SCHOOL OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SYLLABUS

FOR

Pre Ph.D. Course in
COMPUTER SCIENCE & APPLICATIONS

Session: 2020-2021

HEMWATI NANDAN BAHUGUNA GARHWAL UNIVERSITY
SRINAGAR (GARHWAL) UTTARAKHAND - 246 174

Course Code SOET/CSE/CSA:

Pre- Ph.D. Course-work Scheme			
S.No.	*Course Code*	*Course*	*Credits*
1.	SOET/CSE/CSA101	Research Methodology	4
2.	SOET/CSE/CSA102	Part A: Research and Publication Ethics (RPE) Part B: Technical Writing using LaTex	2 1
3.	-	Elective-I	4
4.	-	Elective-II	4
List of Electives** ***Specialization course as suggested by supervisor***			
1.	SOET/CSE/CSA103	Advanced Software Engineering	4
2.	SOET/CSE/CSA104	Advanced Database Concepts	4
3.	SOET/CSE/CSA105	Advanced Network Technologies	4
4.	SOET/CSE/CSA106	Embedded Systems	4
5.	SOET/CSE/CSA107	Advanced Computer Architecture	4
6.	SOET/CSE/CSA108	Information Retrieval	4
7.	SOET/CSE/CSA109	Conceptual in Mathematical Sciences	4
8.	SOET/CSE/CSA110	Advanced Networking and Protocols	4
9.	SOET/CSE/CSA111	Information Security	4
10.	SOET/CSE/CSA112	Data warehousing and Data Mining	4
11.	SOET/CSE/CSA113	Data Structure and Algorithm	4

** Student has to choose any two electives from the list of electives.

SOET/CSE/CSA101: Research Methodology

UNIT- I

Research Methodology: Introduction, Meaning of Research, Objective of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research.

Defining the Research Problem : Research Problem Definition, Selecting the Problem, Necessity of Defining the Problem, Techniques Involved in Defining a Problem.

UNIT- II

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Dependent and Independent Variable, Extraneous Variable, Control, Confounded Relationship, Research Hypothesis, Experimental and Non-Experimental Hypothesis-Testing Research, Experimental and Control Groups, Treatments, Experiment and Experimental Unit(s).

Design of Sample Surveys: Introduction, Sample Design, Sampling and Non-Sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs, Non-probability Sampling, Probability Sampling, Complex Random Sampling Designs.

UNIT- III

Data Collection: Introduction, Experiments and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection.

Data Preparation: Data Preparation Process, Questionnaire Checking, Editing, Coding, Classification, Tabulation, Graphical Representation, Data Cleaning, Data Adjusting, Some Problem in Preparation Process, Missing Values and Outliers, Types of Analysis, Statistics in Research. Use of internet in research work **:** Use of internet networks in research activities in searching material, paper downloading, submission of papers, relevant websites for journals and related research work. Introduction to Patent laws etc., process of patenting a research finding, Copy right, Cyber laws.

References:

1. *Research Methodology Methods and Techniques*, Kothari, C. R., Wiley Eastern Ltd.
2. *Microsoft Excel Data Analysis and Business Modeling*, Wayne L. Winston, Microsoft Press, ISBN: 0735619018
3. *Research Methodology: a step-by-step guide for beginners*, Kumar, Pearson Education.
4. *Practical Research Methods*, Dawson, C., UBSPD Pvt. Ltd.
5. *Research Methodology*, Sharma, N. K., KSK Publishers, New Delhi.

RESEARCH AND PUBLICATION ETHICS (RPE)

About the Course:
Overview: This course has 6 modules mainly focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands on sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research and p metrics and plagiarism tools introduced in the course.

THEORY
RPE 01: PHILOSOPHY AND ETHICS
1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgments and relations.
RPE 02: SCIENTIFIC CONDUCT
1. Ethics with respect to science and research
2. Intellectual honest and research integrity
3. Scientific misconducts: falsification, fabrication, and plagiarism.
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data.
RPE 03: PUBLICATION ETHICS
1. Publication ethics: definition, introduction and importance
2. Best practices/standards setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
5. Violation of publication ethics, authorship and contributor ship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

PRACTICE

RPE 04: OPEN ACCESS PUBLISHING
1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright and self-archiving policies.
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder/ journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggested, etc.

RPE 05: PUBLICATION MISCONDUCT
A. Group Discussions
1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools
Use of plagiarism software like Turnitin, Urkund and other open source software tools.

RPE 06: DATABASES AND RESEARCH METRICS
A Databases
1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics
 Impact Factor of journal as per journal citation report, SNIP, SJR, IPP and Cite Score.

 Metrics: h-index, g index, i10 index, altmetrics

SOET/CSE/CSA102: Part B: Technical Writing using LaTex

Course Structure: Syllabus for Technical writing using LaTeX (1 CREDIT COURSE – 15 hours)

S.NO.	CONTENT	HOURS
1	Installation of the software LaTeX	1
2	Understanding Latex compilation Basic Syntax, Writing equations, Matrix, Tables	2
3	Page Layout – Titles, Abstract Chapters, Sections, References, Equation references, citation. List making environments Table of contents, Generating new commands, Figure handling Numbering, List of figures, List of tables, Generating index.	3
4	Packages: Geometry, Hyperref, amsmath, amssymb, algorithms, Algorithmic graphic, color, tilez listing.	3
5	Classes: article, book, report, beamer, slides. IEEE trans.	2
6	Applications to: Writing Resume Writing question paper Writing articles/ research papers Presentation using beamer.	2
7	Theory, Practical and exercises based on the above concepts.	1
8	Citation and format style: APA style, MLA style, AMA style, IEEE Style, Chicago style	1

SOET/CSE/CSA103: Advanced Software Engineering

UNIT-I
Software Project Management: Software Project Planning, Conventional Software Management, Evolution of Software Economics, Improvement of Software Economics, Project Metrics.

UNIT-II
Software Configuration Management: Configuration Management, Change Management, Version Management, Build and Release Management.
Software Quality: Introduction, Software Quality Assurance, Quality Models, Study of Quality Metrics.

UNIT-III
Software Reuse: Motivation, Inhibitors, Techniques - Component Based Software Engineering, Process Models, Reuse Metrics
Software Re-engineering: Introduction Re-engineering, Restructuring and Reverse Engineering, Re-engineering existing systems, Data Re-engineering and migration, Software Reuse and Reengineering, Reengineering Metrics.

UNIT-IV
Designing with objects and components: Designing with objects: design practices for object-oriented paradigm, Object- oriented frame works, Hierarchal object oriented design process and heuristics, the fusion method, the unified process. Component – based design: The component concept, designing with components, designing components, COTS, Performing User interface design-The Golden rules, Interface analysis and design models, user and task analysis, analysis of display content and work environment, applying interface design steps, user interface design issues, design evaluation.

UNIT-V
Project Scheduling and Risk Management: Project Scheduling: Basic concepts, project scheduling, defining a task set and task network, timeline Charts, tracking the schedule, tracking the progress for an OO project, Earned value analysis. Risk Management: reactive vs. Proactive risk strategies, software risks, risk identification, risk Projection, risk refinement, risk mitigation and monitoring, the RMMM plan.

References:
1. *Software project management*, Walker Royce, Pearson Education, 2004.
2. *Software Re-engineering*, Robert S. Arnold, IEEE Comp. Society, 2003.
3. *Software Engineering : A Practitioner's Approach*, Pressman ,3rd Ed.
4. *An Integrated Approach to Software Engineering*, Pankaj Jalote , Narosa Publishers, 1992.
5. *Fundamentals of Software Engineering*, Ghezzi, Cario ,PHI, 1994.
6. *Software Engineering*, Sommerville, Ian ,4th edition, Addison Wesley, 1992.

SOET/CSE/CSA104: Advanced Database Concepts
UNIT-I
Data Base Analysis and Design Techniques: Database Design Methodologies: Conceptual, Logical, Physical Designs. ER Modeling: Specialization, Generalization, Aggregation, Normalization Theory.
UNIT-II
Distributed Databases concepts: Functions and Architecture of a DDBMS, Data Allocation, Fragmentation and Query Optimization. Transparencies in DDBMS.
UNIT-III
Object Oriented DBMSS Concepts and Design: Abstraction, Encapsulation, object Identity, Methods, Classification and Inheritance, Overloading, Overriding, Polymorphism . Complex Objects, storing objects in Relational Databases. Pointer swizzling techniques, Persistence schemes, versions and schema evolution, Object Relational Databases and Nested Relational model.
UNIT IV
Cluster analysis:
Paradigms, Partitioning algorithms, k-Mediod, CLARA, CLARANS, Hierarchical algorithms, DBSCAN, BIRCH, CURE, Categorical clustering algorithms, STIRR, ROCK,CACTUS; Rough Set Theory: Definition, Reduct, Propositional reasoning, Types of reducts, Rule extraction, Decision tree, Fuzzy sets, Granular computing. Web & Text Mining: Web mining- content, structure, usage, Text mining, unstructured text, Episode rule discovery, Hierarchy of categories, text clustering. Temporal & Spatial Mining: Temporal association rules, Sequence mining, GSP algorithm, SPADE,SPIRIT, WUM, Episode discovery, Event Prediction Problem, Time series analysis, Spatial Mining tasks, trends, clustering.

References:
1. *Database Systems*, Thomas Conolly, Carolyn Begg, Pearson Education, Third Edition.
2. *Fundamentals of Database Systems*, Navathe and Ellmassri Pearson Education, Fourth Edition.

SOET/CSE/CSA105: Advanced Network Technologies

UNIT-I
Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet Foundation of Networking, Protocols: 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model. ATM - Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.

UNIT-II
The Link Layer and Local Area Networks: Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-to-Point Protocol, Link Virtualization. Routing and Internetworking: Network–Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost- Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer

UNIT-III
Logical Addressing: IPv4 Addresses, IPv6 Addresses. Internet Protocol: Internetworking, IPv4, IPv6,Transition from IPv4 to IPv6 – Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intradomain Multicast Protocols, Interdomain Multicast Protocols, Node-Level Multicast algorithms - Transport and End-to-End Protocols: Transport Layer, Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control –Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server

UNIT-IV
Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs). Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch VPNs, Tunneling and Overlay Networks Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – VoIP and Multimedia Networking: Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocol - Mobile A-Hoc Networks: Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks – Wireless Sensor Networks: Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

References:

1. *Data Communication & Networking*, B.A. Forouzan.
2. *Computer Networks*, A.S. Tanenbaum, Prentice Hall, 1992, 3rd edition.
3. *Data & Computer Communication*, William Stallings, McMillan Publishing Co.
4. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W.Ross, Third Edition, Pearson Education, 2007
5. *Data Communications,* Fred Halsall, Pearson Education.

SOET/CSE/CSA106: EMBEDDED SYSTEMS

UNIT I

Introduction to Embedded Systems: Embedded Systems, Processor Embedded into a System, Embedded Hardware Units and Devices in a System, Embedded Software, Complex System Design, and Design Process in Embedded System, Formalization of System Design, and Classification of Embedded Systems

UNIT II

8051 and Advanced Processor Architecture: 8051 Architecture, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts, Introduction to Advanced Architectures, Real World Interfacing, Processor and Memory organization Devices and Communication Buses for Devices Network: Serial and parallel Devices & ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer, Real Time Clock, Networked Embedded Systems, Internet Enabled Systems, Wireless and Mobile System protocols

UNIT III

Embedded Programming Concepts: Software programming in Assembly language and High Level Language, Data types, Structures, Modifiers, Loops and Pointers, Macros and Functions, object oriented Programming, Embedded Programming in C++ & JAVA References:

UNIT IV

Real – Time Operating Systems: OS Services, Process and Memory Management, Real – Time Operating Systems, Basic Design Using an RTOS, Task Scheduling Models, Interrupt Latency, Response of Task as Performance Metrics. RTOS Programming: Basic functions and Types of RTOSES, Windows CE

Embedded Software Development Process and Tools: Introduction to Embedded Software Development Process and Tools, Host and Target Machines, Linking and Locating Software, Getting Embedded Software into the Target System, Issues in Hardware-Software Design and Co-Design Testing, Simulation and Debugging Techniques and Tools: Testing on Host Machine, Simulators, Laboratory Tools

References:

1. Embedded Systems, Raj Kamal, Second Edition TMH.
2. Embedded/Real-Time Systems, Dr.K.V.K.K.Prasad, dreamTech press
3. The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi,Pearson.
4. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.
5. An Embedded Software Primer, David E. Simon, Pearson Education.
6. Micro Controllers, Ajay V Deshmukhi, TMH.
7. Microcontrollers, Raj kamal, Pearson Education.
8. Introduction to Embedded Systems,Shibu K.V,TMH.

SOET/CSE/CSA107: Advanced Computer Architecture

UNIT-I

Parallelism in Uniprocessor Systems: Trends in parallel processing, Basic Uniprocessor Architecture, Parallel Processing Mechanism.

Parallel Computer Structures: Pipeline Computers, Array Computers, Multiprocessor Systems

UNIT-II

Architectural Classification Schemes: Multiplicity of Instruction-Data Streams, Serial versus Parallel Processing, And Parallelism versus Pipelining: An overlapped Parallelism, Principles of Linear Pipelining, Classification of Pipeline Processors, Superscalar Pipeline Design, Super pipelined Design Structures for Array Processors: SIMD Array Processors, SIMD Computer Organizations, Inter-PE Communications

UNIT-III

SIMD Interconnection Networks: Static versus Dynamic Networks, Mesh-Connected Illiac Network, Cube Interconnection Networks Multiprocessor Architectures: Functional Structures: Loosely Coupled Multiprocessors, Tightly Coupled Multiprocessors Interconnection Networks: Time Shared for Common Buses, Crossbar Switch and Multiport memories.

UNIT-IV

ILP software approach- compiler techniques- static branch protection - VLIW approach - H.W support for more ILP at compile time- H.W verses S.W Solutions Storage systems- Types – Buses - RAID- errors and failures- bench marking a storage device- designing a I/O system. Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading.

References:

1. *Computer Architecture and Parallel Processing*, Faye A. Briggs, McGraw-Hill International Editions
2. *Computer Systems Organization & Architecture*, John d. Carpinelli, Addison Wesley
3. Advanced Computer Architectures, Dezso Sima, Terence Fountain, Peter Kacsuk, Pearson.

SOET/CSE/CSA108: Information Retrieval

UNIT -I
Introduction To Information Storage and Retrieval Systems: Information versus Data Retrieval, Basic concepts- The user task, Logical view of documents, Past, Present and Future of IR, Early Developments, Information Retrieval in the Library, The Web and Digital Libraries, Retrieval Process.

UNIT- II
Modeling: Classic Models, Introduction to IR Models, Basic Concepts, the Boolean Model, the Vector Model, Term Weighting, Normalized Term Frequency, Inverse Document Frequency, Similarity Measures, Cosine Similarity, Probabilistic Models.

Retrieval Evaluation: Introduction, Retrieval performance evaluation, Recall and Precision, Reference Collection- TREC, CACM, ISI.

UNIT-III
Query languages: Introduction, keyword Based Querying, Single Word Queries, Context Queries, Boolean Queries, Natural Language, Pattern Matching, Structured Queries- Fixed, Hypertext and Hierarchal Structure,Text preprocessing: Stop word Removal, Stemming, Frequency Counts and computing 'tf-idf' Term Weight, Introduction to commonly used data structure in IR.

UNIT-IV
Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems; Information System Evaluation: Introduction, Measures used in system evaluation,
Measurement example – TREC results.

Multimedia Information Retrieval: Models and Languages: Data Modeling, Query Languages, Indexing and Searching Libraries and Bibliographical Systems – Online IR Systems, OPACs, Digital Libraries.

References:

1. Modern Information Retrieval,Ricardo Baeza-Yates, Neto, PEA,2007.
2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000.
3. Information Retrieval: Algorithms and Heuristics, Grossman, Ophir Frieder, 2/e, Springer, 2004.
4. Information Retrieval Data Structures and Algorithms, Frakes, Ricardo Baeza-Yates, PEA

SOET/CSE/CSA109: Conceptual in Mathematical Sciences

UNIT- I
Ideas and their contributors: Four-color theorem, Goldbach's Conjecture and other conjectures in mathematics.

Paradoxes**:** Zeno's, Russell's, Liar's, Barber's, Berry's, Grelling-Nelson's, Richard's, Bertrand's etc and other paradoxes from set theory, logic , statistic and probability, arguments, Fallacious arguments.

UNIT- II
Mathematical and logical puzzles: Concept of proof & proof techniques: By contradiction, by counter example, by cases, contra positive, Diagonalization principle, Pigeon-hole principle, principle of mathematical induction, principles of structural induction, Controversies and new trends, Pythagoreans and irrational members, cantor's theory, Berkley's objection to foundations (use of infinitesimals) of calculus, Experimental mathematics

UNIT- III
Statistics and probability theory,Counting Principles and mathematical structure
Mathematical Logic: Propositional Calculas, Predicate Calculus.

References:
1. Discrete Mathematics by Kenneth H. Rosen, TMH.
2. Introduction to Mathematical Logic by Elliot Mendelson, CRC Press
3. Computability: Computable functions logic and foundations of mathematics by RL Epstein & WA Cornell
4. The Lady or the tiger and other logical puzzles by Raymond Smulyan, Penguin books
5. Statistics and Truth: Putting chance to work by CR Rao, Ramanujan Memorial Lecture
6. Discrete thoughts: Essay on Mathematics, Science and Philosophy by Mark Kac, Gian-Carlo Rota et al, (Birkhauser)

SOET/CSE/CSA110: Advanced Networking and Protocols
UNIT- I
Transport Layer: The transport service, Services provided, Service primitives, Sockets, Elements of transport protocols, addressing, connection establishment, connection release, flow control and buffering, multiplexing, crash recovery, UDP-Introduction, Remote Procedure Call, TCP- Service model, Protocol, frame format, connection establishment release, connection management.
UNIT- II
The Application Layer: DNS, Telnet and Rlogin, FTP,TFTP,SNMP, SMTP, World Wide Web(Client and Server Side, cookies, wireless web), Java and the Internet, Multimedia (streaming audio, Internet Radio, voice over IP-RTP, video standards) Real time traffic over the internet , Link layer protocols and performance, Performance analysis of MAC layer protocols.
UNIT- III
Network Architecture: Protocol Hierarchies, Layered model, Services, Interface, Reference Models, Underlying Technologies, LAN's (Ethernet, Token Ring, and Wireless), Point-to-Point WAN's, Switched WAN's (X.25, Frame Relay and ATM).
UNIT- IV
Internet Layer Protocols: IP- Datagram, fragmentation and reassembly, ICP, ICMP, Interior and Exterior Routing-RIP, OSPF, BGP, Multicast Routing- Unicast, Multicast and Broadcast, Multicasting

References:
1. Behrouz Forouzan, TCP/IP Protocol Suite, Second Edition, Tata McGraw Hill
2. Andrew S Tanenbaum, Computer Networks, Fourth Ecition, Pretice Hall
3. Douglas E. Comer, Internetworking with TCP/IP,Vol. 1, Principles, Protocols and Architecture Fifth Edition, Prentice Hall, 2000, ISBN o-13-018380-6.
4. William Stallings, High Speed Network, Pearson Education

SOET/CSE/CSA111: INFORMATION SECURITY
UNIT I
Security Goals, Security Attacks Interruption, Interception, Modification and Fabrication Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internet work security, Internet Standards and RFCs
UNIT II
Conventional Encryption Principles & Algorithms(DES, AES, RC4), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution, Public key cryptography principles, public key cryptography algorithms(RSA, RABIN, ELGAMAL,Diffie-Hellman, ECC), Key Distribution.

UNIT III
Approaches of Message Authentication, Secure Hash Functions (SHA-512, WHIRLPOOL) and HMAC Digital Signatures: Comparison, Process- Need for Keys, Signing the Digest, Services, Attacks on Digital Signatures, Kerberos, X.509 Directory Authentication Service.
UNIT IV
Email Security: Pretty Good Privacy (PGP) and S/MIME.IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats, Virus Countermeasures Firewall Design principles, Trusted Systems, Intrusion Detection Systems

References:
1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education, 2008.
2. Cryptography & Network Security by Behrouz A. Forouzan, TMH 2007.
3. Information Security by Mark Stamp, Wiley – India, 2006.
4. Information Systems Security,Godbole,Wiley Student Edition.
5. Cryptography and Network Security by William Stallings, Fourth Edition,Pearson Education 2007.
6. Fundamentals of Computer Security, Springer.
7. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH

SOET/CSE/CSA112: DATA WAREHOUSING AND MINING
UNIT I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining.

Data Preprocessing: Need for Preprocessing; the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT II

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and
OLAP Technology, Attribute-Oriented Induction.

UNIT III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and callable Frequent Item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining . Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

UNIT IV

Cluster Analysis Introduction: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based
Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis - Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multirelational Data Mining: Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Applications and Trends in Data Mining: Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining and Social Impacts of Data Mining.

References:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, 2nd Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.
3. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Edn Asia.
4. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley student Edition
5. The Data Warehouse Life cycle Tool kit – Ralph Kimball Wiley student edition
6. Building the Data Warehouse By William H Inmon, John Wiley & Sons Inc, 2005.
7. Data Mining Introductory and advanced topics –Margaret H Dunham, Pearson education

SOET/CSE/CSA113: Data Structure and Algorithm

UNIT-I
Basics Of Data Structure: Definition of data structure, asymptotic notations- big ohm, omega, theta, recurrence relation, stack, prefix notation, postfix notation, infix notation queues, algorithm and complexity, linked list.

UNIT-II
Trees and Graphs: Trees, binary tree, complete binary tree, expression tree, representation of tree, traversal of Binary Tree, binary search tree, operations on a tree, m-way search tree, graphs, types of graph, spanning tree, rank and nullity of graph, cut vertex, cut edge, planar graph.

UNIT-III
Sorting and Searching: Linear search, binary search, inserting into a binary tree, deleting from a binary tree, bubble sort, merge sort, quick sort, insertion sort, heap sort, complexity of sorting techniques, complexity of searching.
Algorithm Design: Divide and Conquer, Greedy algorithm, optimal merge pattern, fractional knapsack problem, Huffman coding, minimum spanning tree, shortest path algorithm, dynamic programming, travelling salesman problem, 0/1 knapsack problem.

UNIT-IV
Elementary Graphs Algorithms, Minimum Spanning Trees, Single source Shortest Paths, All-Pairs Shortest Paths, Maximum Flow,. Selected Topics: Randomized Algorithms, String Matching, NP Completeness, Approximation Algorithms.

References:
1. *Introduction to Algorithms,* Cormen T.H., Leiserson C.E., Rivest R.L., , PHI, 2000
2. *Computer Algorithms*, Horowitz E., Sahni S., Rajasekaran S., Galgotia Publications, 1999.
3. *The Design and Analysis of Computer Algorithms*, Aho A.V., Hopcroft J.E. Ullman J.D., Pearson Education Asia, 1998, 1974
4. *The Art of Computer Programming Volume 1 (Fundamental Algorithms),* Knuth D.E., Narosa Publishing House, 1973
5. *The Art of Computer Programming Volume 3 (Sorting and Searching),* Knuth D.E., Addison-Wesley, 1973.