DOCTOR OF PHILOSOPHY

SYLLABUS FOR COUSE WORK PAPERS

May, 2013

DEPARTMENT OF COMPUTER APPLICATIONS,
NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI – 620 015
TAMIL NADU, INDIA

CA802-DNA COMPUTING FUNDAMENTALS

Introduction – structure and manipulation of DNA, DNA operations and Automata-the Turing Machine-the Random Access Machine- Data structure-Computation Complexity- P and NP

Filtering Models-Splicing Models-Constructive Models –Membrane Models

An existing Models of DNA Computing- Ogihara and Ray's Boolean circuit Models – An Alternative Boolean circuit simulation- Proposed Physical implementation And Analysis- P- RAM Simulation – The Translation process

Implementation of Basic logical elements- Initial set construction with in filtering Model- Advantages of implementation – Experimental investigations- Laboratory Implementations.

Successful implementations –Gene unscrambling in ciliates- Biological Backgrounds- Models of Gene construction

References:

1. Martyn Amos, "Theoretical and Experimental DNA Computation", 1st Edition,Springer, 2005
2. Gheorghepaun, GizegorzRozenberg,ArtoSalomaa , "DNA computing: New Computing paradigms, 1st Edition, Springer, 2005

CA803-MOBILE AGENTS TECHNOLOGY

Introduction to Mobile Agents: Conventional Approaches- Introduction to Mobile Agents - History of Mobile Agents - The Early Approaches of Mobile Code- Merits of Mobile Agents - Application Domains of Mobile Agents

Mobile Agents: Concepts, Functions, and Possible Problems: The Mobile Agent Migration Process- Generic Framework for Agent Migration - Effective Migration as a Core Feature of Mobile Agent - Mobile Agents versus Client-Server - Comparison with respect to Performance Analysis - Case Study for Mobile Migration

Mobile Agent Communication: Introduction-Classification of Communication Models for Mobile Agents- Message Passing- Information Space-Solutions to Provide Location-Transparent Communication- Central Server and Home Agency Solutions- Forwarding Pointers- Broadcast-Based Approaches- Hierarchical Approaches

Mobile Agent Security: Security Requirements and Cryptographic Techniques - Authenticity- Confidentiality- Integrity- Accountability- Availability-Anonymity- Taxonomy of Possible Attacks- Malicious Agents- Malicious Agencies-Protecting Mobile Agents- Preventing and Detecting Attacks on Mobile Agents-Protecting Agencies

The Tracy Mobile Agent Toolkit: Running a Tracy Agency-Programming Agents with Tracy- Installation- Programming Mobile Agents- Programming Kalong Scripts-Programming Migration Strategies- Managing Logical Agency Networks

References:

1. Peter Braun and Wilhelm R.Rossak, "Mobile Agents: Basic Concepts, Mobility Models, and the Tracy Toolkit", 1st Edition, Morgan Kaufmann, 2004
2. Gian P. Picco, "Mobile Agents", 1st Edition, Springer, 2001
3. William R Cockayne and Michael Zyda, 1st Edition, "Mobile Agents", Prentice Hall, 1998

CA804-DATA MINING INDEXING AND INFORMATION RETRIEVAL

Data Mining: Introduction: Definition, Functionalities, Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data reduction, Discretization and Concept Hierarchy Generation

Mining Association Rules in large Databases, Classification and prediction: Classification byDecision Tree induction, Bayesian Classification, Back Propagation, Association RuleMining, Prediction, other Methods. Cluster Analysis: Types of data, Major Clustering Methods, Partitioning methods, Hierarchical Methods, Density Based Methods, Grid Based Methods,Model Based Methods, and Outlier Analysis. Mining Text Databases

Text Representation: Word statistics; Zipfs law; Porter stemmer; morphology; index term Selection; using thesauri. Metadata and markup languages (SGML, HTML, XML)Text Categorization and clustering: Categorization algorithms: Rocchio; naïve Bayes; decision trees; and nearest neighbor. Clustering algorithms: agglomerative Clustering; K-means; expectation maximization (EM). Applications to information filtering; organization;and relevance feedback

Basic Tokenizing, Indexing, and Implementation of Vector-Space Retrieval; Simple Tokenizing, stop-word removal, and stemming; inverted indices; efficient processing with sparse vectors, advanced indexing and Searching Text: Efficient string searching and pattern matching.

Introduction: Goals and history of IR. The impact of the web on IR, The role of artificial Intelligence (AI) in IR.Basic IR Models: Boolean and vector-space retrieval models; ranked retrieval; text-similarity Metrics; Tf –IDF (term frequency/inverse document frequency) Weighting; cosine similarity-Experimental Evaluation of IR, Query and Languages, Text Representation,web Search, Advanced IR Models.

References:

1. Data mining: Concepts and Techniques, by jiawei Han and MichelineKamber ,Morgan Kaufmann Publishers,ISBN 1-55860-489-8
2. Modern information Retrieval, by Ricardo Baeza-Yates and BerthierRiberio-Neto,Addsion Wesley, ISBN 0-201-39829-x
3. Data mining: Introductory and Advanced Topics, Margaret H. Dunham, PersonEducation, First Indian Reprint, 2003
4. Data mining Techniques, ArunK.Pujari, University Press (india) Limited, FirstEdition,2001

CA805-DATA MINING AND ADVANCED CONCEPTS

Introduction:Introduction and related concepts –OLAP, Data Warehousing, Information retrieval, Machine learning and applications.

Visualization And Statistical Perspectives:Classification algorithms- Statistical based algorithms, distance based algorithms,Decision tree based algorithms neural network based algorithms, and rule based Algorithms – Clustering techniques – Similarity distance measures, hierarchical Algorithms, partitioning algorithms, clustering large databases. Association rules – basic algorithms,Parallel and distributed algorithms, comparing approaches, incremental rules, Advanced association rule techniques and measuring the quality of rules

Web Mining: Web mining – web content mining, web structure mining and web usage mining Techniques

Temporval And Spatial Mining: Temporal mining – modeling temporal events, time series, sequences, temporal Association rules.Spatial mining – Spatial data over view, spatial rules, spatial Classification algorithms, and spatial clustering algorithms

Applications:Tools - Applications – case Studies

References:

1. Data mining introductory and advanced topics – Margaret H. Dunham
2. Data mining: practical machine learning tools and techniques – witten, Lan H and Frank, Eibe , 2nd edition KAUFMANN – Publication 2003
3. Managing data mining advice from experts – KUDYBA, Stephen – cybertechPublication – 2002
4. Web data mining and applications in Business Intelligence and counter – BhavaniThuraisingham-Terrosim – CRC press.
5. Jiawei Han, MIchelineKamber, Data Mining concepts and Techniques, Morgan Kauffmann publishers, 2000

CA806-DATA MINING IN BIOINFORMATICS

Introduction to Data Mining in Bioinformatics , Data Mining Perspective - Data Cleaning, Data Preprocessing and Data Integration , Exploration of Data Mining Tools for Biodata Analysis, Discovery of Frequent sequential and structured patterns, Classification and Cluster Analysis Methods. Computational Modeling of Biological Networks, Data Visualization and Visual Data Mining

Multiple sequence alignment by Antipole clustering - Antipole Tree Data Structure for clustering, Multiple sequence Alignment via Antipoles. Comparing ClustalW and AntiClustAI,RNA Structure Comparison and Alignment - RNA structure comparison and alignment Models, Hardness Results, Algorithms for RNA Secondary structure comparison, Algorithms for RNA structure Alignment

Piecewise Constant Modeling of Sequential Data using Reversible Jump Markov Chain Monte Carlo-Bayesian Approach and MCMC Methods. Gene Mapping by Pattern Discovery - Gene Mapping, Haplotype Patterns as a Basis for Gene Mapping, Instances of the Generalized Algorithm.

Preliminaries, Predicting Folding Path ways, Pathways for other Proteins; Data Mining Methods for Systematics of Protein Sub cellular Location

Phyloinformatics - Purpose of Phylogenetic Database, Taxonomy,Tree Space,Synthesizing Bigger Trees, Visualizing Large Trees, Phylogenetic Queries, Implementation. Declarative and Efficient querying on Protein Secondary Structures - Protein Format, Query Language and queries, Query Evaluation Techniques, Query Optimizer and Estimation.

References:

1. Jason T.L. Wang, Mohammed J.Zaki, Hannu T.T. Toivonen and Dennis Shasha(Eds),"Data Mining in Bioinformatics(Advanced Information and Knowledge pfocessing)", Istedition, Springer-VerlagNew York, 2004
2. SushmitaMitra, TinkuAcharya "Data Mining:Multimedia,Soft Computing &Bioinformatics", 1st edition,John Wiley & Sons, 2003
3. Dan E. Krane and Michael L. Raymer, "Fundamental Concepts of Bioinformatics ", Pearson Education, 2003
4. Margaret H. Dunham and Sridhar “Data Mining, Introduction and Advanced Topics",Pearson Education, 2006

CA807-RESEARCH FUNDAMENTALS IN COMPUTER SCIENCE AND APPLICATIONS

Algorithms and Data Structures: Recurrences, Recursion, Linear and Binary SearchAnalysis, Sorting Problems and Selection, Greedy Strategy, Divide- and – Conquer,Dynamic Programming.Data Structures-Primitive: Arrays, Stacks, Queues. Non- Primitive:Lists and Trees (Binary Tree and Binary Search Trees)

Operating Systems: Operating System Concepts,Types of Operating Systems,Process Management,CPUScheduling, Synchronization,Deadlocks, Memory Management,File Management –File Access Methods and File Allocation Methods, Basics of UNIX Operating Systems

Computer Networks: Network concepts,Reference Models,Network Standardization,Transmission media,Error Detection and Correction,Data Link control, Switching,Routing Algorithms,Congestion Control Algorithms,TCP/IP, UDB,DNS,FTP,TELNET,SMTP,SNMP.

Computer Architecture: Number Systems,Boolean algebra and Simplification,Combinational Circuit – Adder,Multiplexer,Decoders, Sequential Circuit – Flip Flops. Memory – Cache and virtual Memory.CPU – arithmetic logic unit, addressing modes, Instruction cycle and Instruction Pipelining, Programmed I/O,Interrupt –driven I/O and DMA, RISC and CISC

Databases: File Systems – Database Systems – Database System Architecture – Data models –E-RModel, Relational Model -Relational Database Design, Database Administration,ObjectBased Databases,Distributed Databases,Transaction Management – concurrency Control.

References:

1. T.HCormen, C.E. Leiserson, R.L.Rivest and C.Stein, “Introduction to Algorithms”,Prentice Hall, 2001Silberschatz,peter Baer Galvin and Greg Gagne, “operating System Concepts”, Seventh Edition,John Wiley,2004.
2. Silberschatz,HendryF.Korth and S.Sudarshan, “Database System Concepts”, Fifth Edition, TataMcGrawHill, 2005
3. AndrewS.Tanenbaum, “computer Networks” Fourth Edition,Prentice Hall,2003.
4. WilliamStallingoftwares, “computer Architecture “, Third Edition, Prentice Hall, 2000

CA808-MULTIMEDIA SYSTEMS AND APPLICATIONS

Introduction: Fundamentals of multimedia, media and data streams, sound/audio, Image, graphics, video and animation.

Data Compression Methods:Data compression including coding requirements, source, entropy, and hybridcoding, JPEG, H.261 (px64), MPEG, MP3 and etc. Computer technology issues such as communication architecture, multimedia workstations, cache systems, storage systems and optical storage.

Multimedia Systems: Multimedia operating system issues such as real-time operation, resource management,process management, file systems, and Multimedia networking. Multimedia synchronization,presentation requirements, reference model and synchronization techniques.

Multimedia Database: Multimedia database issues such as data organization, indexing and retrieval. Multimedia applications including digital libraries, system software, toolkits, conferencing paradigms, structured interaction support, and examples from video/audio/graphics conferencing

Case Study: Latest Web technologies, such as XML, X3D and Semantic Web

References:

1. Fundamentals of Multimedia, Ze-Nian Li, and Mark S. Drew, Pearson Prentice Hall, October 2003.
2. Multimedia Communication Systems, K. Rammohanarao, Z. S. Bolzkovic, D. A. Milanovic, 1st edition. Prentice Hall, May 2002
3. Video Processing and Communications, Yao Wang, JoemOstermannand Ya-Qin Zhang, PrenticeHall, 2002.
4. Web Caching and Replication, Michael Rabinovichand Oliver Spatscheck, Addison-Wesley, 2002.
5. Multimedia Communications: Applications, Networks, Protocols and Standards, Fred Halsall, Addison-Wesley, 2001.

CA809-MOBILE DATA MANAGEMENT

Centralized versus distributed databases – Fragmentation –Distributed Database Architecture – Client/Server database – Distributed Transactions – Locking and Commit protocols – Distributed Concurrency control – Distributed Recovery –Security and Reliability.

Introduction to mobile database system – Type of mobility – IntroductionWireless network communication – Continuous connectivity – Location and Handoff Management, Data processing and mobility – Effect of mobility on the Management of data.

Transaction management in mobile database systems : Transaction execution in MDS, Mobile Transaction model,Execution model based on ACID transaction Frame work,Weak connectivity operation, Consistency restoration schema,Concurrency control mechanisms,Transactions commitment in MDS.

Mobile database recovery: Introduction, Log management in MDS, Mobile Database recovery schemes. Wireless information broadcast: Broadcast infrastructure, Exponential index, Location based indexing,on-demand data scheduling, Data dissemination system. Ubiquitous data management

Introduction to XML –Structure of XML- XML Data –XML Namespaces –XML Document Schema – Data Type definitions – XML Querying and Transformation – XML Presentation Techniques - XML Infrastructure – Security Overview - Canonicalization -XML Security Frame work – XML for Mobile Federated database systems

References:

1. Database Management Systems, Ramakrishnan and Gehrke, McGraw Hill,Third Edition, 2003
2. Distributed Databases – Principles and Systems, Stefano Ceri&GiuesppePelagatti,McGraw Hill,1987
3. Mobile Database systems,Vijaykumar, Wiley publications 2006
4. Mobile Communications,Jochen Schiller, Person Education
5. Database and Applications Security – Integrating Information Security and data Management,Dr.BhavaniThuraisingham, Auerbach publications,2005
6. XML: The Complete Reference, Heather Williamson, Tata McGraw Hill,2001
7. URL:http://citeseerx.ist.psu.edu/viewdoc/summary?doi =10.1.1.21.1871

CA810-USER INTERFACE DESIGN AND IMPLEMENTATION

Introduction to interaction design-Good and Bad design-Interaction design-Goals of interaction design-Usability principles-understanding and conceptualizing interaction - Problem pace-conceptual model-interface metaphors-interaction paradigms.

Understanding users-effects of interface to users-Cognition process framework tor cognition-mental model-information processing-psychology aspects of the user-affective aspects-expressive interface - user frustration-virtual characters.

Process of interaction design- interaction design activities and process-identify user needs and requirements-alternative design-lifecycle models for interactive design and Hel task description and anal) sis-interaction methods prototyping-user centered approaches-testing and modeling users-Designing for collaboration and communication- CSCW-Groupware.

Advanced issues in HCI-multimodal interaction-speech and gesture interaction - assistive technology-interaction in the virtual world-biometrics-ubiquitous computing and HCI -intelligent user interface-information retrieval- hypertext and digital libraries

XML – DTD – Namespace – XPATH – XPOINTER – XLINK-XQUERY -XML schema XUL and other technologies and tools for UI

References:

1. Amsterdam: North-Holland “Handbook of Human-Computer Interaction”, 1988.
2. Alan Dix, Janet Finlay, Gregory Abowd and Russell Beale. "Human ComputerInteraction" 3rd edition. Prentice hall, 2004.
3. Jenny preece, Yvonne Rogers & Helen sharp, "Interaction Design: Beyond Human-Computer Interaction" New York, John Wiley and Sons, 2002.

CA811-NATURAL LANGUAGE PROCESSING

Introduction: Natural Language Processing - Linguistic Background -Mathematical Foundations -Logic Programming-Logic and Model Theoretic Semantics-Morphological Analysis.

Syntactic Processing:Grammars and Parsing-- Top Down Parser, Bottom Up Chart Parser, Transition Network Grammars, Finite State Models and Morphological Processing, Grammar and Logic Programming, Feature Systems and Augmented Grammars, Grammars for Natural Language.

Semantic Interpretation:Semantic And Logic Form-Word Senses And Ambiguity, Basic Logical Form Language, Encoding Ambiguity In Logic Form, Verbs States In Logic Form-Thematic Roles, Defining Semantic Structure -Model Theory.

Ambiguity Resolution:Selection Restriction, Semantic Filtering Using Selection Restrictions, Semantic Networks, Statistical Word Sense Disambiguation-Collocations-Statistical Semantic Preferences, Combined Approach to Disambiguation Other Strategies for Semantic Interpretation.

Contextual Interpretation:Knowledge Representation-Representation Based on FOPC-Frames-Discourse Context And Reference-Deep And Surface Anaphora-Ellipsis -Using World Knowledge-Reference And Matching Expectations-Scripts-Action Effect Based Reasoning-Plan Inference Algorithm.
Applications- Information Extraction-Information Retrieval-Text Mining-Author Identification-Summarization – Categorization- Ontologies

References:

1. Allen.J, "Natural Language Understanding ", second edition 1995, BenjaminCummings Publishing Co
2. Manning.C.D and Schutze.H, "Foundations of Statistical Natural Language Processing ", MITPress, 1999

CA812-ADVANCED DISTRIBUTED SYSTEMS

Distributed Systems: Motivation – Characteristics – System Models – Communication – RPC – Remoteobject invocation - Message oriented Communication – Stream Oriented communication

Process – Code migration – Software agents – Name services – File systems – Security.

Fundamentals of middleware – Different styles of middleware – Distributed transaction and Messaging Middleware – Object based, Coordinated based Distributed Systems.

Mobility and Middleware – Introduction to Mobile Computing – wireless networks – Mobile IPMobility and Adaptation from Mobile Computing to Ubiquitous Computing.

Multimedia / Real-time Systems – Multimedia and Real time requirements - Distributed Multimedia systems and real time systems – Multimedia and real time communication

References:

1. Coulouris, Dollimore, Kindberg, "Distributed Systems: Concepts and Design", 3rd edition, Addison Wesley,2000
2. Judith m.Myerson, "The Complete Book Of Middleware", Auerbach Publication, 2002
3. A.S. Tanenbaum,M.V.Steen, "Distributed Systems Principles and Paradigms", Pearson Education, 2002
4. Steinmetz, Nahrstedt, "Multimedia:Computing Communication & Application", Prentice Hall,1995
5. Jochen Schiller, "Mobile Communications", Addison Wesley,2000

CA813-XMLANDCLOUD COMPUTING

Xml Technology: Role OF XML-XML and the Web-XML Language Basics – SOAP –Web Services-Revolutions OF XML – Service Oriented Architecture (SOA). XML – Name Spaces- Structuring With Schemas and DTD – Presentation Techniques – Transformation – XMLInfrastructure

Understanding Cloud Computing: Cloud Architecture – Cloud Storage – Advantages of Cloud – Disadvantages of Cloud Computing – Cloud Services.

Developing Cloud Services: Web- Based Application – Pros and Cons of Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On – Demand computing –Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine –IBM Clouds

Using Cloud Services: Collaborating on Calendars, Schedules and Task Management – Exploring Online SchedulingApplications – Exploring Online Planning and Task Management – Collaborating on Event Management –Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing – Collaborating on Databases – Storing and Sharing Files

Other Ways to Collaborate Online: Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating WebConference Tools – Collaborating Via Social Networks and Groupware – Collaborating Via Blogs and Wikis

References:

1. Frank. P.Coyle, XML, Web Services and The Data Revolution, Pearson Education, 2002
2. Michael Miller, Cloud Computing: Web – Based Applications That change the Way You Work and Collaborate Online, Que Publishing, August 2008
3. Haley Beard,Cloud Computing Best Practices for Managing and Measuring Processes
4. For On-demand Computing, Applications and Data Centers in the Cloud with SLAs,Emereo Pty Limited,July 2008

CA814-MOBILE ADHOC NETWORK BASED MULTIMEDIA COMPUTING

Wireless LAN:InfraredVs.Radio Transmission and Adhoc Networks – IEEE 802.11 – HIPERLAN-Bluetooth – GSM – Mobile Services – System Architecture – Localization and Calling – Handover and Security – Wireless Application Protocol.

Mobile Adhoc networks: Introduction to Adhoc networks – Characteristics of MANETS – Applications of MANETS – Challenges of MANETS – Routing in MANETS – Criteria for classification – Taxonomy of MANETS Routing algorithms – Topology based routing algorithms –Position based routing algorithms.

Broadcast Systems: Overview – Cyclical repetition of data – Digital Audio Broadcasting – Multimedia Object Transfer Protocol – Digital Video Broadcasting – DVB data broadcasting – DVB for high speed Internet access- Convergence of Broadcasting and Mobile communications.

Multimedia and the Internet: Fundamentals of multimedia – Hardware Peripherals – Basic Tools – Multimedia Authoring Tools – Tools – Text – Sound – Images – Animation- Video – Tools for World Wide Web – Designing For the World Wide Web – Delivering on the World Wide Web.

Multimedia and Networking: Multimedia applications – in Networking – Internet – Adhoc Networks.

References:

1. Jochen Schiller – "Mobile Communication", Person Education, Second Edition,2004
2. Carlos Corderio Dharma p.Aggarwal- "Adhoc and Sensor networks – Theory and Applications", World Scientific Publications, March 2006.
3. C.Siva Ram Murthy and B.S Manoj, AdHoc Wireless Networks: Architectures and Protocols, Prentice Hall PTR, 2004.
4. Fred Halsall - "Multimedia Communication", Addision Wesley,2001
5. Tay Vaughan – "Multimedia – Making it work", TATA McGraw – HILL, Fourth Edition,2000.

CA815-INFORMATION RETRIEVAL SYSTEM

Introduction: Fundamentals of multimedia, media and data streams, sound/audio , image, graphics,Video and animation, Data compression including coding requirements, source, entropy, and Hybrid coding, JPEG, H.261(px64) ,MPEG,MP3 and etc. Overview of IR Systems, historical Perspectives, basic evaluation

Document Representation and Indexing: Document representation including statistical characteristics of text, basic queryProcessing. Data structures and file organization for IR, automatic indexing and indexing Models

Retrieval Models and Relevance Feedback: Retrieval models including similarity measures and ranking, Boolean matching,Vector space models, Probabilistic models, etc. searching and filtering techniques including Relevance feedback, user profiles, collaborative filtering

Classification and Clustering: Classification including text classification and naïve bayes, vector space classification and support vector machine learning on documents. Clustering including flat clustering and Hierarchical clustering

Web Retrieval: IR system and the W WW, Web search basics including web characteristics, advertising as the economic model, search user experience and index size and estimation - Crawling, distributing indexes, connectivity servers, hyperlink analysis, page rank, hubs and Authorities

References:

1. Fundamentals of multimedia, Ze-Nian Li, and Mark S.Drew person prentice Hall, October 2003.
2. Data Compression the complete reference, David Salomon, second edition.
3. Introduction information retrieval, Christopher D. Manning, PrabhakarRaghavan and HinrichSchutze, Cambridge University Press.2008
4. Introduction to modern information retrieval, Gerard Salton, Michael McGill, International student edition.

CA821-COMPUTATIONAL BASICS FOR QUANTUM COMPUTATION

Vector Spaces and Linear Equations – Vector Spaces and Subspaces, The solution of m Equations in n Unknowns, Linear Independence, Basis, Dimension, The Four Fundamental Subspaces, Networks and Incidence Matrices, Linear Transformations

Orthogonality – Orthogonal Subspaces, Inner Products and Projections Onto Lines, Orthogonal Bases, Orthogonal Matrices, and Gram-Schmidt Orthogonalization; Eigen values and Eigenvectors – The Diagonal Form of a Matrix, Similarity Transformations

Hermitian operators; tensor products; the commutator and anti-commutator; the polar and singular value decompositions

The postulates of quantum mechanics – state space; evolution; quantum measurement; distinguishing quantum states; projective measurements; POVM measurements; phase; composite systems

Application: superdense coding; the density operator – ensembles of quantum states; general properties of the density operator; the reduced density operator; the schimdt decomposition and purifications; EPR and Bell inequality

References:

1. Strang, Gilbert. Linear Algebra and its applications. Brooks Cole, 4th edition.
2. P. M. Mathews and K. Venkatesan, a Textbook of Quantum Mechanics, Tata McGraw-Hill (1977).
3. J.L. Powell and B. Crasemann, Quantum Mechanics, Narosa Publishing House (1993).
4. J. J. Sakurai, Modern Quantum Mechanics, Addison-Wesley (1999).

CA822-QUANTUM COMPUTATION AND QUANTUM INFORMATION

Overview and introductory material – physics of information, quantum information, quantum complexity, quantum parallelism, quantum hardware, axioms of quantum mechanics, the qubit, the density matrix, Schmidt decomposition, ambiguity of the ensemble interpretation

Quantum measurement – orthogonal measurement, superoperators, Kraus representation theorem, three quantum channels, master equation; quantum entanglement – nonseparability of EPR pairs, the Bell inequality, using entanglement, quantum cryptography, mixed-state entanglement

Quantum complexity and Quantum algorithms – classical circuits, quantum circuits, quantum algorithms, quantum database search, the grover algorithm, generalized search and structured search, distributed database search, periodicity, factoring, phase estimation, discrete log, simulation of quantum systems

Quantum error-correcting codes – criteria for quantum error correction, general properties of QECC, probability of failure, classical linear codes, Calderbank-Shor-Steane codes, 7-qubit code, constraints on code parameters, stabilizer codes, 5-qubit code, quantum secret sharing, codes over GF(4), good quantum codes, codes that correct multiple errors, quantum channel capacity; entanglement measures; quantum channel capacity

Fault tolerant quantum computation; topological quantum codes - quantum computing with anyons, flux-charge composites, spin and statistics, combining anyons, unitary representations of the braid group, topological degeneracy, toric code revisited, nonabelianAharonov-Bohm effect, quantum computing with nonabelianfluxons, anyon models generalized, simulating anyons with a quantum circuit, Fibonacci anyons, quantum dimensions, pentagon and hexagon equations

References:

1. Nielsen, Michael A. and Isaac L. Chuang. Quantum Computation and Quantum Information. Cambridge, UK: Cambridge University Press, September 2000.
2. Peres, Asher. Quantum Theory: Concepts and Methods. New York, NY: Springer, 1993.

CA823-EVOLUTIONARY ALGORITHMS IN BIOINFORMATICS

Exact matching: basic algorithms, fundamental preprocessing - Exact matching: classical algorithms; Boyer-Moore and Knuth-Morris-Pratt - Exact set matching; keyword trees - Suffix trees; linear-time construction of suffix trees - Applications of suffix trees; Decision trees, Tries and G-tries, Design strategies.

Introduction to Evolutionary Computation Techniques: Heuristic Algorithms: Hill Climbing, Simulated Annealing, Tabu Search - Neural Networks, Fuzzy Logic.
Metaheuristic Algorithms: Genetic Algorithms, Evolutionary Strategies - Particle Swarm Optimization - Ant Colony Optimization - Artificial Immune Systems - Other Algorithms - Harmony Search, Honey-Bee Optimization, Memetic Algorithms, Co-Evolution, Multi-Objective Optimization, Artificial Life - Hybrid Techniques.

Heuristic alignment methods: BLAST/FASTA and the statistics of local alignments - Multiple sequence alignment - Definition, scoring, techniques - Aligners for proteins sequences - Spliced alignment - Motif finding in DNA and proteins - Using Genetic Algorithms for Pair - wise and Multiple Sequence Alignments.

Programming Strategies: Genetic programming, Evolutionary programming - Clustering Microarray Data with Evolutionary Algorithms: Introduction – k-means techniques – the array miner software - Protein Folding: Protein Computer model, Application of Evolutionary Computation to Protein Folding with Specialized Operators.

Evolutionary Computation and Fractal Visualization of Sequence Data: Introduction, chaos game, IFSs, chaos automata. Discovery of Genetic and Environmental interactions in disease Data using Evolutionary Computation: Feature phase, Clustering Phase, Experimental results.

References:

1. Gary B. Fogel and David W. Corne“Evolutionary Computation in Bioinformatics “, Morgan Kaufmann Publishers, 2003
2. Dan Gusfield, “Algorithms on strings, trees and sequences (Computer science and computational biology)”, Cambridge university press, 1997
3. Neil C. Jones and Pavel A. Pevzner, “An introduction to bioinformatics algorithms”, MIT Press 2004
4. N.Gautham, “Bioinformatics – Databases and Algorithms”, Narosa publishing house, 2006
5. Daniel Ashlock, “Evolutionary Computation for Modeling and Optimization”, Springer, 2005
6. GuszEiben and Jim Smith, “Introduction to Evolutionary Computing”, Springer, 2007
7. AndriesEngelbrecht,“Computational Intelligence: An Introduction”, Wiley, 2007
8. Kenneth DeJong, “Evolutionary Computation a Unified Approach’’, MIT press 2006

CA824-WEB MINING AND INFORMATION RETRIEVAL

Data Mining Classification: Supervised Learning–Decision Tree Induction–Classifier Evaluation–Rule Induction Classification Based on Association–Types of Classification–Unsupervised learning – K–means Clustering–Representation of Clusters – Hierarchical Clustering-DistanceFunction-Data Standardization-Handling of Mixed Attributes – Cluster Evaluation-Discovering Holes and Data Regions – Partially Supervised Learning – Learning from Labeled and unlabeled Examples-EM Algorithm – Learning from Positive and Unlabeled Examples

Web Mining – Retrieval, Search And Link Analysis: Information Retrieval- Information Retrieval Models-Relevance Feedback- Evaluation Measures – Text and Web Page pre-Processing-Inverted Index and its Compression-Latent Semantic Indexing – Web search – Meta Search: combining Multiple Rankings-Combination Using Similarity Scores – Web Spamming – Link Analysis – Social Network Analysis Co-Citation and Bibliographic coupling-Page Rank HITS- Community-TF*IDF

Web Crawling And Wrapper Generation: Web Crawling – Algorithm – Implementation Issues – Types – Crawler Ethics and Conflicts Structured data Extraction: Wrapper Generation – Wrapper Induction – Instance Based Wrapper Learning – Automatic wrapper Generation: Problems –String Matching and Type Matching Multiple Alignment – Building DOM Trees –Extraction Based on Multiple Pages – Using Techniques in Previous Sections.Information Integration –Schema Matching – Pre-Processing for Schema Matching-Combining similarities-Integration of Web Query interfaces - Constructing a Unified Global Query Interface.

Opinion Mining:Sentiment Classification-Feature-Based Opinion Mining and summarization–Comparative Sentence and Relation Mining-Opinion Search-Opinion Spam.

Web Usage Mining:Data Collection and Pre-Processing-Data Modeling for Web Usage Mining-Discovery and Analysis of Web Usage Patterns -Discussion and Outlook - Current Trends.

References:

1. Alex Berson, Stephen J. Smith “Data Warehousing, Data Mining,& OLAP”, TataMcgraw- Hill, 2004
2. Liu. B, “Web Data Mining, Exploring Hyperlinks, Contents and Usage Data”,Springer, 2007
3. Reference Jiawei Han, MichelineKamber, “Data Mining: Concepts andTechniques”, Morgan KaufmanPublishers, 2000.
4. Sean Kelly, “Data Warehousing in Action”, John Wiley & Sons Inc., 1997.
5. PaulrajPonnaiah, “Data Warehousing Fundamentals”, Wiley Publishers, 2001.
6. UsamaM.Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth, RamasamyUthurusamy, “Advances in Knowledge Discover and Data Mining”, The M.I.TPress, 1996
7. Christopher D. Manning, PrabhakarRaghavan&HinrichSchütze,”Introduction to Information Retrieval”,Cambridge University Press,2008

CA825-DATABASE SECURITY

Introduction to databases-Security Requirements-Reliability and Integrity-sensitive Data-Inference-Direct Attack-Indirect Attack-Aggregation-Multilevel Databases-Proposal for Multilevel security.

Privacy Concepts-Information Privacy-Computational Privacy-Privacy Principles and Policies-Authentication and Privacy-Privacy on the Web-E-mail Security-Impacts on Emerging Technologies-RFID-Electronic Voting-VoIP and Skype- Privacy Preserving Data Mining.

Mathematics for Cryptography-Properties of Arithmetic-Complexity-Symmetric Encryption-DES-AES-Public Key Encryption-RSA-El Gamel and Digital Signature Algorithms

Data Anonymization: Data Privacy- Replacement - Suppression -Generalization - Perturbation – Ingredients for anonymization techniques- Privacy Preservation in Social Networks- Anonymization Methods for Social Network- Security in Advanced Databases: Multimedia-Mobile-Web Database.

Data Masking:Overview-Data Masking Architectures-Data Masking Techniques-Data Masking Issues-Mathematics of Data Masking-Encryption vs Masking - Data Sanitization Techniques.

References:

1. M. Bhavani, Thuraisingham , “Database and Applications Security”, Auerbach Publications,2005.
2. William Stallings, “Cryptography and Network Security – Principles and Practices”, Prentice Hall of India, Third Edition, 2003.
3. Charles P. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Pearson Education, Fourth Edition, 2007.
4. Bin Zhou Jian Pei Wo-Shun Luk, “A Brief Survey on Anonymization Techniques for Privacy PreservingPublishing of Social Network Data “, School of Computing Science,Simon Fraser University, Canada
5. “Data Masking: What You Need to Know What You Really Need To Know Before You Begin “, A Net2000 Ltd. White Paper, Retrieved from http://www.grid- tools.com/solutions/data_masking.php

CA826-PRINCIPLES OF COGNITIVE SCIENCE

Basic Concepts: Fundamental concepts- Interdisciplinary perspective - Representations – Computations - Architecture of mind- memory –reasoning - problem solving

Philosophical and Psychological approach: Philosophical approach: Mind body problem – Monism- Dualism – Functionalism – Knowledge acquisition- Emergent property Dennett's multiple draft theory – Psychological Approach: Voluntary approach – Structuralism – Functionalism – Gestalt approach – Psychoanalytic approach – Behaviorist approach

Cognitive approach: Modularity – Template matching theory – Feature detection theory – Computational theory of vision – Feature integration theory – Theories of Attention- Theory of pattern recognition Memory – Types of memory – Memory models – Visual Imaging – Problem solving

Other approaches: Network approach: ANN – Topologies – Connectionist approach – semantic networks. Linguistic approach: Language Acquisition – deprivation – Wernicke Geschwind model – Speech recognition. Artificial Intelligence: Machine representation of Knowledge – Machine reasoning – Logical reasoning – Inductive reasoning – Expert systems – Fuzzy logic – ID3 algorithm

Extensions to cognitive science: Brains – Emotions – Consciousness – Body, world and dynamic systems Issues in cognitive science – Enhancing cognitive science – Multiagent systems

References:

1. Cognitive Science An introduction to the study of mind, Jay Friedenberg and Gordon silverman, Sage Publications, 2006
2. The MIT Encyclopedia of The Cognitive sciences, Robert A.Wilson and Franck C.Keil, MIT Press, 1999
3. Mind Introduction to Cognitive science, Paul Thagard, MIT Press, 2005

CA827-DIGITAL VIDEO PROCESSING AND COMMUNICATIONS

Basic Concepts: Video Formation-Perception – Representation - Color Perception and Specification - Video Capture and Display - Analog Video Raster - Analog Color Television Systems - Digital Video.

Video Sampling and Modeling:Fourier Analysis of Video Signals and Frequency Response of the Human Visual System - Video Sampling - Video Sampling Rate Conversion -Video Modeling - Two-Dimensional Motion Estimation - Three-Dimensional Motion Estimation

Video Coding:Foundations of Video Coding - Waveform-Based Video Coding – Content -Dependent Video Coding - Scalable Video Coding - Video Compression Standards.

Video Communications:Error Control in Video Communications - Streaming Video over the Internet and Wireless IP Networks - Determination of Spatial-Temporal Gradients - Gradient Descent Methods.

Case Studies: Video Compression System for Mobile Devices, Video Streaming System for Mobile Devices.

References:

1. Yao Wang, Ya-quin Zhang, JoernOstermann, “Video Processing and Communications”, Published by Prentice Hall, 2001
2. David Solomon, “Data Compression, the complete reference”, 4th edition, Springer, 2006
3. Fred Halsall, “Multimedia Communications: Applications, Networks, Protocols and Standards”, Addison-Wiley, 2001

CA828-MATHEMATICAL FOUNDATIONS OF CRYPTOGRAPHY

The Cryptologic Model, Random and Pseudorandom Keys.“When Are Problems Hard?”, P, NP, and Feasibility, Randomization, BPP, and RP, Infeasibility and PP, P/poly, Polynomial size circuit", Function Ensembles, Pseudorandom Number Generators.

One way functions, One-way functions with public input , Pseudo-random number generators and one way functions, Weak one way functions, Converting Weak One Way Functions to One Way Functions , Reverse expansion, (Weak) One-way permutations, Square Root Extraction and Nontrivial Factoring Problems.

A Little Bit of Number Theory, Next-bit Unpredictability, Stretching the output of a pseudorandom number generator, Private Key Stream Cryptosystems, Simple Passive Attack, Simple Chosen Plaintext Attacks (Informal Definition), Simple chosen plaintext attack, Block cryptosystems.

Pseudo random function generators, Trapdoor functions & RSA, Square Root Extraction, Existence of Pseudorandom Number Generators, Some Probability Review, Hidden Inner Product Bit , More on Hidden Bits, Many Hidden Bits, Statistical Distinguishability of Distributions, Computational Indistinguishability of Distributions, Strengthening the Hidden-Bit Theorems, A Version of the Triangle Inequality, Entropy and Information.

Prefix-free codes, Huffman codes, PRNG's from One-Way Functions, Hash Functions and One-Way Hash Functions, Applications of Hash Functions, Thwarting the birthday attack, Blinded signatures

References:

1. B. Schneider, Applied Cryptography, Wiley, 1996
2. M. Luby, Pseudorandomness and Cryptographic Applications, Princeton U. Press, 1996
3. A, Menezes, P. van Oorshot, S. Vanstone, Handbook of Applied Cryptography, CRC Press, 1997
4. N. Koblitz, A Course in Number Theory and Cryptography, Springer-Verlag, 1994
5. O. Goldreich, Foundations of Cryptography, unpublished manuscript (available electronically athttp://www.eccc.uni-trier.de/eccc-local/ECCC-Books/oded book readme.html

CA829-FOUNDATIONS OF COMPUTER APPLICATIONS RESEARCH

Probability, Statistics and Estimation: Random experiments, Sample space, Axioms of probability, Conditional probability: Bayes' Theorem. Independent events - Probabilistic models: standard discrete, continuous models and Markov models. Minimum Mean Square Estimation (MMSE), Maximum Likelihood Estimation (MLE), linear and interval estimation. Tests of Significance, ANOVA

Heuristics and meta-heuristics optimization techniques: Local Search; Meta Heuristics: Simulated Annealing (SA), Tabu Search (TS); Evolutionary Algorithm: Genetic Algorithm (GA). Ant Colony Optimization (ACO), Particle Swarm Optimization (PSO), Neural Network (NN); Fuzzy Systems (FS), Rough Sets (RS)

Graph Algorithms: Definitions and Representation, Minimum Spanning Tree: Prim's Algorithm, Single-Source Shortest Paths: Dijkstra's Algorithm, All-Pairs Shortest Paths, Transitive Closure, Vertex Covering, Vertex Coloring - Randomized Algorithms

Data Analysis and Data Analytics: General Linear Regression Model, Estimation for β, Error Estimation, Residual Analysis. Discriminant Analysis-Two group problem, the k-group problem, multiple groups, Interpretation of Multiple group Discriminant Analysis solutions.Clustering and Classification Techniques - Principal Component Analysis - Factor Analysis

Tools and Technologies: MATLAB, WEKA, SPSS/SAS TOOLS, NS/2, Web 2.0 - Study and application to the individual scholar's field of research.

References:

1. YannisViniotis, "Probability and Random Processes for Electrical Engineers", Mc-Graw HillInternational Edition, 1998.
2. S. Rajasekaran and G.A.V. Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
3. R. Eberhart, P.Simpson and R. Dobbins, "Computational Intelligence-Pc Tools", AP Professional, Boston, 1996.
4. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C. Stein, "Introduction to algorithms", 3rd edition, MIT Press, 2009.
5. Richard A. Johnson and Dean W. Wichern, "Applied Multivariate Statistical Analysis", fifth Edition, Pearson Education, 2002.
6. William R. Dillon and Mathew Goldstein, "Multivariate Analysis: Methods and applications", John Wiley and Sons, 1984.
7. http://www.mathworks.in/academia/student_center/tutorials/launchpad.html
8. http://www.cs.utexas.edu/users/ml/tutorials/Weka-tut/
9. http://www-01.ibm.com/software/analytics/spss/

CA830-ADVANCES IN CLOUD COMPUTING TECHNOLOGIES

Understanding Cloud Computing:Cloud computing-History of Cloud Computing-Cloud Architecture-Cloud Storage-Why Cloud Computing Matters – Advantages of Cloud Computing-Disadvantages of Cloud Computing-Companies in theCloudToday-Cloud Services.

Developing Cloud Services: Web-Based Application -Pros and Cons of Cloud Services Development – Types of Cloud Service Development - Software as a Service –Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools –Amazon Ec2 – Google App engine – IBM Clouds

Cloud Computing For Everyone:Centralizing Email Communications-Collaborating on Schedules-Collaborating on To-Do Lists – Collaborating Contact Lists-Cloud Computing for the Community-Collaborating on Group Projects and Events- Cloud Computing for the Corporation.

Using Cloud Services: Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications –Exploring Online Planning and Task Management-Collaborating on Event Management-Collaborating on Contact Management

Other Ways To Collaborating Online:Collaborating via Web-Based Communication Tools-Evaluating Web Main Services-Evaluating Web Conference Tools-Collaborating via Social Networks and Groupware Collaborating via Blogs and Wikis.

References:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and MeasuringProcesses for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.
3. Cloud Computing: A practical Approach by Anthony T.Velte, Toby J. Velte, Robert Elsenpeter, The McGrow Hill Companies-2010.

CA831-MOBILE COMMUNICATION AND COMPUTING

Introduction To Middle Ware:Emergence of Middleware – objects, web services- middleware Elements, Vendor Architecture- Interoperability – middleware in Distributed applications – Types of Middleware-Transaction Oriented Middleware MOM-RPC

Wireless Protocols:Issues and challenges of Wireless networks – Location management, Resource management, Routing, Power management, Security. Wireless Media Access Techniques – ALOHA , CSMA, Wireless LAN , MAN , IEEE 802.11 (a,b,e,f,g,h,i),,Bluetooth. Protocols for 3G & 4G cellular networks – IMT – 2000,UMTS, CDMA2000, Mobility management and handover Technologies, All-IP based cellular Network

Adhoc Networks:Introduction and Definitions, Adhoc Network Applications, DesignChallenges. Evaluating Adhoc Network Protocols -the Case for a Test bed. Routing in Mobile AdhocNetworks: Introduction, Flooding. Proactive Routing; On Demand Routing; Proactive Versus on demandDebate; Location based Routing

Network Issues: Mobile IP - DHCP - Mobile transport layer - Indirect TCP - Snooping TCP - Mobile TCP - Transmission / timeout freezing - Selective retransmission - Transaction oriented TCP

Application Issues:Wireless application protocol - Dynamic DNS - File systems - Synchronization protocol- Context-aware applications - Security - Analysis of existing wireless network

References:

1. QusayH.Mahmound ,"Middleware for Communication" John wiley and sons, 2004
2. J. Schiller, Mobile Communications, Addison Wesley, 2000.
3. William C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley,1993
4. Theodore S. Rappaport, Wireless Communications, Principles and Practice, PrenticeHall, 1996
5. W. Stallings, Wireless Communications & Networks, Prentice Hall, 2001
6. PrasantMohapatra and Srikanth Krishnamurthy, Springer International Edition, 2009

CA832-ADVANCED DATA MINING

Data Mining Techniques-Data Mining Process-Process with a typical set of data-Big Data-Visualization of data through data mining software

Data Mining Methods as Tools - Memory-Based reasoning methods of Data Mining - Algorithms with prototypical data based on real applications

Market Basket Analysis - Fuzzy Data Mining approaches - Fuzzy Decision Tree approaches Fuzzy Association Rule applications

Rough Sets - Support Vector Machines - Genetic algorithms

Social Computing - Analysis -Graph Mining - Web Mining - Privacy Preserving Data Mining

References:

1. David L. Olson and DursunDelen. Advanced Data Mining Techniques. Springer, 2008.
2. Charu C. Aggarwal and Haixun Wang. Managing and Mining Graph Data. Springer, 2010.
3. Ian H. Witten, Eibe Frank and Mark A. Hall. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann Publishers, 2011.
4. Jiawei Han and MichelineKamber. Data Mining: Concepts and Techniques. Morgan Kaufmann Publishers, 2006.

CA833-WEB MINING

Web Crawling - Algorithms - Implementation Issues - Types - Crawler Ethics and Conflicts - Indexing - Text Analysis and Classification

Ranking Algorithms - Web Search and Retrieval - Link Analysis - Social Network Analysis - Co-Citation and Bibliographic Coupling - Page Rank, HITS - Community Discovery - Term Frequency - Inverse Document Frequency (TF.IDF)

Building DOM Trees - Extraction Based on Multiple Pages - Information Integration - Schema Matching - Pre-Processing for Schema Matching - Strategies for Combing Similarities - Integration of Web Query interfaces - Constructing a Unified Global Query Interface

Clustering/Community Algorithms - Topical Locality - Web growth models - Web Traffic models

Social Tagging - Social Networks and Social Media - Information Diffusion

References:

1. AnandRajaraman, Jure Leskovec and Jeffrey D. Ullman. Mining of Massive Data Sets. CambridgeUniversity Press, 2012.
2. Jiawei Han and MichelineKamber. Data Mining: Concepts and Techniques. Morgan KaufmannPublishers, 2006.
3. SoumenChakrabarthi. Mining the Web: Discovering Knowledge from Hypertext Data. MorganKaufmann Publishers, 2003.
4. Bing Liu. Web Data Mining, Exploring Hyperlinks, Contents and Usage Data. Springer, 2007.

CA834-CLOUD BASEDE-LEARNING

Cloud Computing Essentials: Cloud Architecture – Cloud Storage – Advantages of Cloud Computing – Disadvantages of Cloud Computing –Cloud Services -Software as a service -Platform as a service - Infrastructure as a service.

Migrating into a Cloud: Introduction -The Cloud Service Offerings and Deployment Models - Challenges in the Cloud - Broad Approaches to Migrating into the Cloud -Deciding on the Cloud Migration - The Seven-Step Model of Migration into a Cloud - Migration Risks and Mitigation

Cloud service providers: Amazon EC2 (IaaS)- Amazon S3 (IaaS) – Google (SaaS, PaaS) - MS Azure (PaaS)- Salesforce.com (SaaS, PaaS)- Scaling a cloud infrastructure (IaaS).

E-learning Principles: Definition – Varieties of e-learning – Components of e-learning : CBT,WBT - Virtual class rooms- Learner-led-e-learning – Facilitated e-learning – Instructor –led - e-learning - Embedded e-learning - Telementoring and e-coaching

Cloud Computing for E-Learning: Cloud based E-Learning architecture - The Software as a Service Delivery Model for E-Learning - Cloud-based education E-learning strategy for instructors -Tools and examples for e-learning -Location shifting tools - Time shifting tools - Interaction tools - Learning management tools -Public cloud SaaS and PaaS tools.

References:

1. Tim Mather, SubraKumaraswamy and ShahedLatif “Cloud Security and Privacy”, Published byO’Reilly Media, Inc., First Edition, 2009.
2. RajkumarBuyya, James Broberg, AndrzejGoscinski “Cloud Computing Principles andParadigms”Published by A John Wiley & Sons, Inc., 2011
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July2008.
4. E-Learning by Design,William Horton,Wiley publication 2006.
5. E-Learning:An Expression of the knowledge Economy, Gauravchada, S.M.Nafaykumail, TataMcGraw –Hill publication 2002.
6. E-Learning Tools and Technologies, William Horton, Katherine Horton, Wiley publication 2003.
7. http://www.ibm.com/developerworks/industry/library/ind-cloud-e-learning1/index.html
8. http://www.skillspark.ca/
9. http://www.slideshare.net/ssuser6e1ce5/e-learning-system-architecture-based-on-cloud-computing

CA835-MULTICORE PROGRAMMING AND GPGPU PROGRAMMING

Introduction to Parallel Programming, Parallel Architectures, Types of Parallelism, Flynn's Taxonomy, Introduction to Concurrent Programming

Parallel Programming Concepts, Design Patterns for Parallel Programming, Debugging Parallel Programs, Performance Monitoring and Optimization of Parallel Programs

Parallelizing Compilers, SIMD Programming, Synthesizing Parallel Programs, Understanding Parallelism with GPUs

CUDA History, Applications of CUDA, GPU Computing, CUDA Development Environment, CUDA Architecture, Libraries and SDKs

CUDA Programming Fundamentals, Multi-CPU and Multi-GPU Programming, GPGPU Programming, Open CL and Other Libraries

References:

1. Programming Massively Parallel Processors: A Hands-on Approach, David B. Kirk and Wen-mei W. Hwu
2. Parallel Programming For Multicore and Cluster Systems, Thomas Rauber and GudulaRunger
3. CUDA Programming - A Developer's Guide to Parallel Computing with GPUs
4. CUDA by Example, Jason Sanders, Edward Kandrot
5. MIT Open Courseware: Multicore Programming Primer
6. Nvidia CUDA Training and Open Source CUDA References

CA836-SECURITY ASPECTS OF CLOUD ARCHITECTURE

Introductory Topics: Domain of information security. Taxonomy of information security, Information as an asset, Need for securing information in the contexts of individuals, organizations, business, and government. Impact of information security on ensuring security in a broader context. System security topics : Access Control – MAC, DAC, RBAC. Security Models as basis for OS security - BLP, Biba, Chinese Wall and Clark Wilson. Introduction to DB Security. Software vulnerabilities - Buffer and stack overflow, Phishing. Malware - Viruses, Worms and Trojans. Topological worms. Internet propagation models for worms

Cryptography Topics: Secret vs. Public, Secret Key - DES, Public Key - RSA, Cryptographic hash - SHA1, Discrete Log - Diffie Helman, Digital certificates and PKI. Evolution of cryptography – from Enigma to Elliptic Curve Cryptography. —Interlinkings with number theory and other developments in mathematics. Development of cryptographic protocols. Concept of cryptocomplexity. Protocol topics: One way and two way authentication, Centralised Authentication, Needham-Schroeder protocol, Kerberos. Biometrics for authentication - methods and error types

Information security in the context of Trust and Privacy. Models of trust and computational aspects. Difference between privacy and security. Relevance of privacy rights from individual and organizational viewpoints – links with information security. Security as a dynamic equilibrium between attacks and defenses. Modeling attack and defense mechanisms using game theoretic concepts

Enterprise security - Policy, Standards, Guidelines and Procedures. The balance between operational security and compliance/legal requirements in specific domains – An example of financial (SOX) or health (HIPAA) may be adopted. International standardization – ISO 27000 series (1 to 6) – salient features

Security in current applications Cases from any two of the three topics: Online banking or Credit Card Payment Systems, Web Services Security, RFIDs

References:

1. Bernard Menezes, Network security and Cryptography, Cengage Learning India, 2010.
2. Dieter Gollmann, Computer Security, 3rd edition, John Wiley and Sons Ltd., 2011.
3. Whitman and Mattord, Principles of Information Security, 4th edition,Cengage Learning, 2011.
4. Information Security Management Handbook, 6th Edition, Harold Tipton, Micki Krause (Editors) Auerbach / CRC Press, 2012.
5. Computer Security Handbook, 5th Edition. Seymour Bosworth, M E Kabay (Editors). John Wiley, 2009.
6. Furnell, Katsikas, Lopez, Patel. Securing Information and Communication Systems: Principles, Technologies and Applications,Artech House Inc., 2008.
7. Charles P Pfleeger, Shari Lawrence Pfleeger. Security in Computing, 4th edition, Prentice Hall,2007.
8. H. Delfs and H. Knebl, Introduction to Cryptography: Principles and Applications, Springer-Verlag.
9. Speed and Ellis, Internet Security, Elsevier Science.

10. Security Engineering with patterns: origins, theoretical model, and new applications. Markus Schumacher. LNCS 2754, Springer.
11. ISO Standards in information security. http://www.27000.org/.
12. J M Seigneur. Trust, Security and Privacy in Global Computing. Ph.D. Thesis, University of Dublin.

CA837-ADVANCED INFORMATION SECURITY

Introduction- Computer Security, Threats to security, History of Computer security, Computer System Security and Access Controls (System access and data access). Threats - Viruses, worms, Trojan horse, bombs, trap doors, spoofs, email virus, macro Viruses, remedies, Intruders, Malicious software, Firewalls, vulnerabilities & threats, Network Denial of service attack.

Communication security- Encryption, classical encryption techniques, data encryptions standards, advance encryption techniques, Network Security-Kerberos,X.509, some network security projects-SDNS, DISNet ,Project MAX, Secure NFS

Security- E-Mail Security, IP security, Web security, Server security- security for network server, web servers, mobile technologies (java and java script etc). Intrusion detection techniques – techniques to provide privacy in Internet Application and protecting digital contents(music, video, software) from unintended use, authentication.

System and Application Security- mail security (PGP etc) file System security, program and security, memory security, Sandboxing. Security threads protection intruders- Viruses-trusted system. Secure programming languages- concepts structured multiprogramming, shared classes, cooperating sequential processes, structure of the multiprogramming system RC-4000 software.

References:

1. Dicter gouman, John Wiley & Sons, "Computer Security", Library of Congress Cataloging in Published Data- third Edition,2011,
2. Mathew Bishop, "Computer Security: Art and Science",Addison-Wisley,2002
3. Mathew Bishop, "Introduction to computer Security", Addison-Wisley 1st Edition, 2004
4. Kaufman, Perlman and Speciner, "Network security",Pearson Education 2nd Edition 2002
5. William Stallings, "Cryptography and Network", CRC Press, 1996

CA838-MEDICAL IMAGE ANALYSIS

BREAST IMAGING AND RELATED TECHNOLOGIES: Fundamentals of Imaging Analysis –Digital Mammography: Fundamentals of Breast Tomosynthesis – Computer-Aided Detection and Diagnosis – Breast Imaging Modalities

IMAGE SEGMENTATION: Pixel-Based Direct Classification Methods: Data Clustering, k-Means Clustering, Fuzzy c-Means Clustering, An Adaptive FCM Algorithm - Advanced Segmentation Methods: Estimation-Model Based Adaptive Segmentation, Image Segmentation Using Neural Networks.

IMAGE REPRESENTATION, ANALYSIS, AND CLASSIFICATION: Feature Extraction and Representation - Feature Selection for Classification - Feature and Image Classification - Image Analysis and Classification Example: “Difficult-to-Diagnose” Mammographic Microcalcifications.

IMAGE REGISTRATION: Rigid-Body Transformation - Principal Axes Registration - Iterative Principal Axes Registration - Image Landmarks and Features-Based Registration - Elastic Deformation-Based Registration.

IMAGE VISUALIZATION: Feature-Enhanced 2-D Image Display Methods - Stereo Vision and Semi-3-D Display Methods - Surface And Volume-Based 3-D Display Methods - Vr-Based Interactive Visualization.

References:

1. Mammography and Beyond: Developing Technologies for the Detection of Breast Cancer, Sharyl J. Nass, I.Craig Henderson & Joyce C. Lashof, National Academy Press. (e-Book).
2. Medical Image Analysis, Second Edition, Atam P. Dhawan, Wiley Publications, 2011.