CS501C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

FORMAL LANGUAGES AND AUTOMATA THEORY

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Identify different formal language classes and their relationships
- Design grammars and recognizers for different formal languages
- Understand the logical limits to computational capacity
- Get proper insight on un-decidable problems

UNIT I

Why study Automata Theory, Central Concepts of Automata Theory, Informal Picture of Finite Automata, Deterministic Finite Automata, Nondeterministic Finite Automata and Applications, Finite Automation with Epsilon Transitions.

UNIT II

Regular Expressions and their Applications, Finite Automata and Regular Expressions, Algebraic Laws for Regular Expressions.
Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT III

Context Free Grammars (CFG), Parse Trees, Applications of CFG, Ambiguity in Grammars and Languages.
Definition of Pushdown Automaton, The Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

UNIT IV

Normal forms for CFG, Pumping Lemma for Context Free Languages, Closure and Decision Properties of CFLs
Turing Machine Model, Representation of Turing Machines, Language Acceptability by TM, Design of TMs, Universal Turing Machine, Halting Problem of TM, Church-Turing Thesis.

UNIT V

A Language that is not Recursively Enumerable, An Undecidable Problem that is Recursively Enumerable, Undecidable Problems about Turing Machines,
The Classes of P and NP, NP Complete Problem.

Text Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
2. Martin J C, Introduction to Languages and the Theory of Computation, 3rd edition, Tata McGraw-Hill, 2003.

Reference Books:

1. Krithivasan K, Introduction to Formal Languages, Automata Theory and Computation, Pearson Education, 2009.
2. Rich E, Automata, Computability, and Complexity – Theory and Applications, Pearson Education, 2012.
3. Singh A, Elements of Computation Theory, Springer, 2009.
4. Cohen D I A, Introduction to Computer Theory, 2nd edition, John Wiley, 2000.
5. Lewis H, Papadimitriou C H, Elements of the Theory of Computation, 2nd edition, Prentice Hall, 1997.

Course Outcomes

At the end of the course, students will be able to

- Write a formal notation for strings, languages and machines.
- Design finite automata to accept a set of strings of a language.
- Determine whether the given language is regular or not.
- Design context free grammars to generate strings of context free language.
- Determine equivalence of languages accepted by pushdown automata and languages generated by context free grammars
- Distinguish between computability & non-computability and decidability & undecidability.

CS502C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

OPERATING SYSTEMS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- provide knowledge about the services rendered by operating systems
- present detail discussion on processes, threads and scheduling algorithms.
- discuss various file-system design and implementation issues
- provide good insight on various memory management techniques
- expose the students with different techniques of handling of deadlocks
- familiarize students the basics of Linux system and perform administrative tasks on Linux servers
- discuss how the protection domains help to achieve security in a system

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, protection and security, Computing environments, Open-Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

UNIT II

Process Concept: Process scheduling, Operations on processes, Interprocess communication, Communication in client server systems.

Multithreaded Programming: Multitheading models, Thread libraries, Threading issues, Examples.

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.

UNIT III

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples.

Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.

UNIT IV

Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.
File Systems: Files, Directories, File system implementation, management and optimization.
Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

UNIT V

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.
System Security: Introduction, Program threats, System and network threats, Cryptography for security, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer security classification.
Case Studies: Linux, Microsoft Windows 7.

Text Books:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Interprocess Communication and File systems.)

Reference Books:

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

Course Outcomes

By the end of this course students will be able to:

1. Recognize how the applications interact with the operating system as the later working as intermediary program between the machine and the application.
2. Understand how operating system manages resources such as processors, memory and I/O.
3. Demonstrate knowledge and understanding of how concurrency in OS is handled.
4. Understand the techniques used to implement the process manager
5. Implement various memory management and demand paging techniques.
6. Comprehend virtual memory abstractions in operating systems
7. Design and develop file system interface.
8. Understand various schemes available for achieving system protection and system security

CS503C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPUTER NETWORKS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Provide insight about fundamental concepts, basic taxonomy and terminology of Computer Networks.
- Gain comprehensive knowledge about the principles, protocols, and significance of Layers in OSI and TCP/IP

UNIT I

Introduction to Computer Networks: Networks, Component and Categories, Topologies, Transmission Media, Reference Models: ISO/OSI Model and TCP/IP Model.
Physical Layer: Analog and Digital Signals, Periodic Analog Signals, Transmission Impairments, Data rate limits, Performance, Digital data transmission techniques, Analog data transmission techniques, Multiplexing: FDM, WDM and TDM; Spread Spectrum, Switching: Circuit and Packet.

UNIT II

Data Link Layer and Medium Access Sub Layer: Design Issues, Error Detection and Error Correction, Elementary Data Link Protocols, Sliding Window Protocols, Channel allocation problems, Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA; IEEE 802.3 Ethernet.

UNIT III

The Network Layer: Network layer design issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

UNIT IV

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, Internet Transport Protocols: UDP, TCP; Network Performance Measurement.

UNIT V

The Application Layer: Introduction, Client-Server Programming, Domain Name System (DNS), WWW and HTTP, FTP, E-mail, TELNET, Secure Shell, SNMP, IP Security Architecture, Firewalls.

Text Books:

1. Computer Networks, Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.
2. Data communications and Networking, Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.

Reference Books:

1. Kurose J F, Ross K W, *Computer Networking – A Top-Down Approach*, 5th edition, Pearson Education, 2010.
2. Peterson L L, Davie B S, *Computer Networks - A Systems Approach*, 5th edition, Morgan Kaufmann, 2011.
3. Forouzan B A, Mosharraf F, *Computer Networks – A Top-Down Approach*, Tata McGraw-Hill, 2012.
4. Olifer N, Olifer V, *Computer Networks – Principles, Technologies, and Protocols for Network Design*, Wiley, 2006.

Course Outcomes

By the end of this course students will be able to:

- Choose the transmission media depending on the requirements.
- Explain the functions of different layer of the OSI Protocol
- Analyze MAC layer protocols and LAN technologies
- Implement routing and congestion control algorithms
- Design new protocols for computer network.
- Configure DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls using open source software and tools.

CS504C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

SOFTWARE ENGINEERING

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to understand

- Software life cycle models.
- Software requirements and SRS document.
- Different software design strategies
- Quality control and how to ensure good quality software.
- Planning and estimation of software projects.
- Maintenance of software and gain knowledge of the overall project activities.

UNIT I

Introduction to Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development: Agility, Agility and the Cost of Change, Extreme Programming, Agile Process Models

UNIT II

Understanding Requirements: Requirements Engineering, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

Requirements Modeling: Requirements Analysis, Scenario based Modeling, Class based Modeling, Requirements Modeling Strategies, Flow Oriented Modeling, Patterns for Requirement Modeling, Requirements Modeling for WebApps

Design Concepts: Design Process, Design Concepts, Design Model.

Architectural Design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Alternative Architectural Designs, Architectural Mapping using Data flow.

UNIT III

Component Level Design: Component, Class based Components, Conducting Component level design, Component level Design for WebApps, Designing Traditional Components, Component based Development.

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation.

Pattern Based Design: Design Patterns, Pattern based Software Design, Architectural Patterns, Component Level Design Patterns, User Interface Design Patterns.

UNIT IV

Software Quality Concepts: Software Quality, Software Quality Dilemma, Achieving Software Quality.

Software Quality Assurance: Elements of Software Quality Assurance, SQA Goals and Metrics, Formal Approaches to SQA, Statistical SQA, Software Reliability.

Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Unit Testing and Integration Testing (both Conventional and OO Software), Test Strategies for WebApps, Validation Testing, System Testing, Art of Debugging.

Testing Conventional Applications: Software Testing Fundamentals, Internal and External View of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Model based Testing, Testing for Specialized Environments, Patterns for Software Testing.

Computer Aided Software Engineering: CASE and its Scope, CASE Environment, CASE Support in Software Life Cycle, Characteristics of CASE Tools, Towards Second Generation CASE Tool.

UNIT V

Managing Software Projects: Project Management Concepts, Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Project Planning Process, Software Scope and Feasibility, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for OO Projects, Project Scheduling – Basic Principles, Defining a Task Set and Task Network, Scheduling, Introduction to Risk Management, Software Maintenance, Software Supportability, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering.

Text Books:

1. Pressman R S, *Software Engineering: A Practitioner's Approach*, 7th edition, McGraw-Hill, 2010.
2. Sommerville I, *Software Engineering*, 9th edition, Pearson Education, 2011.

Reference Books:

1. Jalote P, *Software Engineering: A Precise Approach*, Wiley, 2010.
2. Braude E J, Bernstein M E, *Software Engineering: Modern Approaches*, 2nd edition, Wiley, 2010.
3. Saleh K A, *Software Engineering*, J Ross Publishing, 2009.
4. Bruegge B, Dutoit A H, *Object-Oriented Software Engineering Using UML, Patterns, and Java*, 3rd edition, Prentice Hall, 2009.
5. Bennett S, McRobb S, Farmer R, *Object-Oriented System Analysis and Design Using UML*, 4nd edition, McGraw-Hill, 2010.
6. Lethbridge T C, Laganiere R, *Object-Oriented Software Engineering*, 2nd edition, McGraw-Hill, 2005.

Course Outcomes

By the end of this course students will be able to

- Define and develop a software project from requirement gathering to implementation.
- Obtain knowledge about principles and practices of software engineering.
- Focus on the fundamentals of modeling a software project.
- Obtain knowledge about estimation and maintenance of software systems
- Comprehend, assess, and calculate the cost of risk involved in a project management
- Implement testing methods at each phase of SDLC

CS505O

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020

(With effect from the academic year 2022-23)

OPEN ELECTIVE I

No.of Credits: 3 Instruction Hours/Week: 2L+2P

- Open elective courses are to be successfully completed on SWAYAM online portal of Government of India.
- Courses offered by Department as Program Core/ Program Elective/ Audit courses shall not be opted as open elective.

CS506L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

OPERATING SYSTEMS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the course, "Operating Systems".

CS507L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPUTER NETWORKS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the course, "Computer Networks".

CS508S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

JAVA PROGRAMMING (Skill Advance Course)

No.of Credits: 3 Instruction Hours/Week: 2T+2P

Course Objectives:
The course is designed to

- Identify Java language components and how they work together in applications.
- Learn how to design a graphical user interface (GUI) with Java Swing.
- Understand how to use Java APIs for program development.
- Learn how to extend Java classes with inheritance and dynamic binding.
- Learn how to use exception handling in Java applications.
- Understand how to design applications with threads in Java.

The course shall cover the following topics:

- Introduction
- Data Types, Variables, Arrays, Operators
- Control Statements
- Classes and Methods
- Inheritance
- Packages and Interfaces
- Exception handling
- Stream based I/O
- Multithreaded Programming
- The Collections Framework
- Networking
- Applet and AWT
- GUI Programming with Swings
- Introduction to JDBC

Text Books:

1. Herbert Schildt, *Java The complete reference*, 9th edition, McGraw Hill Education (India) Pvt. Ltd.

Reference Books:

1. Paul Dietel, Harvey Dietel, *Java How to Program*, 10th Edition, Pearson Education.
2. T. Budd, *Understanding Object-Oriented Programming with Java*, updated edition, Pearson Education.
3. Cay S. Horstmann, *Core Java Volume – 1 Fundamentals*, Pearson Education.
4. Sagayaraj, Dennis, Karthik and Gajalakshmi, *Java Programming for core and advanced learners*, University Press
5. Y. Daniel Liang, *Introduction to Java programming*, Pearson Education.
6. P. Radha Krishna, *Object Oriented Programming through Java*, University Press.
7. S. Malhotra, S. Chaudhary, *Programming in Java*, 2nd edition, Oxford Univ. Press.
8. R.A. Johnson, *Java Programming and Object-oriented Application Development*, Cengage Learning.

Course Outcomes

Having successfully completed this course the students will be able to:

- Write programs for solving real world problems using java collection frame work.
- Write multithreaded programs.
- Write GUI programs using swing controls in Java.

ME509M

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

V Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

UNIVERSAL HUMAN VALUES

No.of Credits: Nil Instruction Hours/Week: 2

Course Objectives:

The course is designed to

- develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- understand (or developing clarity) the harmony in the human being, family, society and nature/existence.
- strengthen self-reflection and to develop commitment and courage to act.
- understand social responsibility of an engineer.
- appreciate ethical dilemma while discharging duties in professional life.

UNIT I

Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT II

Understanding Harmony in The Human Being - Harmony in Myself! :
Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility (Sukh and Suvidha). Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.

UNIT III

Understanding Harmony in The Family and Society- Harmony in Human-Human Relationship: Understanding harmony in the Family - the basic unit of human interaction. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness (Ubhay-tripti); Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution (Samadhan), Prosperity (Samridhi), fearlessness (Abhay) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family.

UNIT IV

Understanding Harmony in The Nature and Existence - Whole Existence as Coexistence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V

Implications of The Above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations.

Text Books:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

Reference Books:

1. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
2. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
3. Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
4. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
5. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
8. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.
9. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
10. India Wins Freedom - Maulana Abdul Kalam Azad.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. AI Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story.

Course Outcomes

Having successfully completed this course the students will be able to:

- become more aware of themselves, and their surroundings (family, society, nature)
- distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- understand the role of a human being in ensuring harmony in society and nature.
- become sensitive to their commitment towards what they have understood (human values, human relationship and human society)
- distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

CS601C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPILER DESIGN

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Enrich the knowledge in various phases of compiler and its use
- Identify different methods of lexical analysis
- Design top-down and bottom-up parsers
- Develop syntax directed translation schemes
- Develop algorithms to generate code for a target machine
- Use the tools related to compiler design effectively and efficiently

UNIT I

Introduction to Assembler, Compiler and Interpreter; Elements of ALP, Single Pass and Two Pass Assemblers, Structure of a Compiler

Lexical Analysis: Role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, Lexical Analyzer Generator (Lex)

UNIT II

Syntax Analysis: Introduction, Context Free Grammars, Writing a Grammar, Top-down Parsing, Bottom-up Parsing, Introduction to LR Parsing, More Powerful LR Parsers, Introduction to YAAC.

UNIT III

Syntax Directed Translation (SDT): Syntax Definitions, Evaluation Orders for SDTs, Applications of SDTs, Schemes of SDTs

Run Time Environments: Storage Organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management.

UNIT IV

Intermediate Code Generation: Variants of Syntax Trees, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking, Control Flow Statements, Back Patching.

UNIT V

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization.

Text Books:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers Principles, Techniques and Tools, Second Edition, Pearson Education, 2014.
2. D M Dhamdhere, Systems Programming, TMH Education, 2011.

Reference Books:

1. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", BS Publications, 2005
2. Dhamdhere, D. M., "Compiler Construction Principles and Practice", 2nd edition, Macmillan India Ltd., New Delhi, 2008

Course Outcomes

By the end of this course students will be able to:

- Design a compiler for a simple programming language
- Understand phases in the design of compiler
- Design top-down and bottom-up parsers
- Develop syntax directed translation schemes
- Comprehend and adapt to Lex and Yacc tools in compiler design

CS602C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

ARTIFICIAL INTELLIGENCE

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand the basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- Introduce the concepts of machine learning and neural networks.
- Examine the applications of AI techniques in intelligent agents, artificial neural networks and other machine learning models.

UNIT I

The History of AI: What is Intelligence, Search for Mechanical Intelligence, Evolution of Artificial Intelligence (AI), Systems Approach, Overview of topics.
Uninformed Search: General state space search, General Search Paradigms Depth-First Search, Depth-Limited Search, Iterative Deepening Search, Breadth-First Search, Bi-directional Search, Uniform-Cost Search.
Informed Search: Best-First Search, N-Queens problem, A* Search, Eight Puzzle problem, Hill Climbing Search, Simulated Annealing, Tabu Search, Constraint Satisfaction, Constraint Satisfaction algorithms: Generate and Test, Backtracking, Forward Checking and Look Ahead, Min-Conflicts Search.

UNIT II

AI and Games: Two Player Games, The Minimax Algorithm, Tic-Tac-Toe problem, Minimax with Alpha-Beta Pruning, Classical Game AI, Checkers, Chess, Scrabble, Video Game AI, Movement and Path finding, Table Lookup with Offensive and Defensive Strategy, NPC Behavior, Team AI, Real-Time Strategy AI.
Knowledge Representation (KR): Types and Role of Knowledge, Semantic Nets, Frames, Propositional Logic, First Order Logic (Predicate Logic), Semantic Web, Computational Knowledge Discovery, Ontology, Common Sense.

UNIT III

Machine Learning: Machine Learning Algorithms, Supervised Learning, Decision Trees, Unsupervised Learning, Markov Models and implementation, Nearest Neighbor Classification, 1NN and k-NN Examples. Evolutionary Computation: Introduction to Evolutionary Computation, Biological Motivation, Genetic Algorithms, Genetic Programming, Evolutionary Strategies, Differential Evolution.

UNIT IV

Neural Networks I: Concept of Neural Networks, Biological Motivation, Fundamentals of Neural Networks, The Perceptron, Least-Mean-Square (LMS) Learning, Learning with Backpropagation, Probabilistic Neural Networks, Tips for Building Neural Networks. Neural Networks II: Unsupervised Learning, Hebbian Learning, Simple Competitive Learning, k-Means Clustering, Adaptive Resonance Theory, Hopfield Auto-Associative Model.

UNIT V

Robotics and AI: Introduction, Taxonomy of Robotics, Hard vs. Soft Robotics, Braitenburg Vehicles, Natural Sensing and Control, Perception with Sensors, Actuation with Effectors, Robotic Control Systems, Simple Control Architectures, Movement Planning, Distributed Robotics. Intelligent Agents: Anatomy of an Agent, Agent Properties and AI, Hybrid Agent, Agent Architectures, Types of Architectures, Agent Languages, Agent Communication. Biologically Inspired and Hybrid Models: Cellular Automata, Artificial Immune Systems, Artificial Life, Fuzzy Logic, Evolutionary Neural Networks, Ant Colony Optimization, Affective Computing.

Text Books:

1. M Tim Jones, Artificial Intelligence - A Systems Approach, Infinity Science Press, 2008.

Reference Books:

1. Russel S, Norvig P, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson Education, 2010.
2. Rich E, Knight K, Nair S B, Artificial Intelligence, 3rd edition, Tata McGraw-Hill, 2009.
3. Luger G F, Artificial Intelligence, 6th edition, Pearson Education, 2009.
4. Carter M, Minds and Computers: An Introduction to the Philosophy of Artificial Intelligence, Edinburgh University Press, 2007.
5. Coppin B, Artificial Intelligence Illuminated, Jones & Bartlett, 2004.
6. Ertel W, Introduction to Artificial Intelligence, Springer, 2011.

Course Outcomes

By the end of this course students will be able to:

- Demonstrate basic understanding of artificial intelligence and its fundamentals.
- Identify a search algorithm for a problem and estimate its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique for a given problem
- Possess the ability to apply AI techniques to solve problems of game playing, expert systems, machine learning and robotics.

CS603C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

CRYPTOGRAPHY AND NETWORK SECURITY

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
This course aims at training students to master the:

- Understand the basic categories of threats to computers and networks
- Discuss various cryptographic algorithms including secret key cryptography and public-key cryptography.
- Different encryption techniques along with hash functions, MAC, digital signatures
- Design issues and working principles of various authentication protocols and PKI standards.

UNIT I

Introduction to Security: Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, a Model for Network Security Mathematics of Cryptography: Algebraic Structures (Groups, Rings, Fields and Galois Fields), Divisibility and the Division Algorithm, The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms

UNIT II

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography Block Ciphers: Traditional Block Cipher Structure, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles, Advanced Encryption Standard, AES Structure, AES Transformation Functions, AES Key Expansion, Multiple Encryption and Triple DES, Block Cipher Modes of Operation

UNIT III

Public-Key Cryptography: Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Cryptography Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Requirements and Security, Secure Hash Algorithm (SHA) Message Authentication Codes: Requirements for Message Authentication Codes, HMAC, CMAC

UNIT IV

Digital Signatures: Digital Signatures, Elgamal Digital Signature Scheme, Schnorr Digital Signature Scheme, NIST Digital Signature Algorithm, Elliptic Curve Digital Signature Algorithm Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure User Authentication: Remote User-Authentication Principles, Remote User-Authentication Using Symmetric Encryption, Kerberos, Remote User-Authentication Using Asymmetric Encryption.

UNIT V

Transport-Level Security: Web Security Considerations, Transport Layer Security, Secure Shell (SSH) Electronic Mail Security: S/MIME, Pretty Good Privacy IP Security: IP Security Overview, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange

Text Books:

1. William Stallings, *Cryptography and Network Security*, 8th Edition, Pearson Education

Reference Books:

1. Bernard L. Menezes, Ravinder Kumar, *Cryptography, Network Security and Cyber Laws*, Cengage Learning.
2. Behrouz A Forouzan, Debdeep Mukhopadhyaya, *Cryptography and Network Security*, 3rd Edition, Mc-GrawHill.
3. Jason Albanese, Wes Sonnenreich, *Network Security Illustrated*, McGraw Hill.

Course Outcomes

At the end of the course, the students will be able to:

- Apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.
- Understand key management and distribution schemes and design user authentication protocols
- Apply different digital signature algorithms to achieve authentication and create secure applications
- Perform simple vulnerablility assessments and password audits.
- Configure simple firewall architectures

CS604C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

COMPUTER GRAPHICS

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Understand the basics of various inputs and output computer graphics hardware devices.
- Exploration of fundamental concepts in 2D and 3D computer graphics.
- Learn 2D raster graphics techniques, 3D modelling, geometric transformations, 3D viewing and rendering.

UNIT I

Introduction- Image processing as picture analysis, Advantages of Interactive Graphics, Representative uses of computer graphics, Classification of applications, Development of hardware and software for computer graphics, Conceptual framework for Interactive Graphics.

Scan Converting Lines – Basic Incremental algorithm, Midpoint Line algorithm and additional issues; Scan Converting Circles, Scan Converting Ellipses, Solid Filling– Rectangles, Polygons and Ellipse arcs; Pattern filling, Thick primitives, Cohen-Sutherland line clipping algorithm, Parametric line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm, Generating characters and Antialiasing.

UNIT II

Display Systems - Raster-scan and Random scan.

Geometrical transformations – 2D transformations, Homogeneous coordinates, Matrix representation of 2D transformations, Composition of 2D transformations, Window to view-port transformation, Matrix representation of 3D transformations, Composition of 3D transformations and Transformation as a change in coordinate system.

Representing Curves and surfaces – Polygon meshes, Parametric cubic curves, Parametric bicubic surfaces andQuadric surfaces.

Fractals – Lines and Surfaces.

UNIT III

Viewing in 3D - Projections, Specifying an arbitrary 3D view, Examples of 3D viewing, Mathematics of planar geometric projections, Implementing planar geometric projections, Coordinate systems.

Solid Modeling – Representing solids, Regularized Boolean set operations, Primitive instancing, Sweep representations, Boundary representations, Spatial-Partitioning Representations, Constructive solid geometry, Comparison of representations, User interfaces for solid modelling.

UNIT IV

Achromatic and Colored Light – Achromatic light, Chromatic color, Color models for raster graphics, Reproducing color, Using color in computer graphics.
Visible Surface Determination – Functions of two variables, Techniques for efficient visible surface algorithms, z-Buffer algorithm, Scan-line algorithms, Visible surface ray tracing.

UNIT V

Illumination Models - Ambient light, Diffuse reflection, Atmospheric attenuation.
Shading4 Models – Constant shading, Interpolated shading, Polygon mesh shading, Gouraud shading, Phong shading, Problems with interpolated shading.
Surface Detail – Surface-detail polygons, Texture mapping, Bump mapping.
Animation – Conventional and Computer-Assisted animation, Animation languages, Methods of controlling animation, Basic rules of animation, Problems peculiar to animation.

Text Books:

1. Hughes J F, Van Dam A, Foley J D, et al., Computer Graphics*:* Principles and Practice, 3rd edition, Addison-Wesley, 2013.

Reference Books:

1. Foley J D, Van Dam A, Feiner S K, John F H, Computer Graphics: Principles & Practice in C, 2nd edition, Pearson Education, 1995.
2. Ragiv Chopra, Computer Graphics, S. Chand& Company, 2012.

Course Outcomes

At the end of the course, students will be able to

- Understand the various computer graphics hardware and display technologies.
- Implement various 2D and 3D objects transformation techniques.
- Apply 2D and 3D viewing technologies into the real world applications.

CS605E1

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

DATA MINING (Professional Elective I)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand the principles of Data Warehousing and Data Mining
- Know the Architecture of a Data Mining system
- Learn pre-processing techniques and data mining functionalities
- Compare and contrast classification and clustering algorithms

UNIT I

Introduction: Why Data Mining? What Is Data Mining? What Kinds of Data Can Be Mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining.

Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity.

Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT II

DataWarehouse: Basic Concepts, DataWarehouse Modeling: Data Cube and OLAP, DataWarehouse Design and Usage, DataWarehouse Implementation, Data Generalization by Attribute-Oriented Induction.

Data Cube Computation, Data Cube Computation Methods, Processing Advanced Kinds of Queries by Exploring Cube Technology, Multidimensional Data Analysis in Cube Space.

UNIT III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods, Which Patterns Are Interesting?—Pattern Evaluation Methods.

Advanced Pattern Mining: A Road Map, Pattern Mining in Multilevel, Multidimensional Space, Constraint-Based Frequent Pattern Mining, Mining High-Dimensional Data and Colossal Patterns, Mining Compressed or Approximate Patterns, Pattern Exploration and Application.

Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy.

UNIT IV

Classification-Advanced Methods: Bayesian Belief Networks, Classification by Backpropagation, Support Vector Machines, Classification Using Frequent Patterns, Lazy Learners (or Learning from Your Neighbors), Other Classification Methods, Additional Topics Regarding Classification.

Cluster Analysis: Basic Concepts, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering.

UNIT V

Advanced Cluster Analysis: Probabilistic Model-Based Clustering, Clustering High-Dimensional Data, Clustering Graph and Network Data, Clustering with Constraints.

Outlier Detection: Outliers and Outlier Analysis, Outlier Detection Methods, Statistical Approaches, Proximity-Based Approaches, Clustering-Based Approaches, Classification-Based Approaches, Mining Contextual and Collective Outliers, Outlier Detection in High-Dimensional Data.

Overview of Data Mining Trends and Research Frontiers: Mining Complex Data Types, Other Methodologies of Data Mining, Data Mining Applications, Data Mining and Society, Data Mining Trends.

Text Books:

1. Jiawei Han, Micheline Kamber and Jian Pei, Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann Publishers, Elsevier, 2012.

Reference Books:

1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publishers, Elsevier, 2006.
2. Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Introduction to Data Mining, Pearson Education, 2016.
3. Hongbo Du, Data mining Techniques and Applications: An Introduction, 1st Edition, Cengage India Publishing, 2013.
4. Arun K Pujari, Data Mining Techniques, 3rd Edition, Universities Press, 2013.
5. T.V Suresh Kumar, B Eswara Reddy, Jagadish S Kallimani, Data Mining: Principles and Applications, First edition, Elsevier, 2012.
6. Vikram Pudi, P Radha Krishna, Data Mining, Oxford University Press, 2009.
7. Sam Anahory and Dennis Murray, Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems, First Edition, Pearson Education India, 2002.
8. K.P.Soman, Shyam Diwakar,V.Ajay, Insight Into Data Mining: Theory and Practice, Prentice Hall India, 2006.

Course Outcomes

By the end of this course students will be able to

- Comprehend the various architectures and its application with data mining
- Design and develop data mining algorithms to analyze raw real world data
- Apply preprocessing techniques for data cleansing
- Analyze multi-dimensional modeling techniques and Classification & Clustering algorithms

CS605E2

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

DISTRIBUTED SYSTEMS (Professional Elective I)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Familiarize the students with the basics of distributed computing systems.
- Understand issues related to clock Synchronization and distributed mutual exclusion.
- Introduce the concepts of distributed object based systems and distributed file systems.

UNIT I

Distributed Systems: Introduction, Goals, Types of Distributed Systems.
Architectures: Architectural Styles, System Architectures, Architectures versus Middleware, Self-Management in Distributed Systems.
Processes: Threads, Virtualization, Clients, Servers, Code Migration.

UNIT II

Communication: Fundamentals, Remote Procedure Call, Message-Oriented Communication, Stream-Oriented Communication, Multicast Communication.
Naming: Names, Identifiers and Addresses, Flat Naming, Structured Naming, Attribute-Based Naming.

UNIT III

Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of Nodes, Election Algorithms.
Consistency and Replication: Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Replica Management, Consistency Protocols.

UNIT IV

Fault Tolerance: Introduction, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.
Security: Introduction, Secure Channels, Access Control, Security Management.

UNIT V

Distributed Object-Based Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, Security.
Distributed File Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, Security.

Text Books:

1. Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems: Principles and Paradigms, Second Edition, Pearson Education, 2007.

Reference Books:

1. Brendan Burns, Designing Distributed Systems: Patterns and Paradigms for Scalable, Reliable Services, O'Reilly, First Edition, 2018.
2. Sukumar Ghosh, Distributed Systems: An Algorithmic Approach, CRC Press, Second Edition, 2014.
3. Kenneth P Birman, Guide to Reliable Distributed Systems: Building High-Assurance Applications and Cloud-Hosted Services, Springer, 2014.
4. George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, Distributed Systems: Concepts and Design, Pearson Education, Fifth Edition, 2012.
5. Maarten Van Steen, Andrew S. Tanenbaum, Distributed Systems, CreateSpace Independent Publishing Platform/ Amazon Digital Services, Third Edition, 2017.
6. Roberto Vitillo, Understanding Distributed Systems, Roberto Vitillo, 2021.
7. Gerard Tel, Introduction to Distributed Algorithms, Cambridge University Press, Second Edition, 2000.
8. Andrew S. Tanenbaum, Distributed Operating Systems, Pearson Education, First Edition, 2002.

Course Outcomes

Having successfully completed this course the students will be able to:

- Understand the design principles in distributed systems and the architectures for distributed systems
- Apply various distributed algorithms related to clock synchronization, concurrency control, deadlock detection, load balancing.
- Develop the Mutual Exclusion and Deadlock detection algorithms in distributed systems.
- Analyze fault tolerance and recovery in distributed systems and algorithms for the same.
- Analyze the design and functioning of distributed file systems.

CS605E3

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

OBJECT ORIENTED ANALYSIS AND DESIGN
(Professional Elective I)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Understand the Object-based view of systems
- Develop robust object-based models for systems
- Inculcate necessary skills to handle complexity in software design
- Understand the notations of Unified Modelling Language

UNIT I

OOAD Basic Concepts – Complexity: The Structure of Complex Systems, The Inherent Complexity of Software, The Five Attributes of a Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, On Designing Complex Systems.

The Object Model: The Evolution of the Object Model, Foundations of the Object Model, Elements of the Object Model, Applying the Object Model.

UNIT II

Classes and Objects: The Nature of an Object, Relationships among Objects, The Nature of a Class, Relationships among Classes, The Interplay of Classes and Objects, On Building Quality Classes and Objects.

Classification: The Importance of Proper Classification, Identifying Classes and Objects, Key Abstractions and Mechanisms.

UNIT III

Method – Notation: The Unified Modeling Language, Package Diagrams, Component Diagrams, Deployment Diagrams, Use Case Diagrams, Activity Diagrams, Class Diagrams, Sequence Diagrams, Interaction Overview Diagrams, Composite Structure Diagrams, State Machine Diagrams, Timing Diagrams, Object Diagrams, Communication Diagrams.

UNIT IV

Process: First Principles, The Macro Process: The Software Development Lifecycle, The Micro Process: The Analysis and Design Process.

Pragmatics: Management and Planning, Staffing, Release Management, Reuse, Quality Assurance and Metrics, Documentation, Tools, Special Topics, The Benefits and Risks of Object-Oriented Development.

UNIT V

Applications - System Architecture: Satellite-Based Navigation - Inception, Elaboration, Construction, Post-Transition.

Artificial Intelligence: Cryptanalysis - Inception, Elaboration, Construction, Post-Transition.

Web Application: Vacation Tracking System - Inception, Elaboration, Construction, Transition and Post-Transition.

Course Outcomes

Having successfully completed this course the students will be able to:

- Analyse and model software specifications.
- Abstract object-based views for generic software systems.
- Deliver robust software components.

Text Books:

1. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Conallen, Kelli A. Houston, *Object-Oriented Analysis and Design with Applications*, Addison-Wesley/Pearson, Third Edition, 2015.

Reference Books:

1. Michael Blaha and James Rumbaugh, *Object-oriented modelling and design with UML*, Prentice-Hall of India, 2005.
2. Craig Larman, *Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development*, 3rd edition, Pearson Education, 2005.
3. Ali Bahrami, *Object Oriented Systems Development*, McGraw-Hill, 1999.
4. Booch Grady, *Object Oriented Analysis and Design*, 2nd edition Pearson Education, 2000.
5. Fowler, Martin, *UML Distilled*, 3rd edition, Pearson Education, 2004.
6.
7. Lunn, Ken, *Software development with UML*, Palgrave Macmillan, 2003.
8. O'Docherty, Mike, *Object-Oriented Analysis & Design*, Wiley, 2005

CS606L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

ARTIFICIAL INTELLIGENCE AND COMPILER DESIGN LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the course, "Artificial Intelligence".

CS607L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

CRYPTOGRAPHY AND NETWORK SECURITY LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the courses, "Cryptography and Network Security".

CS608L

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
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COMPUTER GRAPHICS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 12 assignments are to be given covering the topics of the courses, "Computer Graphics".

CS609S

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

ADVANCED PYTHON PROGRAMMING

No.of Credits: 3 Instruction Hours/Week: 2T+2P

Course Objectives:
The course is designed to

- Familiarize the basics of Python Third Party Tools and usages.
- Understand the advantage of using Python libraries for implementing Machine Learning models.
- Understand the Python Data Structures for Full Stack Development.

The course shall cover the following topics:

- Parallel System Tools: Forking Processes, Threads, Program Exits, Interprocess Communication, The multiprocessing Module, Other Ways to Start Programs, A Portable Program-Launch Framework, Other System Tools Coverage.

- GUI Design with Tkinter: Menus, Listboxes and Scrollbars, Text, Canvas, Grids, Time Tools, Threads, and Animation, Other Widgets and Options.

- GUI Coding Techniques: GuiMixin: Common Tool Mixin Classes, GuiMaker: Automating Menus and Toolbars, ShellGui: GUIs for Command-Line Tools, GuiStreams: Redirecting Streams to Widgets, Reloading Callback Handlers Dynamically, Wrapping Up Top-Level Window Interfaces, GUIs, Threads, and Queues, More Ways to Add GUIs to Non-GUI Code, The PyDemos and PyGadgets Launchers.

- Complete GUI Programs: PyEdit: A Text Editor Program/Object, PyPhoto: An Image Viewer and Resizer, PyView: An Image and Notes Slideshow, PyDraw: Painting and Moving Graphics, PyClock: An Analog/Digital Clock Widget, PyToe: A Tic-Tac-Toe Game Widget.

- Network Scripting: Python Internet Development Options, Plumbing the Internet, Socket Programming, Handling Multiple Clients, Making Sockets Look Like Files and Streams, A Simple Python File Server.

- Client-Side Scripting: FTP: Transferring Files over the Net, Transferring Files with ftplib, Transferring Directories with ftplib, Transferring Directory Trees with ftplib, Processing Internet Email, POP: Fetching Email, SMTP: Sending Email, email: Parsing and Composing Mail Content, A Console-Based Email Client, The mailtools Utility Package, NNTP: Accessing Newsgroups, HTTP: Accessing Websites, The urllib Package Revisited, Other Client-Side Scripting Options.

- The PyMailGUI Client: Major PyMailGUI Changes, A PyMailGUI Demo, PyMailGUI Implementation, Ideas for Improvement.

- Server-Side Scripting: What's a Server-Side CGI Script?, Running Server-Side Examples, Climbing the CGI Learning Curve, Saving State Information in CGI Scripts, The Hello World Selector, Refactoring Code for Maintainability, More on HTML and URL Escapes, Transferring Files to Clients and Servers.

- The PyMailCGI Server: The PyMailCGI Website, The Root Page, Sending Mail by SMTP, Reading POP Email, Processing Fetched Mail, Utility Modules, Web Scripting Trade-Offs.

- Databases and Persistence: Persistence Options in Python, DBM Files, Pickled Objects, Shelve Files, The ZODB Object-Oriented Database, SQL Database Interfaces, ORMs: Object Relational Mappers, PyForm: A Persistent Object Viewer (External).

- Data Structures: Implementing Stacks, Implementing Sets, Subclassing Built-in Types, Binary Search Trees, Graph Searching, Permuting Sequences, Reversing and Sorting Sequences, PyTree: A Generic Tree Object Viewer.

- Text and Language: Strategies for Processing Text in Python, String Method Utilities, Regular Expression Pattern Matching, XML and HTML Parsing, Advanced Language Tools, Custom Language Parsers, PyCalc: A Calculator Program/Object.

- Python Data Structures for Data Science: Numpy, Pandas, Scipy, MatplotLib, Seaborn

- Python Data Structures for Full Stack Development, Python for Natural Language Processing

- Python for Machine Learning: Working with Beautiful Soup, Scikit-Learn, NLP with Python, Text mining with python.

- Python for Deep Learning: Working with Tensor flow, Keras and PyTorch

- Python for Cryptography and Network Security: Stanford-Corenlp, Bcrypt

Text Books:

1. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
2. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016

Reference Books:

1. Mark Lutz, Learning Python, O`Reilly, Fifth Edition, 2013.
2. Dattaraj Rao, Keras to Kubernetes: The Journey of a Machine Learning Model to Production, Wiley, 2019.
3. Wes McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, O`Reilly, Second Edition, 2017.
4. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O`Reilly, First Edition, 2017.
5. Andreas C. Müller and Sarah Guido, Introduction to Machine Learning with Python: A Guide for Data Scientists, O`Reilly, First Edition, 2016.

6. Jake VanderPlas, Python Data Science Handbook: Essential Tools for Working with Data, O`Reilly, First Edition, 2016.
7. Delip Rao and Brian McMahan, Natural Language Processing with PyTorch: Build Intelligent Language Applications Using Deep Learning, O`Reilly, First Edition, 2019.
8. Miguel Grinberg, Flask Web Development: Developing Web Applications with Python, O`Reilly, Second Edition, 2018.
9. Joel Grus, Data Science from Scratch: First Principles with Python, O`Reilly, First Edition, 2015.
10. J. Burton Browning, Marty AlchinPro Python 3: Features and Tools for Professional Development, Apress, Third Edition, 2019.
11. Abhishek Nandy, Manisha Biswas, Reinforcement Learning: With Open AI, TensorFlow and Keras Using Python, Apress, 2018.
12. Navin Kumar Manaswi, Deep Learning with Applications Using Python: Chatbots and Face, Object, and Speech Recognition With TensorFlow and Keras, Apress, 2018.
13. Akshay Kulkarni, Adarsha Shivananda, Natural Language Processing Recipes: Unlocking Text Data with Machine Learning and Deep Learning using Python, Apress, 2019.
14. Sayan Mukhopadhyay, Advanced Data Analytics Using Python: With Machine Learning, Deep Learning and NLP Examples, Apress, 2018.
15. Jojo Moolayil, Learn Keras for Deep Neural Networks: A Fast-Track Approach to Modern Deep Learning with Python, Apress, 2019.
16. Manohar Swamynathan, Mastering Machine Learning with Python in Six Steps: A Practical Implementation Guide to Predictive Data Analytics Using Python, Apress, 2017.
17. Daniel Rubio, Beginning Django Web Application Development and Deployment with Python, Apress, 2017.
18. Fabio Nelli, Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Apress, 2015.
19. Fabio Nelli, Python Data Analytics: With Pandas, NumPy, and Matplotlib, Apress, Second Edition, 2018.

Course Outcomes

Having successfully completed this course the students will be able to:

- Apply Python Third- Party Tools in real time environment.
- Apply Python for Cryptography and Network Security.
- Implement Full stack development apps.
- Apply Python libraries for implementing Machine Learning models.
- Apply basic principles of Python Data Structures for Data Science.

CE610M

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VI Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2022-23)

PROFESSIONAL ETHICS

No.of Credits: Nil Instruction Hours/Week: 2

Course Objectives:
The course is designed to

- create an awareness on Engineering Ethics and Human Values.
- instill Moral and Social Values and Loyalty and to appreciate the rights of others.
- study the moral issues and decisions confronting individuals and organizations
- engaged in engineering profession.
- study the related issues about the moral ideals, character, policies, and
- relationships of people and corporations involved in technological activity.

UNIT I

Human Values: Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II

Engineering Ethics: Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg''s theory – Gilligan's theory – Consensus and Controversy –Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III

Engineering as Social Experimentation: Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV

Safety, Responsibilities and Rights: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR)
Discrimination.

UNIT V

Global Issues: Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct – Corporate Social Responsibility.

Text Books:

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

Reference Books:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009.
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.
5. Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd., New Delhi, 2013.

Course Outcomes

Having successfully completed this course the students will be able to:

- Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
- Learn the moral issues and problems in engineering; find the solution to those problems.
- Learn the need for professional ethics, codes of ethics and roles, concept of safety, risk assessment.
- Gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights.

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

VII Semester B.Tech (CSE) – CBCS Regulations-2020
(With effect from the academic year 2023-24)

CYBER SECURITY (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Analyze and evaluate the cyber security needs of an organization.
- Design and develop security architecture for an organization.
- Develop cyber security strategies and policies.
- Determine and analyze software vulnerabilities and develop necessary security solutions.

UNIT I

Building a Secure Organization, Preventing System Intrusions, Guarding Against Network Intrusions, Internet Security, The Botnet Problem, Intranet Security, Local Area Network Security.

UNIT II

Wireless Network Security, Cellular Network Security, RFID Security, Protecting Mission-Critical Systems, Security Management Systems, Information Technology Security Management, Identity Management.

UNIT III

Intrusion Prevention and Detection Systems, Computer Forensics, Network Forensics, Firewalls, Penetration Testing, Vulnerability Assessment.

UNIT IV

NET Privacy, Personal Privacy Policies, Virtual Private Networks, Identity Theft, VoIP Security, SAN Security, SAN Devices Security.

UNIT V

Risk Management, Physical Security Essentials, Biometrics, Information Warfare, Security Through Diversity, Reputation Management, Content Filtering, Data Loss Protection.

Text Books:

1. Vacca J R (Editor), Computer and Information Security Handbook, 2nd edition, Elsevier / Morgan Kaufmann, 2013.
2. Belapure S, Godbole N, Cyber Security, Wiley, 2011.

Reference Books:

1. Gogolin G, Digital Forensics Explained, CRC / Auerbach, 2013.
2. Godbole N, Information Systems Security, Wiley, 2015.

3. Wu C H, Irwin J D, Introduction to Computer Networks and Cyber Security, CRC Press, 2013.
4. Singer P W, Friedman A, Cyber Security and Cyber War: What Everyone Needs to Know, Oxford University Press, 2014.
5. Boddington R, Practical Digital Forensics, Packt, 2016.
6. Drake J J, Lanier Z, et al., Android Hacker's Handbook, Wiley, 2014.
7. Graham J, Howard R, Olson R, Cyber Security Essentials, CRC Press, 2010.
8. Hadnagy C, Wilson P, Social Engineering: The Art of Human Hacking, Wiley, 2010

Course Outcomes

By the end of this course students will be able to:

- Effectively use cyber security and computer forensics software/tools
- Measure the performance and troubleshoot cyber security systems.
- Protect the network from both internal and external attacks
- Provide new security solutions and implement the same confidently.

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MACHINE LEARNING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Understand the basic concepts, techniques and algorithms used in machine learning.
- Formulate machine learning problems corresponding to different applications.
- Develop skills of using recent machine learning software for solving practical problems.
- Develop skills of using recent machine learning software for solving practical problems.
- Evaluate performance and to identify the limitations of machine learning algorithms.

UNIT I

Introduction to Machine Learning: Well-Posed Learning Problems, Designing a Learning System, Perspectives and Issues in Machine learning.
Concept Learning: Introduction, A Concept Learning Task, Concept Learning as Search, Find-S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate-Elimination Algorithm, Remarks on Version Spaces and Candidate Elimination, Inductive Bias.
Decision Tree Learning: Introduction, Decision Tree Representation. Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Algorithm, Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

UNIT II

Artificial Neural Networks: Introduction, Neural Networks Representations, Appropriate Problems for Neural Network Learning, Perceptrons, Multilayer Networks and the Backpropagation Algorithm, Remarks on the Backpropagation Algorithm, An Illustrative Example: Face Recognition, Advanced Topics in Artificial Neural Networks.
Evaluating Hypothesis: Motivation, Estimating Hypothesis Accuracy, Basics of Sampling Theory, A General Approach for Deriving Confidence Intervals, Difference in Error of Two Hypothesis, Comparing Learning Algorithms.

UNIT III

Bayesian Learning: Introduction, Bayes Theorem, Concept Learning, Maximum Likelihood and Least-Squared Error Hypothesis, Maximum Likelihood Hypothesis for Predicting Probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, An Example Learning to Classify Test, Bayesian Belief Networks, The EM Algorithm.

Computational Learning Theory: Introduction, Probably Learning an Approximately Correct Hypothesis, Sample Complexity for Finite Hypothesis Spaces, Sample Complexity for Infinite Hypothesis Spaces, The Mistake Bound Model of Learning.

UNIT IV

Instance-Based Learning: Introduction, k-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

Genetic Algorithms: Motivation, Genetic Algorithms, An Illustrative Example, Hypothesis Space Search, Genetic Programing, Models of Evaluation and Learning, Parallelizing Genetic Algorithms.

Learning Sets of Rules: Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First-Order Rules, Learning Sets of First-Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

UNIT V

Analytical Learning: Introduction, Learning with Perfect Domain Theories: Prolog-EBG, Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

Combining Inductive and Analytical Learning: Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators, State of the Art.

Reinforcement Learning: Introduction, The Learning Task, Q learning, Non-deterministic Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming.

Text Books:

1. Tom M. Mitchell, Machine Learning, McGraw Hill Education, 2018.

Reference Books:

1. Stephen Marsland, Taylor & Francis, Machine Learning: An Algorithmic Perspective, 2nd Edition, CRC Press, 2015.
2. Ethem Alpaydin, Introduction to Machine Learning, 2nd Edition, MIT Press, 2010.
3. Stuart J. Russell and Peter Norvig, Artificial Intelligence A Modern Approach: 3rd Edition, Pearson Education, 2010.
4. M.Tim Jones, Artificial Intelligence: A Systems Approach,3rd Edition, Infinity Science Press, New Delhi, 2008.
5. Elaine Ritch, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, 3rd Edition, Tata McGraw Hill Education, 2009.

Course Outcomes

Having successfully completed this course the students will be able to:

- Design and implement various machine learning algorithms in a range of real world applications
- Analyze the underlying mathematical relationships within machine learning techniques.
- Realize the strengths and weaknesses of popular machine learning approaches
- Comprehend the concepts in Bayesian analysis from probability models

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BIG DATA ANALYTICS (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Discuss the challenges traditional data mining algorithms face when analyzing Big Data.
- Introduce the tools required to manage and analyze big data like Hadoop, NoSql MapReduce.
- Comprehend machine learning and deep learning algorithms for data analytics.
- Understand how big data analytics can leverage into a key component

UNIT I

Introduction to Analytics and Big Data - Characteristics of Big Data, Domain Specific Examples of Big Data Viz. Web, Financial, Healthcare, IoT, Environment, Logistics & Transportation, Industry, Retail; Analytics Flow for Big Data, Big Data Stack, Mapping Analytics Flow to Big Data Stack, Case Studies: Genome Data Analysis and Weather Data Analysis, Analytics Patterns.

UNIT II

Overview of Setting up Big Data Stack, Big Data Patterns - Analytics Architecture Components & Design Styles, MapReduce Patterns.
NoSQL - Key-Value Databases, Document Databases, Column Family Databases, Graph Databases.

UNIT III

Data Acquisition - Data Acquisition Considerations, Publish-Subscribe Messaging Frameworks, Big Data Collection Systems, Messaging Queues, Custom Connectors.
Big Data Storage - HDFS: Architecture and Usage Examples.
Batch Analysis - Hadoop and MapReduce, Hadoop-MapReduce Examples, Pig, Case Study: Batch Analysis of News Articles, Apache Oozie, Apache Spark, Apache Solr.

UNIT IV

Real-time Analysis - Stream Processing, Storm Case Studies, In-Memory Processing, Spark Case Studies.
Interactive Querying - Spark SQL, Hive, Amazon Redshift, Google BigQuery.
Serving Databases & Web Frameworks - Relational (SQL) Databases, Non-Relational (NoSQL) Databases, Python Web Application Framework-Django, Case Study: Django application for viewing weather data.

UNIT V

Analytics Algorithms - Frameworks, Clustering, Case Study: Song Recommendation System, Classification & Regression, Case Studies: Classifying Handwritten Digits and Genome Data Analysis (Implementation), Recommendation Systems.
Data Visualization - Frameworks & Libraries, Overview of Visualization Examples.

Text Books:

1. Arshdeep Bhaga, Vijay Madisetti, Big Data Science and Analytics: A Hands-On Approach, 1st Edition, VPT Publishers, 2019.
2. Michael Minelli, Michele Chambers, Ambiga Dhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley, 2013.

Reference Books:

1. EMC Education Services, "Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 2016.
2. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2012.
3. Rajkumar Buyya, Rodrigo N. Calheiros and Amir Vahid Dastjerdi (Editors), "Big Data Principles and Paradigms", Morgan Kaufmann (An imprint of Elsevier), 2016.
4. Colleen McCue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier, 2007.
5. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
6. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
7. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", Wiley and SAS Business Series, 2012.
8. Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill, 2011.

Course Outcomes

By the end of this course students will be able to

- Understand big data challenges in different domains viz. social media, transportation, finance, medicine and apply the concepts of big data analytics for the said domains.
- Apply several newer algorithms for Clustering, Classifying and finding associations in Big Data
- Design and develop Hadoop and Map Reduce Framework
- Handle several Data Intensive tasks using the Map Reduce Paradigm

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CLOUD COMPUTING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand fundamental concepts of cloud computing and its services.
- Demonstrate an understanding of Service models, deployment models and Virtualization
- Understand the programming and implementation issues of Cloud

UNIT I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Biocomputing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing, Network Computing.

Cloud Computing Fundamentals: Motivation for Cloud Computing, Defining Cloud Computing, 5-4-3 Principles of Cloud computing, Cloud Ecosystem, Requirements for Cloud Services, Cloud Application, Benefits and Drawbacks.

Cloud Computing Architecture and Management: Introduction, Cloud Architecture, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Migrating Application to Cloud.

Cloud Deployment Models: Introduction, Private Cloud, Public Cloud, Community Cloud, Hybrid Cloud.

UNIT II

Cloud Service Models: Introduction, Infrastructure as a Service, Platform as a Service, Software as a Service, Other Cloud Service Models.

Technological Drivers for Cloud Computing: Introduction, SOA and Cloud, Virtualization, Multicore Technology, Memory and Storage Technologies, Networking Technologies, Web 2.0, Web 3.0, Software Process Models for Cloud, Programming Models, Pervasive Computing, Operating System, Application Environment.

UNIT III

Virtualization: Introduction, Virtualization Opportunities, Approaches to Virtualization, Hypervisors, From Virtualization to Cloud Computing.

Programming Models for Cloud Computing: Introduction, Extended Programming Models for Cloud, New Programming Models Proposed for Cloud,

Software Development in Cloud: Introduction, Different Perspectives on SaaS Development, New Challenges, Cloud-Aware Software Development Using PaaS Technology.

UNIT IV

Networking for Cloud Computing: Introduction, Overview of Data Center Environment, Networking Issues in Data Centers, Transport Layer Issues in DCNs, TCP Enhancements for DCNs.

Cloud Service Providers: Introduction, EMC, Google, Amazon Web Services, Microsoft, IBM, SAP Labs, Salesforce, Rackspace, VMware, Manjrasoft.

UNIT V

Open Source Support for Cloud: Introduction, Open Source Tools for IaaS, Open Source Tools for PaaS, Open Source Tools for SaaS, Open Source Tools for Research, Distributed Computing Tools for Management of Distributed Systems.

Security in Cloud Computing: Introduction, Security Aspects, Platform-Related Security Audit and Compliance.

Advanced Concepts in Cloud Computing: Intercloud, Cloud Management, Mobile Cloud, Media Cloud, Interoperability and Standards, Cloud Governance, Computational Intelligence in Cloud, Green Cloud, Cloud Analytics.

Text Books:

1. K. Chandrasekaran, Essentials of Cloud Computing, CRC press, 2014.

Reference Books:

1. Buyya R, Vecchiola C, Selvi S T, Mastering Cloud Computing, McGraw Hill Education (India), 2013.
2. Dan C. Marinescu, Cloud Computing - Theory and Practice, Morgan Kaufmann (an imprint of Elsevier), 2013.
3. Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing - Principles and Paradigms, Wiley India, 2011.
4. Kai Hwang, Geoffrey C Fox, Jack J Dongarra, Distributed and Cloud Computing - From Parallel Processing to the Internet of Things, Morgan Kaufmann (an imprint of Elsevier), 2012.
5. Tim Mather, SubraKumaraswamy, ShahedLatif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O'Reilly.
6. Rittinghouse J W, Ransome J F, Cloud Computing - Implementation, Management, and Security, CRC Press, 2010.
7. Velte A T, Velte T J, Cloud Computing - A Practical Approach, McGraw Hill, 2011.
8. Shroff G, Enterprise Cloud Computing - Technology, Architecture, Applications, Cambridge University Press, 2010.
9. Antonopoulos N, Gillam L, Cloud Computing - Principles, Systems and Applications, Springer, 2010.
10. Furht B, Escalante A, Handbook of Cloud Computing, Springer, 2010.

Course Outcomes

By the end of this course students will be able to:

- Develop the ability to understand the basics of cloud computing and different cloud deployment models.
- Handle resource management and security issues of cloud computing.
- Evaluate the performance of different cloud service models.
- Identify, analyze and use different cloud services/applications/tools available from key cloud providers.

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IMAGE PROCESSING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:
The course is designed to

- Understand the fundamentals of Digital imaging and Image Processing techniques.
- Discuss the concepts of image compression and segmentation.
- Evaluate the performance of image processing algorithms and systems.

UNIT I
Introduction: Fundamentals of Image Processing, Applications of Image Processing, Human Visual Perception, Introduction to Image Formation, Sampling and Quantization, Binary Image, Three-Dimensional Imaging, Image file formats. Color and Color Imagery: Perception of Colors.

UNIT II
Image Transformation: Fourier Transforms, Discrete Cosine Transform, Walsh-adamard Transform, Karhaunen-Loeve Transform or PCA. Discrete Wavelet Transform: Wavelet Transform, Extension to 2D Signals, Lifting Implementation of the Discrete Wave Transforms.

UNIT III
Image Enhancement and Restoration : Introduction, Distinction between image enhancement and restoration, Histrogram-based Contrast Enhancement, Frequency Domain Methods of Image Enhancement, Noise Modeling, Image Restoration, Image Reconstruction, Image Segmentation.

UNIT IV
Recognition of Image Patterns : Introduction, Decision Theoretic Pattern Classification, Baesian Decision Theory, Nonparametric Classification, Linear Discriminant Analysis, Unsupervised Classification Strategies-clustering, K-means clustering algorithm, Syntactic Pattern Classification, Syntactic Inference, Symbolic Projection method. Texture and Shape Analysis.

UNIT V
Fuzzy Set Theory in Image Processing : Introduction, Use of Fuzzy Image, Preliminaries and Background, Image as a Fuzzy Set, Fuzzy Methods of Contrast Enhancement, Image Segmentation using Fuzzy Methods, Fuzzy Approaches to Pixel Classification, Fuzzy c-Means Algorithm, Fusion of Fuzzy logic with neural network. Image mining and Content-Based Retrieval.

Text Books:

1. Maria Petrou and Costas Petrou , “Image Processing the Fundamentals”, John-Wiley and Sons Publishers, 2nd edition, 2010.
2. Rafael C. Gonzalez , Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", 2nd edition, Gatesmark Publishing, 2009.
3. Tinku Acharya and Ajoy K. Ray, “Image Processing Principles and Applications”, John Wiley & Sons publishers, 2005.

Reference Books:

1. Rafael Gonzalez and Richard E. Woods, Digital Image Processing, 4th edition, Pearson, 2017.
2. Anil K Jain, Fundamentals of Digital Images Processing, First edition, Pearson, 2015.

Course Outcomes

By the end of this course students will be able to:

- Understand Image representation and modeling.
- Design and apply image enhancement and restoration techniques
- Develop image processing techniques for assisting digital forensics

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SOFT COMPUTING (Professional Elective)

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Understand basic ANN architectures, algorithms and their limitations
- Understand the concepts of feed forward and feedback ANN.
- Discuss the Fuzzy logic concepts, Fuzzy principles and relations
- Familiarize Genetic Algorithm and its applications to Soft Computing.
- Design and develop ML techniques with assistance of MATLAB

UNIT I

Introduction of soft computing - Soft computing vs. Hard computing- Various types of soft computing techniques- Applications of soft computing-Neuron- Nerve structure and synapse- Artificial Neuron and its model- Activation functions- Neural network architecture- Single layer and Multilayer feed forward networks- McCullochPitts neuron model- Perceptron model- MLP- Back propagation learning methods- Effect of learning rule coefficient.

UNIT II

Counter propagation network - Architecture - Functioning & Characteristics of counter-propagation network - Hopfield/ Recurrent network – Configuration - Stability constraints associative memory- and characteristics- Limitations and applications- Hopfield vs Boltzman machine - Adaptive Resonance Theory – Architecture – Classifications -Implementation and training-Associative Memory.

UNIT III

Different faces of imprecision - Inexactness, Ambiguity, Undecidability, Fuzziness and certainty, Fuzzy sets and Crisp sets. Intersections of Fuzzy sets, Union of Fuzzy sets, the complement of Fuzzy sets - Fuzzy reasoning. Linguistic variables, Fuzzy propositions, Fuzzy compositional rules of inference - Methods of decompositions and Defuzzification.

UNIT IV

Basic concept of Genetic algorithm and detail algorithmic steps - Adjustment of free parameters- Solution of typical control problems using Genetic algorithm - Concept on some other search techniques like tabu search and ant colony search techniques for solving optimization problems.

UNIT V

GA application to optimization problems - Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB - Neural Network toolbox. Stability analysis of Neural Network interconnection systems - Implementation of fuzzy logic controller using MATLAB fuzzy logic toolbox - Stability analysis of fuzzy control systems.

Text Books:

1. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, Wiley India, 3rd edition, 2012.
2. Zimmermann H. J. "Fuzzy set theory and its Applications" Springer international edition, 2011.
3. David E. Goldberg, “Genetic Algorithms in Search, Optimization, and Machine Learning”, Pearson Education, 2009.
4. Laurene V. Fausett, “Fundamentals of Neural Networks: Architectures, Algorithms, And Applications”, Pearson Education, 1st edition, 1993.
5. W. T. Miller, R. S. Sutton and P. J. Webros, “Neural Networks for Control”, MIT Press, 1996.

Reference Books:

1. S. Rajasekaran, and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis, and Applications, Prentice Hall of India, 2007.

Course Outcomes

By the end of this course students will be able to:

- Comprehend the fuzzy logic and the concept of fuzziness involved in various systems.
- Understand the role of soft computing techniques in solving real world applications
- Build optimal classifiers using genetic algorithms
- Implement fuzzy logic controller using MATLAB fuzzy logic toolbox

CS704O

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OPEN ELECTIVE II (Through MOOCs)

No.of Credits: 3 Instruction Hours/Week: 2L+2P

- Open elective courses are to be successfully completed on SWAYAM online portal of Government of India.
- Courses offered by Department as Program Core/ Program Elective/ Audit courses shall not be opted as open elective.

CS705O

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OPEN ELECTIVE III (Through MOOCs)

No.of Credits: 3 Instruction Hours/Week: 2L+2P

- Open elective courses are to be successfully completed on SWAYAM online portal of Government of India.
- Courses offered by Department as Program Core/ Program Elective/ Audit courses shall not be opted as open elective.

HSS706E

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OPTIMIZATION TECHNIQUES

No.of Credits: 3 Instruction Hours/Week: 3

Course Objectives:

The course is designed to

- Cast engineering extrema (minima/maxima) problems into optimization framework.
- Learn efficient computational procedures to solve optimization problems.

UNIT I

Overview of Operations Research, Modeling approach, Decision analysis and Games-Decision environments, Decision making under certainty, Decision making under risk, Decision making under uncertainty, Game theory.

UNIT II

Liner Programming – Formulation, Graphical method, Simplex method, Duality, Formulation of transportation, Assignment and Transshipment models. Goal programming – Formulation, Weighting and Preemptive methods.

UNIT III

Integer Linear Programming – Applications, Branch and bound, and Cutting plane algorithms.

UNIT IV

Nonlinear Programming - Sample applications, Graphical illustration of nonlinear programming problems, Types of nonlinear programming problems, One-variable unconstrained optimization, Multivariable unconstrained optimization.

UNIT V

Karush-Kuhn-Tucker conditions for constrained optimization, Quadratic programming, Separable programming, Convex programming and Non-convex programming.

Text Books:

1. Hillier F S, and Lieberman G J, *Introduction to Operations Research*, 7th edition, Tata McGraw-Hill, 2003.

Reference Books:

1. Taha H A, Operations Research – An Introduction, 8th edition, Prentice Hall of India, 2006.
2. Wagner H M, Principles of Operations Research with Applications to Managerial Decisions, 2nd edition, Prentice Hall of India, 2004.
3. Tulsian P C, and Pandey V, Quantitative Techniques – Theory and Problems, Pearson Education Asia, 2002.

Course Outcomes

After successful completion of the course, student will be able to

- Apply basic concepts of mathematics to formulate an optimization problem
- Analyse and appreciate variety of performance measures for various optimization problems
- Select appropriate solution technologies and strategies,
- Interpret the solution of an optimization problem
- Understand the effects of problem variation on the optimal solution.

CS707S

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MOBILE APPLICATION DEVELOPMENT

No.of Credits: 2 Instruction Hours/Week: 2L+2P

Course Objectives

The course is designed to

- Impart both conceptual and practical knowledge on Android OS.
- Understand and develop robust applications for Mobile devices on Android platform.

The course shall cover the following topics:

- **Introduction to Android Programming:** What is Android?, Obtaining the Required Tools, Launching Your First Android Application.
- **Using Android Studio for Android Development:** Exploring the IDE, Using Code Completion, Debugging Your Application, Publishing Your Application.
- **Activities, Fragments, and Intents:** Understanding Activities, Linking Activities Using Intents, Fragments, Displaying Notifications.
- **Introduction to Android User Interface:** Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Creating the User Interface Programmatically, and Listening for UI Notifications.
- **Designing User Interface with Views:** Using Basic Views, Using Picker Views, Using List Views to Display Long Lists, Understanding Specialized Fragments.
- **Displaying Pictures and Menus with Views:** Using Image Views to Display Pictures, Using Menus with Views, Using WebView.
- **Data Persistence:** Saving and Loading User Preferences, Persisting Data to Files, Creating and Using Databases.
- **Content Providers:** Sharing Data in Android, Using a Content Provider, Creating Your Own Content Providers, Using the Content Provider.
- **Messaging:** SMS Messaging, Sending Email.
- **Location-Based Services:** Displaying Maps, Getting Location Data, Monitoring a Location.
- **Networking:** Consuming Web Services Using HTTP, Consuming JSON Services.
- **Developing Android Services:** Creating Your Own Services, Establishing Communication Between a Service and an Activity, Binding Activities to Services, Understanding Threading.
- **Publishing Android Applications:** Preparing for Publishing, Deploying APK Files.

Text Books:

1. J. F. DiMarzio, Beginning Android Programming with Android Studio, John Wiley & Sons, Inc., Fourth Edition, 2017.
2. Wei-Meng Lee, Beginning Android™ 4 Application Development, John Wiley & Sons, Inc., 2012.

Reference Books:

1. Ian Darwin, Android Cookbook: Problems and Solutions for Android Developers, O'Reilly, Second Edition, 2017.
2. Bill Phillips, Chris Stewart and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch, Third Edition, 2017.
3. Wei-Meng Lee, Android™ Application Development Cookbook: 93 Recipes for Building Winning Apps, John Wiley & Sons, Inc., 2013.
4. Peter Späth, Pro Android with Kotlin: Developing Modern Mobile Apps, Apress, 2018.
5. Neil Smyth, Android Studio 3.0 Development Essentials – Android 8 Edition, Neil Smyth / Payload Media, Inc., 2017.

Course Outcomes

Having successfully completed this course the students will be able to:

- Demonstrate their skills of using Android software development tools
- Demonstrate knowledge on mobile platforms, mobile user interface and user interface design requirements.
- Develop mobile applications and publish in different mobile platforms.

CS/PROJ

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VIII Semester B.Tech (CSE) – CBCS Regulations-2020
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PROJECT WORK, SEMINAR AND INTERNSHIP IN INDUSTRY

No.of Credits: 12

Students, not exceeding four per batch, shall pursue either research-oriented or application-oriented Project Work. The steps to be followed in executing the Project Work are given below:

Research-Oriented Project Work	Application-Oriented Project Work
1. Motivation	1. Motivation
2. Literature Survey	2. Problem Definition
3. Problem Definition	3. Feasibility Study
4. Model Formulation (System Model)	4. Software Requirements Analysis
5. System Design/ Algorithm Development	5. Software Design
6. Proof of Correctness	6. Test Case Design
7. Performance Analysis	7. Coding
8. Performance Measurement	8. Testing
9. Results and Conclusions	9. Conclusions