compiler is designed to understand the programmer 's requirements without ambiguity
CO-5	To synthesize the analysis phase outcomes to produce the object code that is efficient in terms of space and execution time

Course Code:	CSC 602
Course:	Cryptography and System Security
CO-1	Students should be able to explain system security goals and concepts, classical encryption techniques and acquire fundamental knowledge on the concepts of modular arithmetic and number theory.
CO-2	Students should be able to compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.
CO-3	Students should be able to apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
CO-4	Students should be able to apply different digital signature algorithms to achieve authentication and design secure applications.
CO-5	Students should be able to explain network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like ssl, ipsec, and pgp.
CO-6	Students should be able to analyze and apply system security concepts to recognize malicious code.

Course Code:	CSC 603
Course:	Mobile Computing
CO-1	To identify basic concepts and principles in mobile communication & computing, cellular architecture.
CO-2	To describe the components and functioning of mobile networking.
CO-3	To classify variety of security techniques in mobile network
CO-4	To apply the concepts of WLAN for local as well as remote applications
CO-5	To describe and apply the concepts of mobility management
CO-6	To describe Long Term Evolution (LTE) architecture and its interfaces

Course Code:	CSC 604
Course:	Artificial Intelligence
CO-1	Ability to develop a basic understanding of AI building blocks presented in intelligent agents.
CO-2	Ability to choose an appropriate problem solving method and knowledge representation technique.
CO-3	Ability to analyze the strength and weaknesses of AI approaches to knowledge–intensive problem solving.
CO-4	Ability to design models for reasoning with uncertainty as well as the use of unreliable information.
CO-5	Ability to design planning and learning for problem definitions
CO-6	Ability to design and develop AI applications in real world scenarios.

Course Code:	CSDLO6011
Course:	Internet of Things
CO-1	Understand the concepts of IoT and the Things in IoT
CO-2	Understand concept of Smart Object,Sensor network and enabling IOT technologies
CO-3	Emphasize core IoT functional Stack
CO-4	Emphasize on Application Protocols for IOT
CO-5	Apply IoT knowledge to key industries that IoT is revolutionizing
CO-6	Examines various IoT hardware items and software platforms used in projects

Course Code:	CSDLO6012
Course:	Digital Signal and Image Processing
CO-1	Students learn DT signal and apply system for solving problem.
CO-2	Students classify and analyze various types of DT system and solve problem
CO-3	Students implement algorithm, of DFT and FFT and solve problems.
CO-4	Students use the enhancement techniques of DSP.
CO-5	Students differentiate advantages and disadvantage of edge detection techniques
CO-6	Develop Small projects of 1 D and 2 D digital signal processing.

Course Code:	CSDLO6013
Course:	Quantitative Analysis
CO-1	Recognize the need of Statistics and Quantitative Analysis.
CO-2	Apply the data collection and the sampling methods.
CO-3	Analyze using concepts of Regression, Multiple Linear Regression
CO-4	Formulate Statistical inference drawing methods
CO-5	Apply Testing of hypotheses

Course Code:	CSL 601
Course:	System Programming and Compiler Construction Lab
CO-1	Generate machine code by implementing two pass assemblers.
CO-2	Implement Two pass macro processor.
CO-3	Parse the given input string by constructing Top down/Bottom-up parser.
CO-4	Identify and Validate tokens for given high level language and Implement synthesis phase of compiler.
CO-5	Explore LEX & YACC tools.

Course Code:	CSL 602
Course:	Cryptography and System Security Lab
CO-1	apply the knowledge of symmetric and asymmetric cryptography to implement simple ciphers.
CO-2	explore the different network reconnaissance tools to gather information about networks.
CO-3	explore and use tools like sniffers, port scanners and other related tools for analysing packets in a Network.
CO-4	set up firewalls and intrusion detection systems using open-source technologies and to explore email security.
CO-5	explore various attacks like buffer-overflow and web application attack.

Course Code:	CSL 603
Course:	Mobile Computing Lab
CO-1	Develop and demonstrate mobile applications using various tools
CO-2	Articulate the knowledge of GSM, CDMA & Bluetooth technologies and demonstrate it.
CO-3	Students will able to carry out simulation of frequency reuse, hidden/exposed terminal problem.
CO-4	Implement security algorithms for mobile communication network
CO-5	Demonstrate simulation and compare the performance of Wireless LAN

Course Code:	CSL 604
Course:	Artificial Intelligence Lab
CO-1	Identify languages and technologies for Artificial Intelligence.
CO-2	Understand and implement uninformed and informed searching techniques for real world problems.
CO-3	Create a knowledge base using any AI language.
CO-4	Design and implement expert systems for real world problems

Course Code:	CSL 605
Course:	Cloud Computing Lab
CO-1	Implement different types of virtualization techniques.
CO-2	Analyze various cloud computing service models and implement them to solve the given problems.
CO-3	Design and develop real world web applications and deploy them on commercial cloud(s).
CO-4	Explain major security issues in the cloud and mechanisms to address them.
CO-5	Explore various commercially available cloud services and recommend the appropriate one for the given application.
CO-6	Implement the concept of containerization

Course Code:	CSM 601
Course:	Mini Project – 2B
CO-1	Identify societal/research/innovation/entrepreneurship problems through appropriate literature surveys
CO-2	Identify Methodology for solving above problem and apply engineering knowledge and skills to solve it
CO-3	Validate, Verify the results using test cases/benchmark data/theoretical/ inferences/experiments/simulations
CO-4	Analyze and evaluate the impact of solution/product/research/innovation /entrepreneurship towards societal/environmental/sustainable development
CO-5	Use standard norms of engineering practices and project management principles during project work
CO-6	Communicate through technical report writing and oral presentation. ● The work may result in research/white paper/ article/blog writing and publication ● The work may result in business plan for entrepreneurship product created ● The work may result in patent filing.
CO-7	Gain technical competency towards participation in Competitions, Hackathons, etc.
CO-8	Demonstrate capabilities of self-learning, leading to lifelong learning.
CO-9	Develop interpersonal skills to work as a member of a group or as leader

Final Year : VII SEM (REV- 2019 'C' Scheme)

Course Code:	CSC 701
Course:	Machine Learning
CO-1	To acquire fundamental knowledge of developing machine learning models.
CO-2	To select, apply and evaluate an appropriate machine learning model for the given scenario
CO-3	To demonstrate ensemble techniques to combine predictions from different models.
CO-4	To demonstrate the dimensionality reduction technique.
CO-5	Design application using machine learning techniques

Course Code:	CSC 702
Course:	Big Data Analytics
CO-1	Understand the building blocks of Big Data Analytics.
CO-2	Apply fundamental enabling techniques like Hadoop and MapReduce in solving real world problems.
CO-3	Understand different NoSQL systems and how it handles big data.
CO-4	Apply advanced techniques for emerging applications like stream analytics.
CO-5	Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications, etc.
CO-6	Apply statistical computing techniques and graphics for analyzing big data.

Course Code:	CSDC7011
Course:	Machine Vision
CO-1	Elaborate the components of Machine Vision Application.
CO-2	Perform image, video preprocessing operations
CO-3	Explain various transformations, interpolation.
CO-4	Elaborate motion tracking in video.
CO-5	Analyze and Implement appropriate filtering techniques for a given problem.
CO-6	Develop applications based on machine vision

Course Code:	CSDC7013
Course:	Natural Language Processing
CO-1	To describe the field of natural language processing.
CO-2	To design language model for word level analysis for text processing.
CO-3	To design various POS tagging techniques and parsers.
CO-4	To design, implement and test algorithms for semantic and pragmatic analysis.
CO-5	To formulate the discourse segmentation and anaphora resolution.
CO-6	To apply NLP techniques to design real world NLP applications.

Course Code:	CSDC7022
Course:	Blockchain
CO-1	Explain blockchain concepts
CO-2	Apply cryptographic hash required for blockchain.
CO-3	Apply the concepts of smart contracts for an application.
CO-4	Design a public blockchain using Ethereum.
CO-5	Design a private blockchain using Hyperledger.
CO-6	Use different types of tools for blockchain applications.

Course Code:	CSDC7023
Course:	Information Retrieval
CO-1	Define and describe the basic concepts of the Information retrieval system
CO-2	Design the various modeling techniques for information retrieval systems.
CO-3	Understand the query structure and various query operations
CO-4	Analyzing the indexing and scoring operation in information retrieval systems
CO-5	Perform the evaluation of information retrieval systems
CO-6	Analyze various information retrieval for real world application

Course Code:	ILO7013
Course:	Management Information System
CO-1	Explain how information systems Transform Business
CO-2	Identify the impact information systems have on an organization
CO-3	Describe IT infrastructure and its components and its current trends
CO-4	Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making

CO-5	Identify the types of systems used for enterprise-wide knowledge management and how they provide value for businesses

Course Code:	ILO 7016
Course:	Cyber Security and Laws
CO-1	Understand the concept of cybercrime and its effect on outside world
CO-2	Interpret and apply IT law in various legal issues
CO-3	Distinguish different aspects of cyber law
CO-4	Apply Information Security Standards compliance during software design and development

Course Code:	ILO 7017
Course:	Disaster Management and Mitigation Measures
CO-1	Get to know natural as well as manmade disaster and their extent and possible effects on the economy.
CO-2	Plan of national importance structures based upon the previous history.
CO-3	Get acquainted with government policies, acts and various organizational structure associated with an emergency.
CO-4	Get to know the simple do's and don'ts in such extreme events and act accordingly.

Course Code:	CSL70011
Course:	Machine Learning Lab
CO-1	To implement an appropriate machine learning model for the given application.
CO-2	To implement ensemble techniques to combine predictions from different models.
CO-3	To implement the dimensionality reduction techniques.

Course Code:	CSL 7012
Course:	Big Data Analytics Lab
CO-1	To interpret business models and scientific computing paradigms, and apply software tools for big data analytics
CO-2	To implement algorithms that uses Map Reduce to apply on structured and unstructured data
CO-3	To perform hands-on NoSql databases such as Cassandra, HadoopHbase, MongoDB, etc.
CO-4	To implement various data streams algorithms.
CO-5	To develop and analyze the social network graphs with data visualization techniques.

Course Code:	CSDL7011
Course:	Machine Vision Lab
CO-1	Students will be able to read image and video file, perform different Processing.
CO-2	Students will be able to do edge detection ,depth estimation
CO-3	Students will be able to choose appropriate algo for segmentation
CO-4	Students will be able to implement object detection technique

Course Code:	CSDL7013
Course:	Natural Language Processing Lab
CO-1	Apply various text processing techniques.
CO-2	Design language model for word level analysis.
CO-3	Model linguistic phenomena with formal grammar.
CO-4	Design, implement and analyze NLP algorithms.
CO-5	To apply NLP techniques to design real world NLP applications such as machine translation, sentiment analysis, text summarization, information extraction, Question Answering system etc.
CO-6	Implement proper experimental methodology for training and evaluating empirical NLP systems.

Course Code:	CSDL7022
Course:	Blockchain Lab
CO-1	Creating Cryptographic hash using merkle tree
CO-2	Design Smart Contract using Solidity.
CO-3	Implementing ethereum blockchain using Geth.
CO-4	Demonstrate the concept of blockchain in real world application.

Course Code:	CSDL7023
Course:	Information Retrieval Lab
CO-1	To frame queries for information retrieval
CO-2	To implement modeling techniques
CO-3	To perform query expansion techniques 4
CO-4	To demonstrate evaluation techniques for IR

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Course Code:	CSP 701
Course:	Major Project – I
CO-1	To develop the understanding of the problem domain through extensive review of literature.
CO-2	To Identify and analyze the problem in detail to define its scope with problem specific data.
CO-3	To know various techniques to be implemented for the selected problem and related technical skills through feasibility analysis.
CO-4	To design solutions for real-time problems that will positively impact society and environment.
CO-5	To develop clarity of presentation based on communication, teamwork and leadership skills.
CO-6	To inculcate professional and ethical behavior.

Final Year: VIII SEM (REV- 2019 'C' Scheme)

Course Code:	CSC 801
Course:	Distributed Computing
CO-1	Demonstrate the knowledge of basic elements and concepts related to distributed system technologies.
CO-2	Illustrate the middleware technologies that support distributed applications such as RPC, RMI and Object-based middleware.
CO-3	Analyze the various techniques used for clock synchronization, mutual exclusion and deadlock.
CO-4	Demonstrate the concepts of Resource and Process management.
CO-5	Demonstrate the concepts of Consistency, Replication Management and fault Tolerance.
CO-6	Apply the knowledge of Distributed File systems in building large-scale distributed applications.

Course Code:	CSDC8011
Course:	Deep Learning
CO-1	Gain basic knowledge of Neural Networks.
CO-2	Acquire in depth understanding of training Deep Neural Networks.
CO-3	Design appropriate DNN model for supervised, unsupervised and sequence learning applications.
CO-4	Gain familiarity with recent trends and applications of Deep Learning.

Course Code:	CSDC8012
Course:	Digital Forensics
CO-1	Discuss the phases of Digital Forensics and methodology to handle the computer security incident.
CO-2	Describe the process of collection, analysis and recovery of the digital evidence.
CO-3	Explore various tools to analyze malwares and acquired images of RAM/hard drive.
CO-4	Acquire adequate perspectives of digital forensic investigation in mobile devices
CO-5	Analyze the source and content authentication of emails and browsers.
CO-6	Produce unambiguous investigation reports which offer valid conclusions

Course Code:	CSDC8013
Course:	Applied Data Science
CO-1	To gain fundamental knowledge of the data science process.
CO-2	To apply data exploration and visualization techniques.
CO-3	To apply anomaly detection techniques.
CO-4	To gain an in-depth understanding of time-series forecasting.
CO-5	Apply different methodologies and evaluation strategies.
CO-6	To apply data science techniques to real world applications

Course Code:	CSDC8021
Course:	Optimization in Machine Learning
CO-1	To understand foundational optimization ideas including gradient descent, stochastic gradient methods
CO-2	To apply convex optimization algorithm
CO-3	To analyze and demonstrate several population methods in Evolutionary Computation
CO-4	To apply advanced evolutionary algorithms such as particle swarm and ant colony optimization

Course Code:	CSDC8022
Course:	High Performance Computing
CO-1	Understand parallel and pipeline processing approaches.
CO-2	Design a parallel algorithm to solve computational problems and identify issues in parallel programming.
CO-3	Analyze the performance of parallel computing systems for clusters in terms of execution time, total parallel overhead, speedup.
CO-4	Develop efficient and high-performance parallel algorithms using OpenMP and message passing paradigm.
CO-5	Develop high-performance parallel programming using OpenCL and CUDA framework.
CO-6	Perform the range of activities associated with High Performance Computing in Cloud Computing

Course Code:	ILO8021
Course:	Project Management
CO-1	Apply selection criteria and select an appropriate project from different options
CO-2	Write work break down structure for a project and develop a schedule based on it.
CO-3	Identify opportunities and threats to the project and decide an approach to deal with them strategically.
CO-4	Use Earned value technique and determine & predict status of the project.
CO-5	Capture lessons learned during project phases and document them for future reference

Course Code:	ILO8022
Course:	Finance Management
CO-1	Students should be able to explain the importance and components of the Indian Financial System.
CO-2	Students should be able to estimate the risk & returns and present / future value of ofvarious investments
CO-3	Students should be able to describe corporate finance and significance of financial statements & ratio analysis
CO-4	Students should be able to calculate capital budgeting using various investment appraisal criterias & also the working capital requirements
CO-5	Students should be able to explain the various sources of finance and capital structuretheories & approaches
CO-6	Students should be able to describe the dividend policy theories & approaches

Course Code:	ILO8028
Course:	Digital Business Management
CO-1	Students should be able to summarize drivers of digital business.
CO-2	Students should be able to illustrate various approaches and techniques for E-business and management
CO-3	Students should be able to explain different digital business support services andtechnologies in E infrastructure
CO-4	Students should be able to explain various ethics and societal impacts of e-commerce
CO-5	Students should be able to identify the need of security and summarize various security techniques.
CO-6	Students should be able to develop E-business plan.

Course Code:	ILO8029
Course:	Environmental Management
CO-1	Students should be able to Identify environmental Issues relevant to India and Globalconcerns
CO-2	Students should be able to understand and apply the concept of Environment Management and Sustainable development.
CO-3	Students should be able to relate to the scope of Environment Management and identify career opportunities.
CO-4	Students should be able to understand the concept of ecology, Ecosystem, its interdependence and food chain.
CO-5	Students should be able to demonstrate awareness of environment related legislations.
CO-6	Students should be able to develop awareness of EMS and ISO-14000.

Course Code:	CSL 801
Course:	Distributed Computing Lab
CO-1	Develop test and debug using Message-Oriented Communication or RPC/RMI based client-server programs.
CO-2	Implement techniques for clock synchronization
CO-3	Implement techniques for Election Algorithms.
CO-4	Demonstrate mutual exclusion algorithms and deadlock handling.
CO-5	Implement techniques of resource and process management.
CO-6	Describe the concepts of distributed File Systems with some case studies.

Course Code:	CSDL8021
Course:	Deep Learning Lab
CO-1	Implement basic neural network models to learn logic functions.
CO-2	Design and train feedforward neural networks using various learning algorithms.
CO-3	Build and train deep learning models such as Autoencoders, CNNs, RNN, LSTM etc.

Course Code:	CSDL8022
Course:	Digital Forensics Lab
CO-1	Explore various forensics tools and use them to acquire, duplicate and analyze data and recover deleted data.
CO-2	Implement penetration testing using forensics tools.
CO-3	Explore various forensics tools and use them to acquire and analyze live and static data.
CO-4	Verification of source and content authentication of emails and browsers.
CO-5	Demonstrate Timeline Report Analysis using forensics tools.
CO-6	Discuss real time crime forensics investigations scenarios.

Course Code:	CSDL8023
Course:	Applied Data Science Lab
CO-1	Apply various stages of the data science lifecycle for the selected case study.
CO-2	Demonstrate data preparation, exploration and visualization techniques.
CO-3	Implement and evaluate different supervised and unsupervised techniques.

Course Code:	CSDL8021
Course:	Optimization in Machine Learning Lab
CO-1	To implement derivative based optimization techniques
CO-2	To implement evolutionary optimization
CO-3	To implement advanced evolutionary optimization
CO-4	To apply efficient optimization algorithm for real world applications

Course Code:	CSDL8022
Course:	High Performance Computing Lab
CO-1	Perform Linux based commands on remote machine
CO-2	Compare the performance of sequential algorithms with parallel algorithm in terms of execution time, speedup and throughput.
CO-3	Implement parallel program using OpenMP libraryand analyze its performance
CO-4	Implement parallel program using MPIplatform and analyze its performance
CO-5	Implement parallel program using OpenCL framework and analyze its performance
CO-6	Implement parallel program using CUDA framework and analyze its performance.

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Course Code:	CSP801
Course:	Major Project
CO-1	Implement solutions for the selected problem by applying technical and professional skills.
CO-2	Analyze impact of solutions in societal and environmental context for sustainable development.
CO-3	Collaborate best practices along with effective use of modern tools
CO-4	Develop proficiency in oral and written communication with effective leadership and teamwork.
CO-5	Nurture professional and ethical behavior.
CO-6	Gain expertise that helps in building lifelong learning experience.