

M.Tech in Information Technology

Suggested Plan of Study:

Sl. No.	Semester			
	I	II	III	IV
1	IT700	IT703	IT891/ IT897	IT899
2	IT701	IT704	IT898	
3	IT702	MA712		
4	Elective 1	Elective 3		
5	Elective 2	Elective 4		
6	---	IT890		

Program Core (PC)

IT700	Advanced Algorithms	(3-0-2) 4
IT701	Advanced Database Systems	(3-0-2) 4
IT702	Advanced Web Technologies	(3-0-2) 4
IT703	Advanced Network Security	(3-0-2) 4
IT704	Multimedia Systems Development	(3-0-2)4
MA712	Optimization Techniques and Random Processes	(4-0-0) 4

Elective Courses (EL)

IT800	Mobile Computing	(3-0-0) 3
IT801	Genetic Algorithms	(3-0-0) 3
IT802	Artificial Intelligence	(3-0-0) 3
IT803	Software Architecture	(3-0-0) 3
IT804	Artificial Neural Networks	(3-0-0) 3
IT805	Semantic Web Technologies	(3-0-0) 3
IT806	Distributed Computing Systems	(3-0-0) 3
IT807	Perceptual Audio and Speech Processing	(3-0-0) 3
IT808	Enterprise Resource Planning & Systems	(3-0-0) 3
IT809	Cyber Law & Intellectual Property Issues	(3-0-0) 3
IT810	Data Mining	(3-0-0) 3
IT811	E-Commerce	(3-0-0) 3
IT812	Web Services	(3-0-0) 3
IT813	Virtual Reality	(3-0-0) 3
IT814	Computer Vision	(3-0-0) 3
IT815	Cloud Computing	(3-0-0) 3
IT816	System Integration	(3-0-0) 3
IT817	Information Retrieval	(3-0-0) 3
IT818	Parallel Programming	(3-0-0) 3
IT819	Mobile Adhoc Networks	(3-0-0) 3
IT820	Wireless Sensor Networks	(3-0-0) 3
IT821	Intelligent Information Systems	(3-0-0) 3
IT822	Blind Signal and Image Processing	(3-0-0) 3
IT823	Information Technology for Healthcare	(3-0-0) 3
IT824	Perceptual Image and Video Processing	(3-0-0) 3
IT825	Advanced Computer Networks	(3-0-0) 3
IT826	Topics in Natural Language Processing	(3-0-2) 4

Credit Requirements:

Category	Minimum Credits to be Earned
Program Core (PC)	24
Elective Courses (EL)	12
Mandatory Learning Courses (MLC)	04
Major Project (MP)	20
Total	60

Mandatory Learning Courses (MLC)

IT890	Professional Practice / Seminar	2
IT891 / IT897	Practical Training / Minor Project	2
(To be completed during Vacation between 2 nd & 3 rd Sem.)		

Major Project (MP)

IT898	Major Project I	6
IT899	Major Project II	14

DEPARTMENT OF INFORMATION TECHNOLOGY

IT700 Advanced Algorithms (3-0-2) 4

Algorithmic paradigms: Dynamic Programming, Greedy, Branch-and-bound; Asymptotic complexity, Amortized analysis; Advanced Data structures for efficient manipulation of sets and partition, Efficient Graph algorithms: Depth first search; Strassen's matrix multiplication, Efficient algorithms: matrix inversion and LUP decomposition, Modular arithmetic, NP completeness/approximation algorithms, Randomized algorithms: min cut, primality testing; Online, Linear/Integer programming, Machine Learning Algorithms; Applications and Recent Trends.

Aho, Hopcroft and Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley, 1974.

Horowitz and Sahni, Fundamentals of Computer Algorithms, Galgotia Publications, 1985.

Baase S., Computer Algorithms: Introduction to Design and Analysis, Addison Wesley, 1998.

Michael T Goodrich & Roberto Tamassia, Algorithm Design: Foundations, Analysis & Internet Examples, John Wiley, 2001.

Dan Gusfield, Algorithms on Strings, Trees and Sequences, Cambridge, 2005.

Jon Kleinberg and Eva Tardos, Algorithm Design, Pearson/Addison Wesley, 2006.

T H Cormen, C E Leiserson, R L Rivest, C Stein, Introduction to Algorithms, 3rd Edition, MIT Press, 2009.

Steven S Skiena, The Algorithm Design Manual, 2nd Edition, Springer-Verlag, 2010.

IT701 Advanced Database Systems (3-0-2) 4

Design of database kernels, Schema integration, Data warehousing, Distributed databases and Client Server architecture, Object-Relational databases, Emerging database technologies and applications, Application of conceptual and physical design to the real world database problems.

M. Tamer Özsu, Principles of Distributed Database Systems, Prentice Hall, 1999.

Ceri S and Pelagatti G, Distributed Databases: Principles and Systems, McGraw Hill, 2000.

T Connolly and C Begg, Database Systems: A practical Approach to Design, Implementation/Management, Pearson, 2002.

R. Elmasri and S. B. Navathe, Fundamentals of Database Systems, Addison-Wesley, 3rd ed., 1999.

R. Ramakrishnan and J. Gehrke, Database Management Systems, McGraw-Hill, 2nd ed., 1999.

M. Stonebraker and J. Hellerstein, Readings in Database Systems, Morgan Kaufmann, 3rd ed., 1998

M. Stonebraker, Object-Relational DBMSs, Morgan Kaufmann, 1996.

R. Mattison, Data Warehousing (Strategies, Technologies and Techniques), IEEE Press, 1998.

IT702 Advanced Web Technologies (3-0-2) 4

Introduction: Structure of the Web, Architecture and Components., Web Engineering: Fundamentals, Current challenges and new developments in the WWW; Web Data Standards: XML basics, Document Object Model, DTD and Schemas, XML Namespaces, XML for data representation and for display – XPath and XSLT, XML Manipulation; Information Retrieval on the Web: The Web and the problem of Search, Handling unstructured, semi-structured, structured data on the Web; Search Engines and search issues.; Web as a Distributed computing platform: Understanding Web Services technology, Service oriented Architecture and REST based web services (Resource Oriented Architecture); The Web 2.0 phenomenon: The Social Web, Social Network Analysis, Trends and research; Web Intelligence: The Semantic Web, principles, standards and technologies, Web of Services, Linked Open data and applications, Trends and research.

Anders Møller and Michael I. Schwartzbach, "An Introduction to XML and Web Technologies", (Addison-Wesley, 2006)

Gerti Kappel and Birgit Prýýll, "Web Engineering: The Discipline of Systematic Development of Web Applications", (Wiley Publishers, 2006)

Christopher Manning, Prabhakar Raghavan and Hinrich Schütze, "Information Retrieval", (Cambridge University Press, 2008).

Alonso, G et al, "Web Services - Concepts, Architectures and Applications Series: Data-Centric Systems and Applications", (Springer, 2004)

Robert A. Hanneman and Mark Riddle. "Introduction to social network methods", (University of California, Riverside, 2005)

Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, "Foundations of Semantic Web Technologies", (Chapman & Hall, 2009)

IT703: Advanced Network Security

(3-0-2) 4

Basics of Network Security: Cryptography, Terminology, Mathematics (One way functions, Discrete Log problem, Integer Factorization), Background (App developers, Hosters, Listers, payloads, Attack life cycle), Authentication and Authorization, Defensive and Secure Programming, Threat Modeling and changes to SDL; Intranet Security: SPAM, Virus and Worms, Social Engineering, Network Management, Vulnerable Applications, Uneducated Users vs Spies, Firewall and DMZ, Piracy; Penetration Testing: Ethics, Moral, Legal values and repercussion, Procedures, Tools, Metasploit and Exploit db; Internet Security: Server side security (Webserver, Database server, Appserver, Compromised user accounts), Client side security (Browser security, Malicious Webserver and Victim Webserver, Malware and terms), Ecommerce (Internet Banking, E-shopping, Mobile Banking –Transactions & Reporting, Trading), Identity Theft (Password Stealing - Phishing/Keyloggers/Malware/Tab nabbing/Social Engg, Tools, Best Practices), Privacy (Introduction, Rights, Legal issues, Online services, Facebook, Google, Social web and Virtual Worlds), Cloud security, Mobile security (Challenges and Malware); Recent trends.

Yi Qian et al, Information Assurance – Dependability and Security in Networked Systems, Morgan Kaufmann, 2008.

William Stallings, Network Security Essentials, 4/e, Pearson Education, 2008.

Rolf Oppliger, Internet and Intranet Security, 2nd Edition, Artech House, 2007.

Nadia Nedjah et al, Computational Intelligence in Information Assurance and Security, Springer 2007.

Yang Xiao and Yi Pan, Security in Distributed and Networking Systems, World Scientific Publishing, 2007.

R Perlman, C Kaufman, M Speciner, Network Security: Private Commn in a Public World, Prentice Hall.

Applied Cryptography, Code Complete, Secure Programming, Articles and papers from <http://securityresearch.in>

IT704: Multimedia Systems Development

(3-0-2) 4

Fundamental Concepts of Multimedia and Hypermedia; Media and Data Streams; Sound/Audio, Images/Graphics, Video and Animation, File Formats; Multimedia Compression Algorithms; Multimedia Networking: Multicasting, Quality of Service, Multimedia over IP; Interactive Multimedia Systems: Touch, Gesture, Marking, Speech and Audition, Virtual Humans: Overview of Virtual Humans, Face Cloning & Face Motion Capture and Analysis and Recent Research Trends.

Ze-Nian Li and Mark S. Drew, Fundamentals of Multimedia, Pearson Education, 2004.

N Magnenat-Thalmann and D Thalmann, Handbook of Virtual Humans, Wiley, 2004.

Steinmetz R and Nahrstedt K, Multimedia Systems, Springer-Verlag, 2004.

Yue-Ling Wong, Digital Media Primer, Pearson/Prentice Hall, 2009.

Fred Halsall and James F. Kurose, Multimedia Communications: Applications, Networks, Protocols & Standards, Pearson, 2004.

IT800: Mobile Computing

(3-0-0) 3

Evolution of Wireless and Cellular Systems; Wireless Propagation: Encoding, Modulation, Multiplexing, and Error Handling Techniques; MAC Layer: Channel Allocation Techniques; Study of Mobile Communication Systems: Infrastructure, Registration and basic Call Establishment & Termination, Handoff, Roaming Support; Threat, Security & Privacy Issues; Ad-Hoc & Sensor Networks: Basic architecture/structure, terminology and Nomenclatures, Routing Protocols; IEEE 802.11 & 802.15; Recent Trends: Ultra-Wideband Technology, Sensor Networks, and Bluetooth;

Joschen Schiller, Mobile Communications, Pearson Education, 2003

Dharma Prakash Agarwal & Qing-An Zeng, Wireless & Mobile Systems, CENGAGE, 2nd Edition, 2006.

William Stallings, Wireless Communication & Networks, Prentice Hall of India, 2nd Edition, 2004.

IT801: Genetic Algorithms

(3-0-0) 3

Robustness of traditional optimization and search techniques, Simple Genetic Algorithms, Similarity templates, goals of optimization, Schema Theorem of John Holland, Computer Implementation of genetic algorithms; Applications of genetic algorithms, advanced operators and techniques in genetic algorithms; Recent research Trends.

David Goldberg, Genetic Algorithms in search, optimizations and machine learning, Addition Wesley, 1999

Charles L Karr and L Michael Freeman, Industrial applications of Genetic Algorithms, CRC Press 1998.

IT802: Artificial Intelligence

(3-0-0) 3

Problem Solving: Solving Problems by Searching, heuristic search techniques, constraint satisfaction problems, stochastic search methods. Game Playing: minimax, alpha-beta pruning. Knowledge and Reasoning: Building a Knowledge Base: Propositional logic, first order logic, situation calculus. Theorem Proving in First Order Logic. Planning, partial order planning. Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks. Learning: Overview of different forms of learning, Learning Decision Trees, Neural Networks. Introduction to Natural Language Processing, Applications and Recent Research Trends.

Nilsson, Nils, Artificial Intelligence: A New Synthesis. Morgan Kaufmann Publishers, 1998.

Russell, Stuart J and Norvig Peter, Artificial Intelligence: A Modern Approach, Prentice Hall, 2003.

NPTEL Videos: Artificial Intelligence

IT803: Software Architecture

(3-0-0) 3

Definition and overview of software architecture, The architecture business cycle: what influences software architects, Different Architectural styles, Architecture description language, Understanding and achieving quality attributes, Attribute-driven design, Documenting software architecture, Evaluating software architecture, Architecture reuse, Case studies and Recent Research Trends.

Mary Shaw, David Garlan, "Software Architecture", Prentice Hall India, 2000

Bass, Len; Paul Clements, Rick Kazman,. Software Architecture In Practice, Second Edition, Addison-Wesley, 2003.

Clements Paul et al, Documenting Software Architectures: Views and beyond, Addison-Wesley, 2003.

IT804: Artificial Neural Networks

(3-0-0) 3

Introduction to Artificial Neural Networks , Artificial Neuron Model and Linear Regression, Gradient Descent Algorithm, Nonlinear Activation Units and Learning Mechanisms, Associative Memory Model, Statistical Aspects of Learning, Single-Layer Perceptions, Least Mean Squares Algorithm, Perceptron Convergence Theorem, Bayes Classifier, Back Propagation Algorithm, Multi-Class Classification Using Multi-layered Perceptrons, Radial Basis Function Network, Principal Component Analysis and Independent Component Analysis, Self Organizing Maps, Applications and Recent Research Trends.

Simon Haykin, "Neural networks - A comprehensive foundations", Pearson, 2004.

Laurene Fausett: "Fundamentals of neural networks: architectures, algorithms, and applications", Prentice Hall.

J.A. Freeman, D.M. Skapura: Neural Networks Algorithms, Applications & Programming Techniques, Addison-Wesley.

James A. Anderson, "An Introduction to Neural Networks", Prentice Hall of India.

Yegnanarayana: "Artificial Neural Networks", Prentice Hall of India, 2004.

IT805: Semantic Web Technologies

(3-0-0) 3

Introduction to the Semantic Web – What is Semantics; Syntax, Structure and Semantics, Formal Languages, Semantic Web vision and Layered Cake Architecture, Vocabularies (Dublin Core, RSS, FOAF); Taxonomies - Descriptive Taxonomies, Navigational Taxonomies, Data Management Vocabulary, Roles of taxonomy in Content Management, Building and Maintaining taxonomies; Structured Web Documents and Resource Description Framework – Understanding content, Metadata, metadata standards, XML + metadata specification, RDF and metadata processing, Knowledge Organization Systems; Classification of organization systems; Relationship Models; Programming with RDF/XML; Web Ontology Language (OWL) - Ontology, Domain Modeling - Logic, Inferencing, Context; Programming with Ontology; Logic Reasoning for the Semantic Web - Classification and semantic metadata extraction techniques: statistical, statistical learning/AI, lexical and natural language, knowledge based; Linked Data, Role of Agents, Semantic Web and Intelligent Agents; Semantic Applications - demonstrating power of semantic technology for services, search, personalization, contextual directory and custom/enterprise applications; next generation semantic content management, Review of some of the active projects (e.g., SHOE, OntoBroker, InfoQuilt) and initiatives (OntoWeb, DAML); Contributions of IR, AI, Logic, and NLP to Semantic Web and Research Trends.

P Hitzler, M Krötzsch, S Rudolph, Foundations of Semantic Web Technologies, Chapman & Hall, 2009.

K Breitman, M A Casanova, W Truszkowski, Semantic Web: Concepts, Technologies and Applications, Springer, 2010.

John Hebler, Matthew Fisher, Ryan Blace, Andrew Perez-Lopez, Semantic Web Programming Wiley, 2009.

Grigoris Antoniou and Frank van Harmelen, A Semantic Web Primer, 2nd Edition, The MIT Press, 2008.

Rajendra Akerkar, Foundations of the Semantic Web Narosa Publishing House, New Delhi, Oxford, 2009.

IT806: Distributed Computing Systems

(3-0-0) 3

Basic concepts - Computer networks, Distributed systems and Computing, Design goals, Fundamental issues and transparencies in DCS, Ordering of events, Ordering of messages and concerned protocols, Global state detection Process synchronization, Process communications, Load balancing techniques.

Mukesh Singhal and Niranjan G. Shivaratri, Advanced Concepts in Operating System, Tata McGraw Hill, 1994.

A.S Tanenbaum and M.V. Steen, Distributed Systems – Principles and Paradigms, PHI.

Randy Chow, Distributed Operating Systems and Algorithms, Addison Wesley.

G.F. Coulouies, J.D. Dollimore and T. Kindberg, Distributed Systems: Concepts & Design, Addison Wesley, 1994.

IT807: Perceptual Audio and Speech Processing

(3-0-0) 3

Fundamentals of Audio and Speech Processing; Speech and Audio Analysis: Transforms – STFT, DCT, Wavelets and Gamma tone Filter banks; Audio and Speech Compression Standards: MPEG, AC-3, EAC-3 and AAC; Human Auditory Perception; Perceptual Audio Quality Metrics, Perceptual Audio Coding and Processing of Digital Speech; Speech and Audio Storage, Retrieval and Communication; Applications and Research Trends.

Jacob Benesty, M. Mohan Sondhi and Yiteng Huang, Handbook of Speech Processing, Springer-Verlag, 2008.

Andreas Spanias, Ted Painter and Venkatraman Atti, “Audio Signal Processing and Coding”, Wiley-Interscience, 2007.

Soren Bech and Nick Zacharov, “Perceptual Audio Evaluation - Theory, Method and Application”, Wiley, 2006.

Hugo Fastl and Eberhard Zwicker, “Psychoacoustics: Facts and Models”, Springer, 3rd edition, 2006.

Marina Bosi and Richard E. Goldberg, “Introduction to Digital Audio Coding Standards”, Springer, 2002.

Ben G. and Nelson M., “Speech and Audio Signal Processing: Processing and Perception of Speech and Music”, Wiley, 1999.

IT808: Enterprise Resource Planning and Systems

(3-0-0) 3

Enterprise Resource Planning and Systems (ERP) – Introduction, ERP & Related Technologies, Customer Relationship Management (CRM), Human Resource Management (HRM), ERP Implementation Life Cycles, ERP Case Studies.

Alexis Leon- Enterprise Resource Planning.

V.K. Garg & N.K. Venkitakrishnan, ERP Ware: ERP Implementation Framework.

Garg & Venkitakrishnan, ERP: By Leon, ERP- Concepts and Planning.

Vinod Kumar G & N. K. Venkitakrishna, ERP - Concepts and Practice, PHI, 1998

Sunil C & Peter-SCM-Strategy and Planning and operation, Pearson Education, LPE, 2002

IT809: Cyber Law and Intellectual Property Issues

(3-0-0) 3

The Right to Access, Anonymity, Data Protection, Malicious Code, Spam, Cyber-Hooliganism, Cyber-Stalking, Identity Theft, Cyber-Terrorism, Cyber-War, Distance Contracting, Obscene Publications, Digital Signatures, Civil Liberties, Civil Liability, Civil Remedies, Criminal Liability, Criminal Penalties, Sovereignty and Jurisdiction; Controlling Digital Goods: Copyright, Protection of Online Commercial Identity (Trade Mark, Domain Name), Controlling Online Business Methods: Patent, ICANN Dispute Resolution Policy and WIPO, Legal Position on Database protection in U.S, E.U and India, Protection of Multimedia works in cyber space, Copyright Infringement & Liability of Network Service provider.

Ahmed Kamal , The Law of Cyber Space , United Nations Institute of Training and Research , October 2005

Intellectual property issues in software published by National Academy Press, Washington D C 1991

Hahn, Robert W., Intellectual Property Rights in Frontier Industries: Software and Biotechnology, AEI Press, 2005.

IT810: Data Mining

(3-0-0) 3

Basic concepts, KDD process, OLAP, Mining frequent patterns, Classification, Clustering, Database based mining, Graph mining, Web mining and Research Trends..

J. Han and M. Kambar, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers (Elsevier), 2008.

Oded Maimon, Lior Rokach, The Data Mining and Knowledge Discovery Handbook, Springer, 2005.

G. Piatetsky –Shapiro and W.J. Frawley (Editors), Knowledge Discovery in Databases, AAAI/MIT Press, 1991.

Sushmita Mitra and Tinku Acharya, Data Mining, Wiley- Interscience, 2004.

IT811: E-Commerce

(3-0-0) 3

Infrastructure and Tools for E-Commerce, Current Trends in E-Commerce applications development, The Business of Internet Commerce, Enterprise level E-Commerce, Security and encryption, Electronic payment systems, Search engines, Intelligent agents in E-Commerce, On-line auctions, Data mining for e-commerce, Web metrics, Recommender systems, Knowledge management, Mobile e-commerce, Legal, ethical & social issues and recent trends.

Henry Chan et al., E-Commerce- Fundamental and applications, John Wiley & Sons, 2002

G. Winfield Treese and Lawrence C.S, Designing Systems for Internet Commerce, Pearson Education, LPE, 2002

Fensel, Dieter, Brodie M. L., Ontologies: A Silver Bullet for Knowledge Management & E-Commerce, Allied Publishers, 2004.

Zimmermann, Olaf; Tomlinson, Mark R.; Peuser, Stefan, Perspectives on Web Services, Allied Publishers, 2004.

IT812: Web Services

(3-0-0) 3

Basic concepts, Enabling Infrastructure, Core functionality and standards, Service semantics, Web service composition, Service development, applications and research trends.

*Alonso, G et al, Web Services -Concepts, Architectures and Applications Series: Data-Centric Systems and Applications*2004.

Sanjiva Weerawarana et al, Web Services Platform Architecture: SOAP, WSDL, WS-Policy, WS-Addressing, WS-BPEL, WS-Reliable Messaging, and More, Prentice Hall, 2005.

Thomas Erl, Service-Oriented Architecture: Concepts, Technology, and Design, Prentice Hall, 2005.

J2EE Web Services, Richard Monson-Haefel, Pearson (LPE), 2005.

IT813: Virtual Reality

(3-0-0) 3

Introduction to Virtual Reality Technology and its effectiveness in Real-Time Applications, Scientific Visualization, Input Devices: Trackers, Navigation and Gesture Interfaces; Output Devices: Graphics, 3D Sound and Haptic Displays; Computing Architectures for Virtual Reality, Modeling, Virtual Reality Programming, Human Factors in Virtual Reality; Virtual Humans: Overview of Virtual Humans, Face Cloning & Face Motion Capture/Analysis, Body Cloning & Body Motion Capture, Body Gesture Recognition and Action Response, Cloth Simulation and Research Trends.

Gerard Jounghyun Kim, Designing Virtual Reality Systems – The Structured Approach, Springer-Verlag, 2005.

N Magnenat-Thalmann and D Thalmann, Handbook of Virtual Humans, Wiley, 2004.

L. J. Hettinger and M W. Haas, Virtual & Adaptive Environment: Applications and Human Performance, Lawrence Erlbaum, 2003.

Grigore C Burdea and Phillippe Coiffet, Virtual Reality Technology, John Wiley, 2003.

IT814: Computer Vision

(3-0-0) 3

Concept of application of computer vision, functional architecture of a vision system visual sensory model and camera calibrative, processing tools, 3D vision, 3D representative schemes, High level vision and navigation.

Sonka M., Hlavac V., Boyle R., “Image Processing Analysis and Machine Design”. PWS Publishers

Ballard D., brown C., “Computer Vision”, Prentice Hall

Bratt W., “Digital Image Processing”, John Wiley & Sons

IT815: Cloud Computing

(3-0-0) 3

Introduction to Cloud Computing, Cloud Computing Delivery Models, Open Source and Industry case Studies of cloud (Apache VCL, Amazon, IBM and Eucalyptus) Introduction to Map/Reduce and Apache Hadoop Programming models for cloud computing and examples/applications, Virtualizations as an enabler for cloud computing infrastructure

George Reese, Cloud Application Architectures, O’Reilly Publications, 2009

Tim Mather, Subra Kumaraswamy, Cloud Security and Privacy, O’Reilly, 2009

Tom White, The Hadoop – Definitive Guide, O’Reilly, 2009.

IT816: System Integration

(3-0-0) 3

Enterprise Integration Drivers, Requirements and Strategies: The Business Imperative for Enterprise Integration, Business Drivers and Requirements, Enterprise Integration Strategy; Enterprise Integration Architecture: Overview, Current Integration Architecture Assessment, Technical Integration Architecture, Service Integration Architecture, Information Integration Architecture, Process Integration Architecture; Enterprise Integration Solutions: Application Integration, Information Integration, Composite Application Integration, Process-Driven Integration, Best Practices for Enterprise Integration; Current trends.

B. G-Bernstein ,W. Ruh. Enterprise Integration: The Essential Guide to Integration Solutions. Addison-Wesley, 2005.

C. Britton , P. Bye, IT Arch & Middleware: Strategies for Building Large Integrated Systems, Addison-Wesley, 2004.

IT817: Information Retrieval

(3-0-0) 3

Introduction: Basic IR Models, Basic Tokenizing, Indexing, and Implementation of Vector-Space Retrieval, Experimental Evaluation of IR, Query Operations and Languages, Text Representation, Web Search, Text Categorization and Clustering, Recommender Systems, Information Extraction and Integration.

C. D. Manning, P. Raghavan and H. Schütze, Introduction to Information Retrieval, Cambridge University Press, 2008.

Richardo & Bertheir, Modern Information Retrieval, Pearson Education, 2000

Korfhage Robert R, Information Storage and Retrieval, John Wiley & Sons, Inc, 1997.

IT818: Parallel Programming

(3-0-0) 3

Introduction to Parallel Computer Architectures, Parallel Programming with OpenMP, Parallel Programming with MPI, Advanced concepts in MPI, Recent Advances in Parallel Programming techniques like Task, Parallelism using TBB, TL2, Cilk++ etc. and software transactional memory techniques. Advances programming on massively parallel processors like GPGPUs and APUs and introduction to compilers and tools on such machines.

J. Dongara, I. Foster, G. Fox, W. Cropp et al, "Sourcebook of Parallel Programming", Morgan Kaufmann.

Barbara Chapman, Gabriele Jost et.al, "Using OpenMP: Portable Shared Memory Parallel Programming", Scientific and Engineering Computation, MIT 2008.

B. Wilkinson and M. Allen, "Parallel Programming: Techniques and Applications", Prentice Hall.

S. Akhter and J. Roberts, "Multi-Core Programming—Performance through Multi-threading", Intel Press, 2006

David B. Kirk and Wen-mei W. Hwu, "Programming Massively Parallel Processors: A Hands-on Approach (Applications of GPU Computing Series)", Elsevier Press, 2010.

IT819 Mobile Adhoc Networks

(3-0-0) 3

Mobile ad hoc networking; imperatives, challenges and characteristics, Bluetooth networks, Routing approaches, Proactive and reactive protocols. Clustering and hierarchical routing, Multipath routing, Security aware routing, Energy efficient communication in ad hoc networks, Measuring energy consumption, Power save protocols, Maximum life time routing, Secure routing protocols, Intrusion detection, Security considerations in ad hoc sensor networks, Key management, Characterization of IP traffic, QOS classification, Self similar processes, Statistical analysis of non – real time traffic and real – time services and Recent trends.

C.S. Murthy & B.S. Manoj, AdHoc Wireless Networks, Pearson

T.Janevski, Traffic Analysis and Design of Wireless IP Networks, Artech House

Ozan K. Tonguz & Gianluigi, Adhoc Wireless Networks, Wiley.

IT820: Wireless Sensor Networks

(3-0-0) 3

Introduction to wireless communication networks and wireless sensor networks, Network architecture and design principles, MAC and Link-layer protocols, Topology control in WSN, Routing protocols, information aggregation, information storage and query, localization, Security issues, Recent trends: multimedia sensor networks etc.

Wireless Sensor Networks: An Information Processing Approach by F. Zhao and L. Guibas, Elsevier/Morgan-Kaufmann, 2004

William Stallings, Wireless Communications and Networks, Prentice Hall, 2004.

P.Nicopolitidis, M.S.Obaidat, G.I. Papadimitria, A.S. Pomportsis, Wireless Networks, John Wiley & Sons, 2003.

K. Pahlavan, P. Krishnamoorthy, Principles of Wireless Networks, - A united approach - Pearson Education, 2002.

IT821: Intelligent Information Systems

(3-0-0) 3

Emerging Technologies and applications with latest knowledge applied to customized logic systems, agent based approaches to modeling, and human-based models, multi-mobile agent systems, the product development process, fuzzy logic systems and ambient intelligent environment such as development of information and communication technologies, multimedia data hiding and watermarking algorithms for real world audio and video applications.

Xuan F. Zha, Artificial Intelligence and Integrated Intelligent Info Systems: Emerging Tech and Applications, IGI Global, 2006

Jialie Shen, Intelligent Music Information Systems: Tools and Methodologies, Idea Group Publishers, 2007

Pan, J.-S; Huang, H.-C; Jain, L.C.; Fang, W.-C; Intelligent Multimedia Data Hiding, Springer, 2007.

IT822: Blind Signal and Image Processing (3-0-0) 3

Introduction to Blind Signal and Image Processing: Principal Component analysis (PCA), Blind Source Separation (BSS) and Independent Component Analysis (ICA), BSS of Instantaneous and Convulsive Mixtures, Sequential Blind Signal Extraction, Robust BSS/ICA with noisy data; Learning Algorithms for Estimation of Sources; Applications: Audio, Speech, Image and Biomedical Signal Processing; Research Trends.

A.Cichocki, S. Amari, Adaptive Blind Signal and Image Processing: Learning Algorithms & Applications, John Wiley, 2002

Hyvarinen, J. Karhunen, E. Oja, Independent Component Analysis, John Wiley, 2001

C S. Roberts, R. Everson, Independent Components Analysis: Principles and Practice, Cambridge University Press, 2001

A. S. Bregman, Auditory Scene Analysis", MIT Press, 2nd Edition, 1999

Handbook on Speech Processing and Speech Communication, Springer, 2007.

IT823 Information Technology for Healthcare(3-0-0) 3

Evolution of IT Enhanced Healthcare, Internet Technologies in Telemedical Systems, Wireless Systems in E-Health, Decision Support Systems in Medicine, Health Telematics Networks, Computer Aided Diagnosis and Recent Trends. *Krzysztof Zielinski, Mariusz Duplaga and David Ingram, IT Solutions For Healthcare, Springer, 2006*
 Robert E Hoyt, Nora Bailey, Ann Yoshihashi, *Health Informatics, 5th Edition, Lulu Publishers, 2012*
Kevin Beaver, Healthcare Information Systems, Auerbach Publications, 2nd Edition, 2002.

IT824: Perceptual Image and Video Processing (3-0-0) 3

Fundamentals of Image and Video Processing; Image and Video Analysis: Image Transforms - DCT, Hadamard, Haar, KL and Wavelets; Image and Video Compression Standards: JPEG, JPEG2000, MPEG1, MPEG2, MPEG4 & MPEG7, H.264 and AVC; Image and Video Rendering and Assessment; Human Visual Perception; Perceptual Video Quality Metrics, Perceptual Coding and Processing of Digital Pictures; Image and Video Storage, Retrieval and Communication; Applications Image and Video Processing and Research Trends.

Perceptual Based Image Processing, Morgan & Claypool, 2009

Al Bovik, "Handbook of Image and Video Processing", Elsevier Academic Press, 2005

H. R. Wu and K. R. Rao, "Digital Video Image Quality and Perceptual Coding", CRC Press, 2005

R. C. Gonzalez and R E Woods, "Digital Image Processing", Pearson Education, 2002

IT825 Advanced Computer Networks (3-0-0)3

Overview of computer networks, seven-layer architecture, TCP/IP suite of protocols etc. MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.) Fast access technologies. (For example, ADSL, Cable Modem, etc.) IPv6: Why IPv6, basic protocol, extensions and options, support for QoS, security, etc., neighbor discovery, auto-configuration, routing. Changes to other protocols. Application Programming Interface for IPv6. Mobility in networks. Mobile IP. IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc. TCP extensions for high-speed networks, transaction-oriented applications. Other new options in TCP.

W. R. Stevens, TCP/IP Illustrated, Volume 1: The Protocols, Addison Wesley, 1994.

G. R. Wright, TCP/IP Illustrated, Volume 2: The Implementation, Addison Wesley, 1995.

W. R. Stevens, TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP, and the Unix Domain Protocols, Addison Wesley, 1996.

R. Handel, M. N. Huber, S. Schroeder, ATM Networks: Concepts, Protocols, Applications, Addison Wesley, 1998.

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Introduction to Language Modelling, History and Applications, Text Processing Systems and architectures, N-grams, Lexical semantics and word-sense disambiguation, part of speech tagging, spelling correction, Text Classification – basics and process, tools, Naïve Bayes classifier, learning algorithms, Probabilistic Similarity Measures and Clustering, Sentiment Analysis, Generating and developing sentiment lexicons, learning lexicons, Information Retrieval, TF/IDF, Vector Space Models, Query analysis and processing, Information Extraction - Maximum Entropy models, Relation Extraction, Stochastic Tagging, and Log-Linear Models, Introduction to Semantics in NLP, Question Answering Models, passphrase analysis and answer generation, summarization, Emerging trends, research issues, challenges, interesting applications in various domains.

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