

NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

Department of Information Technology (IT)
Bachelor of Technology in Information Technology

Basic Science Core (BSC)

| | | | |
|-------|------------------------------|---------|---|
| MA110 | Engineering Mathematics – I | (3-0-0) | 3 |
| PH110 | Physics | (3-1-0) | 4 |
| PH111 | Physics Lab | (0-0-2) | 1 |
| MA111 | Engineering Mathematics – II | (3-0-0) | 3 |
| CY110 | Chemistry | (3-0-0) | 3 |
| CY111 | Chemistry Lab | (0-0-3) | 2 |

Engineering Science Core (ESC)

| | | | |
|-------|---|---------|---|
| EE110 | Elements of Electrical Engg. | (3-0-0) | 3 |
| ME110 | Elements of Mechanical Engg | (3-0-0) | 3 |
| CO110 | Computer Programming | (3-1-0) | 4 |
| CO111 | Computer Programming Lab | (0-0-2) | 1 |
| EC110 | Elements of Electronics and Commn. Engg | 3-0-0) | 3 |
| AM110 | Engineering Mechanics | (3-0-0) | 3 |
| ME111 | Engineering Graphics | (1-0-3) | 3 |

Humanities and Social Science Core (HSC)

| | | | |
|-------|----------------------------|---------|---|
| HU110 | Professional Communication | (3-0-0) | 3 |
| HU300 | Engineering Economics | (3-0-0) | 3 |
| HU302 | Principles of Management | (3-0-0) | 3 |

Programme Core (PC)

| | | | |
|-------|--|---------|---|
| MA200 | Mathematical Foundations of IT | (3-1-0) | 4 |
| IT200 | Data Structures and Algorithms | (3-1-0) | 4 |
| IT201 | Digital Design and Computer Organization | (3-1-0) | 4 |
| IT202 | Unix Programming and Practice | (1-0-3) | 3 |
| IT203 | Computer Systems Organization Lab | (1-0-3) | 3 |
| IT204 | Data Structures and Algorithms Lab | (0-0-3) | 2 |
| IT250 | Operating Systems | (3-0-2) | 4 |
| IT251 | Computer Communication and Networking | (3-0-2) | 4 |
| IT252 | Design and Analysis of Algorithms | (3-0-2) | 4 |
| IT300 | Parallel Computing | (3-0-2) | 4 |
| IT301 | Database Systems | (3-0-2) | 4 |
| IT302 | Web Technologies and Applications | (3-0-2) | 4 |
| IT303 | Automata and Compiler Design | (3-0-2) | 4 |
| IT350 | Software Engineering | (3-0-2) | 4 |
| IT351 | Human Computer Interaction | (3-0-2) | 4 |
| IT352 | Information Assurance and Security | (3-0-2) | 4 |

Major Project (MP)

| | | | |
|-------|-------------------|---------|---|
| IT399 | Minor Project | (0-0-3) | 2 |
| IT449 | Major Project –I | (0-0-3) | 2 |
| IT499 | Major Project –II | (0-0-9) | 6 |

Mandatory Learning Courses (MLC)

| | | | |
|-------|--------------------------------------|---------|---|
| CV110 | Environmental Studies | (1-0-0) | 1 |
| HU111 | Professional Ethics and Human Values | (1-0-0) | 1 |
| IT290 | Seminar | (0-0-2) | 1 |
| IT440 | Practical Training | (0-0-3) | 2 |

Programme Specific Electives (PSE)

| | | | |
|-------|--|---------|---|
| IT205 | Information Systems | (3-0-0) | 3 |
| IT206 | Paradigms of Programming - I | (3-0-2) | 4 |
| IT253 | Paradigms of Programming –II | (3-0-0) | 3 |
| IT254 | Computer Graphics | (3-0-2) | 4 |
| IT255 | Microprocessors and Interfacing | (3-0-2) | 4 |
| IT304 | Multimedia Signal Computing | (3-0-2) | 4 |
| IT305 | Performance Modeling | (3-0-2) | 4 |
| IT306 | Object Oriented Analysis & Design | (3-0-0) | 3 |
| IT307 | Advanced Computer Networks | (3-0-0) | 3 |
| IT353 | Perceptual Audio Processing | (3-0-2) | 4 |
| IT354 | Perceptual Video Processing | (3-0-2) | 4 |
| IT355 | Soft Computing | (3-0-2) | 4 |
| IT356 | Genetic Algorithms | (3-0-2) | 4 |
| IT357 | Artificial Intelligence | (3-0-0) | 3 |
| IT358 | Artificial Neural Networks | (3-0-2) | 4 |
| IT359 | Fuzzy System Models | (3-0-0) | 3 |
| IT360 | Distributed Computing System | (3-0-0) | 3 |
| IT361 | Advanced Database Systems | (3-0-0) | 3 |
| IT362 | Information Retrieval | (3-0-0) | 3 |
| IT363 | Simulation and Modeling | (3-0-2) | 4 |
| IT364 | E-Commerce | (3-0-0) | 3 |
| IT365 | Natural Language Processing | (3-0-2) | 4 |
| IT367 | Time Series Analysis | (3-0-0) | 3 |
| IT400 | Mobile Computing | (3-0-0) | 3 |
| IT401 | Embedded Systems | (3-0-0) | 3 |
| IT402 | Bioinformatics | (3-0-0) | 3 |
| IT403 | Knowledge Management | (3-0-0) | 3 |
| IT404 | System Integration | (3-0-0) | 3 |
| IT405 | Data Warehousing & Data Mining | (3-0-2) | 4 |
| IT406 | Middleware Technologies | (3-0-2) | 4 |
| IT407 | Computer Vision | (3-0-2) | 4 |
| IT408 | Pattern Recognition | (3-0-2) | 4 |
| IT409 | Cloud Computing | (3-0-2) | 4 |
| IT410 | Wireless Sensor Networks | (3-0-2) | 4 |
| IT411 | Mobile Adhoc Networks | (3-0-2) | 4 |
| IT412 | Semantic Web Technologies | (3-0-2) | 4 |
| IT413 | Virtual Reality | (3-0-2) | 4 |
| IT414 | Rich Internet Applications | (3-0-2) | 4 |
| IT450 | Web Services | (3-0-0) | 3 |
| IT451 | Software Architecture | (3-0-0) | 3 |
| IT452 | Computer Architecture | (3-0-0) | 3 |
| IT453 | Transaction Processing | (3-0-0) | 3 |
| IT454 | Software Quality Assurance | (3-0-0) | 3 |
| IT455 | Information Technology for Healthcare | (3-0-0) | 3 |
| IT456 | Enterprise Resource Planning & Systems | (3-0-0) | 3 |

Open Electives (OE)

| | | | |
|-------|--|---------|---|
| IT305 | Performance Modeling | (3-0-2) | 4 |
| IT357 | Artificial Intelligence | (3-0-0) | 3 |
| IT358 | Artificial Neural Networks | (3-0-2) | 4 |
| IT359 | Fuzzy System Models | (3-0-0) | 3 |
| IT405 | Data Warehousing & Data Mining | (3-0-2) | 4 |
| IT456 | Enterprise Resource Planning & Systems | (3-0-0) | 3 |

Suggested Plan of Study

| Semester E | III | IV | V | VI | VII | VIII |
|---------------|----------|----------|----------|----------|----------|----------|
| 1 | MA200 | IT250 | IT300 | IT350 | IT440 | IT499 |
| 2 | IT200 | IT251 | IT301 | IT351 | IT449 | Elective |
| 3 | IT201 | IT252 | IT302 | IT352 | Elective | Elective |
| 4 | IT202 | IT290 | IT303 | IT399 | Elective | Elective |
| 5 | IT203 | Elective | HU300 | HU302 | Elective | |
| 6 | IT204 | Elective | Elective | Elective | Elective | |
| 7 | Elective | Elective | Elective | Elective | | |

Degree Requirements:

| Category of Courses | Minimum Credits to be Earned |
|--|------------------------------|
| Basic Science Core (BSC) | 16 |
| Engineering Science Core (ESC) | 20 |
| Humanities and Social Sciences Core (HSC) | 09 |
| Programme Core (PC) | 60 |
| Electives (ELE): 1) Programme Specific Electives (PSE) \geq 38 2) Open Electives (OE): 0-12 Credits | 50 |
| Major Project (MP) | 08 |
| Minor Project | 02 |
| Mandatory Learning Courses (MLC) | 05 |
| Total | 170 |

Department of Information Technology

MA200 MATHEMATICAL FOUNDATIONS OF INFORMATION TECHNOLOGY (3-1-0) 4

Graph Theory: Undirected and Directed Graphs, Bipartite Graphs, Connectivity, Traversability, Trees, Spanning Trees, Rooted and Binary Trees, Algorithms – Kruskal’s and Prim’s Minimal Spanning Tree, Dijkstra’s Algorithm, Max-flow Min-cut theorem, Algorithms for computing maximum s-t flows in graphs; Probability Theory: Non-deterministic models, Finite Probability Space and related concepts, Conditional Probability, Independent and mutually exclusive events, Bayes’ Theorem, Random Variables – 1D, 2D, Mathematical Expectation, Variance, Correlation, Distributions – Binomial, Poisson, Normal, Gamma, Chi-Square; Sampling Theory: Purpose and nature of sampling -uses and applications, Mean, Median, Mode, Variance, Standard Deviation; Hypothesis Testing: Formulation of hypotheses – null and alternate hypothesis, Parametric/Non-parametric tests and their applicability, Criteria for acceptance of hypothesis, Level of Significance, t/z/Chi-Square Tests with simple applications.

D. B. West, Introduction to Graph Theory, Pearson Education, ISBN 0-13-014400-2

R. Diestel, Graph Theory, Electronic Edition 2000, Springer Verlag, NY.

P. L. Meyer, Introductory Probability and Statistical Applications, Oxford & IBH Pub

S. M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, John Wiley.

R. V. Hogg and A. T. Craig, Introduction to Mathematical Statistics, Macmillan NY, 4th Edition.

IT200 DATA STRUCTURES AND ALGORITHMS (3-1-0) 4

Simple Data types and data structures, Concepts of complexity analyses, worst, best and amortized analyses, Linked lists, stacks, queues, arrays; Concepts of Priority Queues, Hash Tables, Sorting, Search Trees, Graphs; Algorithms design concepts like Divide & Conquer, Dynamic Programming and Greedy.

Aho, Ullman and Hopcroft – Data Structures and Algorithms, Addison Wesley

Mark Allen Weiss, Algorithms, Data Structures and Problem solving with C++, Addison Wesley

T.H Cormen, C.E. leiserson and R.L Rivest - Introduction to Algorithms – The MIT Press, Cambridge, Massachusetts, USA, 1990.

IT201 DIGITAL DESIGN AND COMPUTER ORGANIZATION (3-1-0) 4

Combinational and Sequential Circuits, Basics of CPU, CPU Organization, Data Representation. Instruction Sets, Data Path Design, Fixed Point Arithmetic, ALU Design, Memory Organization, Control Design, Input/output Organization.

N. S. Gill, J. B. Dixit, Digital Design and Computer Organization, USP, 2008

Hamaher, V.Carl, Vranesi, Zvonko, Computer Organization McGraw Hill

J.P. Hayes, Computer Architecture and Organization, 3rd Edition, McGraw Hill, 1998

W. I. Fletcher, An Engineering Approach to Digital Design, PHI, 1999.

D.D. Givone, Digital Principles and Design, TMH, 2002

IT202 UNIX PROGRAMMING AND PRACTICE (1-0-3) 3

Introduction to UNIX OS, history, features, architecture, basic utility commands such as cp, mv, mkdir, rm, ls, grep, find, sed, file utility commands, file attributes, ownerships, permissions and other related utility commands, Usage of vi/vim editor, for programming in C/C++, compilers, debuggers, profilers (like gprof), makefiles, IDEs (for Java development like eclipse), Shell and shell programming, process control commands such as ps, nice, at, mesg, cron, etc, Assignments for lab sessions.

Sumitaba Das, UNIX Concepts and Applications

Richard W Stevens, UNIX Network Programming, Prentice Hall PTR

Roderick Smith O'Relly, UNIX Power Tools

IT203 COMPUTER SYSTEMS ORGANIZATION LAB (1-0-3) 3

Design of Adders, Subtractors, Encoders, Decoders, Shifters, Counters, Flip-flops, Multiplexers, Simple ALU Design using VHDL, Assembly Level Programming with 80X86.

M. Morris Mano, Digital Design Prentice Hall, India, 2nd Ed

Enoch O. Hwang Digital Logic and Microprocessor Design with VHDL Thomson, India, 2007

D.D. Givone, Digital Principles and Design, TMH, 2002

Douglas Perry, VHDL McGraw Hill International, 1998.

IT204 DATA STRUCTURES AND ALGORITHMS LAB

(0-0-3) 2

Implementation of array operations: Stacks, Queues, Circular Queues, Multiple stacks and queues. Implementation of linked lists: stacks, queues, polynomial operations. Doubly linked lists; Tree traversal: AVL tree implementation, application of trees. Hash Table. Searching and sorting.

Mark Allen Weiss, Algorithms Data Structures and Problem Solving with C++, Addison Wesley

IT205 INFORMATION SYSTEMS

(3-0-0) 3

Introduction to IS development, Tools for determining system requirements, Structured analysis and development strategy, Design of files, Introduction to database design, Systems engineering and quality assurance, Managing systems implementation, Hardware and software selection

James A. Senn, Analysis and Design of Information System, 2nd edition, McGraw Hill International Edition

Jeffrey. L. Whitten, Lonnie. D. Bentley, System Analysis and Design Methods 4th Edition. TMH, 2002.

IT206 PARADIGMS OF PROGRAMMING - I

(3-0-2) 4

Fundamentals of Object Oriented Programming (OOP): Introduction, Objects and Classes in Java – Methods – Access specifiers – static members – constructors – finalize method – Arrays – Strings – Packages – JavaDoc comments; OOP Inheritance: Inheritance – class hierarchy – polymorphism – dynamic binding – final keyword – abstract classes – Object class – Reflection – interfaces – object cloning – inner classes – proxies; Generic Programming: Motivation for generic programming – generic classes/methods – generic code/virtual machine – inheritance and generics – reflection and generics – exceptions –exception hierarchy – throwing and catching exceptions – Stack Trace Elements -assertions – logging; Concurrent Programming: Multi-threaded programming – interrupting threads – thread states/properties –thread synchronization – thread-safe Collections – Executors – synchronizers – threads and event-driven programming.

Brac J Cox, Object Oriented Programming: An Evolutionary Approach – Addison Wesley Publishing Company.

Cay S. Horstmann, Gary Cornell, “Core Java: Volume I – Fundamentals, 8th Edition, Sun Microsystems Press, 2008.

K. Arnold and J. Gosling, The JAVA programming language, 3rd edition, Pearson Education, 2000.

Timothy Budd, Understanding Object-oriented programming with Java, Updated Edition, Pearson Education, 2000.

C. Thomas Wu, An introduction to Object-oriented programming with Java, Tata McGraw-Hill, 4th Edition, 2006.

IT250 OPERATING SYSTEMS

(3-0-2) 4

Introduction to OS, File systems, CPU Scheduling, Memory management, Disc scheduling, Virtual memory concept, Deadlocks, Concurrent processes, Operating systems security, Case studies – UNIX operating system; Exercises using Linux and / or other OS to practice / simulate: scheduling, memory management algorithms; Concurrent programming; use of threads and processes; kernel reconfiguration, device drivers and systems administration of different operating systems O/S internals: Writing utilities O/S tuning.

Silberschartz and Galvin, Operating System Concepts, Addison Wesley.

Melin Milenkovic, Operating Systems - Concepts and Design, McGraw Hill, New York 1987

IT251 COMPUTER COMMUNICATION AND NETWORKING (3-0-2) 4

Evolution of Data Communication and Networks, Transmission Fundamentals: Signaling Schemes, Encoding and Modulation, Data Transmission over Networks – Switching Techniques, Layered Architecture of Computer Networks, OSI & TCP/IP Architectures and Layers with protocols, Data link Control and Protocols, Error Detection and Correction, Internetworking & Routing, Transport Layer Protocols, Applications: E-Mail, HTTP, WWW, Multimedia; Implementation of Signaling and Modulation, Bit, Byte & Character Stuffing and Error Detection/Correction Coding Techniques, TCP/IP Level Programming, Routing Algorithms, Exercises comprising simulation of various protocols.

Andrew S. Tannenbaum – Computer Networks, Prentice Hall of India, 2nd Edition, 1990

Behrouz A. Forouzan - Data Communications and Networking, 3rd Edition, Tata McGraw Hill, 2002.

William Stallings - Data and Computer Communications, 2nd Edition; Maxwell, MacMillan International Edition, 1989.

Leon, Garcia and Widjaja - Communication Network, 2nd Edition, Tata McGraw Hill, 2002.

IT252 DESIGN AND ANALYSIS OF ALGORITHMS (3-0-2) 4

Brief overview of Functions, Relations and Sets; Models of computation, various performance measures, General techniques of algorithm design, Analysis of different algorithms for sorting and selection, Data structures for efficient manipulation of sets and partition, Efficient Graph algorithms based on Depth first search, Strassen's matrix multiplication algorithm, Efficient algorithms for matrix inversion and LUP decomposition, Modular arithmetic, NP complete problems and approximation algorithms; Exercises to apply & practice the advanced algorithms: graph algorithms, internet algorithms etc. and analyze them.

Aho, Hopcroft and Ullman the design and analysis of Computer Algorithms, Addison Wesley.

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

Baase S., Computer Algorithm Introduction to Design and Analysis, Addison Wesley.

Knuth D.E., The Art of Computer Programming, Vol. I: Fundamental Algorithms, Addison Wesley.

IT253 PARADIGMS OF PROGRAMMING - II (3-0-0) 3

Programming domains; Language Evaluation; Programming Paradigms – Imperative, Functional, OOP and Logic programming; Formal methods: syntax and semantics - Backus Naur Form, Attribute grammars; Describing semantics - Denotational semantics; Data types, Names, Variables, Bindings, Scope and lifetime, Referencing Environments; Named Constants-Variable Initialization-Subprograms-Parameter Passing – Coroutines; Even Driven Programming: Fundamentals; Case studies from Desktop to Mobile applications, VB.NET, ANDRIOD Applications; Functional programming languages - Lambda calculus - LISP; Application of functional programming languages; Logic programming languages –introduction to predicate calculus - Horn clauses - Logic programming: Prolog, Applications; Asynchronous Programming Model with a Case study (AJAX, C#...); Run-time Program Management; Virtual Machines: Java Virtual Machine, Common Language Infrastructure, Late Binding of Machine Code, Just-in-Time and Dynamic Compilation, Binary Translation, Binary Rewriting, Mobile Code and Sandboxing, Performance Analysis.

Robert W. Sebesta, "Concepts of Programming Languages", 9th Edition, 2009

Ravi Sethi, "Programming Languages - concepts and constructs", Addison Wesley, 2nd Edition, 1996.

Michael L. Scott, "Programming Language Pragmatics", Morgan Kaufmann, 3rd Edition, 2009.

Kenneth.C.Louden, "Programming Languages: Principles and Practices", 2nd Edition, Thomson Learning.

IT254 COMPUTER GRAPHICS (3-0-2) 4

Computer Graphics Hardware; Scan Conversion: lines, circles, ellipses; Filling Algorithms, Clipping Algorithms, Viewing in 3D: Projections, 2D & 3D transformations, Visible surface determination, Animation of 2D images: Implementation of 2D packages which support graphics editor with classical input techniques and animation.

Hearn and Backer, Computer Graphics Principles and Practice-2nd edition

Van Dam, Foley, Feimer, Hugher Computer Graphics Principles and Practice in C- Addison Wesley

IT255 MICROPROCESSORS AND INTERFACING

(3-0-2) 4

Microprocessor history, Microprocessor architecture, 8086, instruction set, subroutines, Programming examples, software development systems, Interrupts, Polling, Daisy chain, RST instructions, Priority encoder, Programmable peripheral devices, 8255, 8253, 8259, 8257, Intel 80386, 80486 & Pentium Processors, Motorola 68000, 68020, 68030 processors, Mother boards, I/o bus, I/O channel, BIOS, DOS PC bus, Multibus I& II, VME and peripheral controllers.

Douglas V. Hall, Microprocessors and Interfacing, 2nd Edition, Tata McGraw-Hill, 2006.

Babby B.Brey, The Intel Microprocessors – Architecture, Programming & Interfacing, Pearson/Prentice Hall, 2008

IT290 SEMINAR

(0-0-2) 1

This seminar is a 1 credit mandatory learning course to be completed during 4th semester. Each student will make technical presentation on a topic of academic interest as per recommendations of the DUGC of IT department.

IT300 PARALLEL COMPUTING

(3-0-2) 4

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.

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

Barbara Chapman et.al, "OpenMP: Portable Shared Memory Parallel Programming", Scientific & Engg 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.

IT301 DATABASE SYSTEMS

(3-0-2) 4

Basic concepts, Data models and languages, Database design (conceptual and physical), System implementation techniques, Current trends in database system, Distributed databases; Design and Implementation of Database systems or packages for applications such as office automation, hotel management, hospital management; deployment of Forms, Reports Normalization, Query Processing Algorithms in the above application projects; Implementation of few important functionalities of relational database management systems

Raghu Ramakrishnan, Database Management Systems, McGraw Hill, 2000

R. Elmasri and S.B Navathe , Fundamentals of Database Systems, The Benjamin/Cummings Publishing Company, 2000

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

Silberschatz, Korth A.F., Sudarshan S., Database System Concepts, McGraw Hill,2005

IT302 WEB TECHNOLOGIES AND APPLICATIONS

(3-0-2) 4

Internet and Web Technology, Infrastructure and tools for Internet Commerce / E-Commerce Current Trends in E-Commerce applications development, Enterprise level E-Commerce: SCM, CRM, EDI, B2Bi, ERP; Exercises to develop web based applications design using client server architecture; CGI programming and middleware exercises; Search engines & e-commerce related exercises; site management & server management and security studies.

Henury 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, 2002.

IT303 AUTOMATA AND COMPILER DESIGN (3-0-2) 4

Introduction to Compiler Design, Regular Expressions, DFA, NFA, Minimization of states, Lexical analysis, usage of Lex, CFG, BNF notation, PDA, Parsing Techniques, Top-down and bottom-up parsing, Error Recovery strategies, Intermediate Code Generation, Runtime environment, Code Generation and introduction to code optimizations.

Aho, Ullman and Sethi, “*Compilers: Principles, Techniques, Tools*”,
Compiler Design in C, Holub

IT304 MULTIMEDIA SIGNAL COMPUTING (3-0-2) 4

Signals in the Physical World, Signals in the Computer: Discrete Signals & Spectra; Discrete Fast Fourier Transforms - FFT Algorithms (DIT, DIF); Discrete Cosine Transforms (DCT); Discrete Wavelet Transforms (DWT); Z-Transform and Convolution; Feed-forward and Feedback Filters; Compression: Audio (MP3), Image (JPEG) and Video (MPEG4).

Ifeachor E C and Jervis B W, “*Digital Signal Processing – A Practical Approach*”, Pearson education, 2002

Michael Stiber and Bilin Stiber, “*Signal Computing: Digital Signals in the Software Domain*”.

J.H. McClellan, R.W. Schafer, and M.A. Yoder, “*DSP First: A Multimedia Approach*”, Prentice Hall, 1999.

IT305 PERFORMANCE MODELING (3-0-2) 4

Performance Evaluation methods. Analytical versus simulation modeling. Performance measurement and benchmarking. Workload modeling. Random variables. Commonly used distributions. Stochastic processes. Markov chain models of computer systems. Queuing models. Discrete event simulation. Simulation Languages. Confidence intervals. Variance reduction techniques. Case studies of analytical & simulation of computer systems.

Raj Jain, *The Art of Computer Systems Performance Analysis*, Jon Wiley and Sons, New York, USA, 1991.

KS Trivedi, *Probability and Statistics with Reliability, Queuing and computer science*, PHI 1982.

Paul & Howard, *Computer systems performance Evaluation & Prediction*, Elsevier, 2005.

IT306 OBJECT ORIENTED ANALYSIS & DESIGN (3-0-0) 3

Introduction to object technology and applications; object oriented decomposition vs. structured decomposition in software development, concepts and applications of object oriented analysis and design, object oriented databases, application development using programming language JAVA

Grady Booch, *Object Oriented Analysis and design with applications*, Addison Wesley

Michael R. Blaha and James Rumbaugh, *Object Oriented Modeling and Design with UML*, Prentice-Hall

IT307 ADVANCED COMPUTER NETWORKS (3-0-0) 3

Review of TCP/IP Protocol suit with latest developments, Broadband networks, advanced concepts: ATM, Frame Relay, Fiber Optic Networks: SONET, VOIP, MIPv6 etc., Remote Access and Wireless Networking: Virtual Private Networks - L2 and L3 Switches, Tunneling; BGP and Adaptive Routing, MPLS: QoS, Network Recovery/Restoration; Security Issues in TCP/IP and BGP, DoS/DDoS attacks, Mitigation with recent trends, Cryptography, Intrusion Detection; Network Management issues and protocols, Internet Management, Common Management Information services/protocol (CMIS/CMIP), Network Trouble Shooting, QoS (Integrated/Differentiated Services), Port based Network Access control, Availability, Scalability, Load Balancing and Recent Trends.

James F Kurose and Keith W Rose, *Computer Networking*, Pearson Education, 2003

Andrew. S. Tannenbaum, *Computer Networks*, Prentice Hall of India, 2nd Edition, 2002.

M. Subramanian, *Network Management: Principles and Practice*, Addison- Wesley, 2000.

William Stallings, *Data and Computer Communications and Networking*, 2nd Edition, TMH, 2002.

Behrouz A Forouzan, Data Communications and Networking, 2nd edition, TMH, 2002.

Leon, Garcia and Widjaja - Communication Networks, TMH 2002.

IT350 SOFTWARE ENGINEERING

(3-0-2) 4

Introduction to Software Engineering, Software Development Life Cycle & Various Models, Requirement Engineering, Software Specification, Software Metrics, Software Design, Modular Structure, Object Oriented Software Engineering, Software Testing & Testing Mechanisms, Software Verification & Validation, Verifying Performance & Reliability, Software Cost Estimation Models, Software Development Tools incl. CASE, Software Project Management.

R.S. Pressman, Software Engineering, McGrawHill

Pankaj Jalote, An Integrated Approach to software Engineering, Narosa Pub., 1995

Ian Sommerville, Software Engineering, 5th Edition. Addison-Wesley Publication House, 1997

Bell Morry, and Pugh. Software Engineering Approach. Prentice Hall.

Dr. K.C. Shet. Software Engineering & Quality Assurance. BPB Publications, New Delhi.

Waman S. Jawadkar, Software Engineering- Principles and practice, Tata McGraw Hill

IT351 HUMAN COMPUTER INTERACTION

(3-0-2) 4

Foundations: The Human, The Computer, The Interaction and Paradigms; The Process of Developing Interactive Systems: Models, Theories, Design Process and Evaluation; Interacting with Computers: Vision, Graphic Design, and Visual Displays - Touch, Gesture and Marking, Speech, Language and Audition; Psychology and Human Factors: Human Information Processing, Designing to fit human capabilities; Research Trends.

Andrew Sears and Julie A. Jacko, The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications, 2nd Edition, Lawrence Erlbaum Associates (CRC Press, Taylor and Francis Group), New York 2007.

Philip Kortum, HCI beyond the GUI: Design for Haptic, Speech, Olfactory and other Nontraditional Interfaces, Elsevier, 2008.

Alan Dix, Janet Finlay, Gregory D Abowd and Russell Beale, Human Computer Interaction, 3rd Edition, Pearson, 2004.

Ben Shneiderman, Catherine Plaisant, Designing the User Interface: Strategies for Effective HCI, 5th Edition, Pearson, 2009.

J. Preece, Y. Rogers and H. Sharp, Interaction Design: Beyond Human Computer Interaction, 3rd Edition, Wiley, 2011.

IT352 INFORMATION ASSURANCE AND SECURITY

(3-0-2) 4

Cryptography, private and public key encryption, uses of encryption; Network Security: threats, controls – encryption, authentication, network security tools (firewalls, intrusion detection); Program security: non-malicious program errors such as buffer overflow, viruses, other malicious code, targeted malicious code, controls against program threats; Protection in operating systems: protected objects, methods of protection, access control, authentication; Web Security; Data security and privacy; Forensics and Incident response; Security Policies and Procedures.

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

Atul Kahate, Cryptography & Network Security, McGraw Hill, 2004

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

N. Nedjah, A. Abraham et al, Computational Intelligence in Information assurance and security, Springer 2007.

IT353 PERCEPTUAL AUDIO PROCESSING

(3-0-2) 4

Fundamentals of Audio and Speech Processing; Speech and Audio Analysis: Transforms – STFT, DCT; Audio and Speech Compression Standards: MPEG and AAC; Human Auditory Perception; Perceptual

Audio Quality Metrics, Perceptual Processing of Digital Speech; Speech and Audio Rendering; Speech and Audio Storage and Retrieval; Applications and Research Trends.

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

A Spanias, T Painter and Venkatraman A, "Audio Signal Processing and Coding", Wiley-Interscience, 2007.

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, Nelson M, "Speech & Audio Signal Processing: Processing and Perception of Speech and Music", Wiley, 1999.

IT354 PERCEPTUAL VIDEO PROCESSING (3-0-2) 4

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; 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; Applications 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

William K Pratt, "Digital Image Processing", Wiley, 2001.

IT355 SOFT COMPUTING (3-0-2) 4

Optimization and Some Traditional Methods and issues, Introduction to Genetic Algorithms, Some Specialized Genetic Algorithms, Introduction to Fuzzy Sets, Fuzzy Reasoning and Clustering, Fundamentals of Neural Networks, Fundamentals biologically inspired computing, Applications and Recent Research Trends.

A. Ghosh, S. Dehuri and S. Ghosh (eds.), Multi-Objective Evolutionary Algorithms for Knowledge Discovery from Databases, ISBN 978-3-540-77466-2, Springer, 2008.

S. Bandyopadhyay and S. K. Pal, Classification and Learning using Genetic Algorithms: Applications in Bioinformatics and Web Intelligence, ISBN 978-3-540-49606-9, Springer-Verlag, Hiedelberg, Germany, 2007.

A. Ghosh, R. K. De and S. K. Pal (eds.), Pattern Recognition and Machine Intelligence, Springer, 2007.

D K Pratihar , Soft Computing , Narosa , 2007.

IT356 GENETIC ALGORITHMS (3-0-2) 4

Robustness of traditional optimization and search techniques, Simple Genetic Algorithms, Similarity templates, goals of optimization, Schema Theorem of John Holland, Computer Implementation and 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.

IT357 ARTIFICIAL INTELLIGENCE (3-0-0) 3

Problem Solving: Solving Problems by Searching, heuristic search techniques, constraint satisfaction problems, stochastic search methods, Game Playing: mini-max, 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 (1998). Artificial Intelligence: A New Synthesis. Morgan Kaufmann Publishers

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

NPTEL Videos: Artificial Intelligence

IT358 ARTIFICIAL NEURAL NETWORKS

(3-0-2) 4

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

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

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

IT359 FUZZY SYSTEM MODELS

(3-0-0) 3

Classical /crisp set, fuzzy sets, Fuzzy numbers, Fuzzy arithmetic, Fuzzy measures, Operations on Fuzzy sets, Fuzzy relations, Multi valued logic, Fuzzy logic, Uncertainty and information, Approximate reasoning, Fuzzy decision making, Fuzzy models, case studies.

Klir and Yuan, Fuzzy Sets and Fuzzy logic, Prentice Hall of India 2001.

Li Xin Wang, A course in fuzzy systems and control, Prentice Hall

J. Yen and R. Langari, Fuzzy logic: Intelligence, control and information, Pearson Education.

IT360 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.

IT361 ADVANCED DATABASE SYSTEMS

(3-0-0) 3

Basic concepts, Buffer management, Query optimization, Selectivity estimation, Concurrency control, Recovery, Database tuning, Distributed databases– principles, architecture, design, query processing, transaction management, Replication, Web databases, Current trends in database system.

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

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

Thomas Connolly and Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation and Management, Pearson Education, 2002.

IT362 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.

IT363 SIMULATION AND MODELING

(3-0-2) 4

System models and Role of Simulation, Types of Systems, Statistical Tools and Techniques, Discrete Event Simulation Languages, Modeling and Performance Evaluation of Computer Systems, Biological and Sociological System Simulation, Verification and Validation.

A. M. Law and W.D. Kelton, Simulation Modeling and Analysis, McGraw Hill, 2000

A. M. Law, Simulation Modeling and Analysis, McGraw Hill, 4th Edition, 2008

IT364 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 and social issues.

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.

IT365 NATURAL LANGUAGE PROCESSING

(3-0-2) 4

Introduction and Overview, Language Modelling, History and Applications, Basic Text Processing - Word stemming, tokenization, normalization, Part of Speech tagging, Text Classification – basics and process, tools, Information Retrieval, TF/IDF, Ranked IR, Vector Space Models, Query analysis and processing, Basics of Information Extraction, Named Entity Recognition, Maximum Entropy models, Relation Extraction; Introduction to Semantics, word sense and word similarity, Basics of Wordnets, tools, Emerging trends, research issues, challenges, interesting applications in various domains.

Daniel Jurafsky and James H. Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, 2nd Edition. Prentice Hall, 2008

Christopher D. Manning and Hinrich Schütze, Foundations of Statistical Natural Language Processing, MIT Press, 1999

Tanveer Siddiqui, U. S Tiwary, Natural Language Processing And Information Retrieval, 1st Edition

IT367 TIME SERIES ANALYSIS

(3-0-0) 3

Introduction, Stochastic Processes, Stationary Time Series Process (Time Domain), Univariate Analysis: Autoregressive (AR) Process. Moving Average (MA) Process, Autoregressive Moving Average (ARMA) Process, Causality, Multivariate Analysis: Autoregressive Distributed Lag (ARDL) Model, Vector Error Correction (VEC) Model, Vector Autoregressive (VAR) Model, Spectral Analysis (Frequency Domain), Non-Stationary Time Series Process, Unit Root Tests: Dickey-Fuller Test Phillips-Peron Test Elliott-Rothenberg-Stock Test, Schmidt-Phillips Test, Kwiatkowski-Phillips-

Schmidt-Shin (KPSS) Test , Zivot-Andrews Test, Cointegration introduction and tests, ARCH , GARCH Model , Generalized Method of Moments (GMM)
Shumway and D. S. Stoffer (2006), Time Series Analysis and Its Applications (With R Examples, Second edn). Springer, New York.
Box, G. E. P. & Jenkins, G. M.: Introduction to Time Series Analysis. Springer Series in Statistics. Second Edition.
Chatfield, Chris: Analysis of Time Series: an Introduction. Chapman & Hall. Sixth Edition.
Diebold, James H.: Introduction to Multiple Time Series Analysis. Springer-Verlag.
Hamilton James D: Time Series Analysis. Princeton University Press.

IT399 MINOR PROJECT

(0-0-3) 2

Design/Experimental/Simulation tasks of relatively minor intensity and scope as compared to the Major Project and in line with the guidelines formulated by the DUGC of IT Department. The Student has to select a project based on the topic of interest. Periodical implementation of the project will be evaluated by the project guide.

IT400 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, Logical Migration, Mobile agents, Security issues.
Kumkum Garg, Mobile computing - Theory and Practice, 2010
Raj Kamal, Mobile computing, Oxford University Press 2007.
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.

IT401 EMBEDDED SYSTEMS

(3-0-0) 3

Embedded System Design Process: Embedded Computing Platform, Program Design and Analysis, Real Time Operating Systems, Networks: Distributed Embedded Architecture, System on Chip (SOC) and the current trends.
David E Silmon, An Embedded Software Printer Pearson Edition Asia, 2001
Wayne Wolf, Computer as Components – Harcourt India Pvt. Ltd. 2001

IT402 BIOINFORMATICS

(3-0-0) 3

Introduction to Bioinformatics, Biological Databanks, Sequence Analysis, Structure Prediction, Protein Folding, Proteomics, Emerging Areas in Bioinformatics
Krane D.E. & Raymer M.L. Fundamental Concepts of Bioinformatics, Pearson, 2003
Attwood & Parrysmith : Introduction to Bioinformatics, Person Ed, 2003
Gibas & Jamnbeck : Developing Bioinformatics Computer Skills, O’Rielly, 2003

IT403 KNOWLEDGE MANAGEMENT

(3-0-0) 3

Introduction to knowledge management, Types of Knowledge within an organization. Intellectual capital. KM Architecture and Tools. ERP for KM. Knowledge sharing tools. Data ware housing, Knowledge strategy creation. KM practice. KM Process. Integrating knowledge sharing and learning, The chief knowledge Officer (CKO) and his/her job. Training programmes for organization. widelearning. Making KM work across various segments of industry and business firms. Case studies of KM practices in successful companies, Future challenges in KM
Ratnja Gogula, Knowledge management: A New Dawn, Institute of Chartered Financial Analysts of India, 2002.

IT404 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, Architecture Overview. Current Integration Architecture Assessment. Technical Integration Architecture, Service Integration Architecture, Information Integration Architecture. Process Integration Architecture, Enterprise Integration Solutions: Application, Information, Composite Application and Process-Driven Integrations; Best Practices for Enterprise Integration.

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

C. Britton and P. Bye, IT Architecture, Middleware: Strategies for Building Large Integrated Systems, Addison-Wesley.

IT405 DATA WAREHOUSING AND DATA MINING (3-0-2) 4

Data Warehousing concepts; Components and building data warehouse. Data Mining – Objectives and examples, data mining process, Data mining techniques, Generalization, Data mining knowledge representation

Raph Kimball Data Warehouse Toolkit, John Wiley

Michael. J. Berry, Gordon Linoff Data Mining Techniques: Marketing, Sales, Customer Support, John Wiley.

IT406 MIDDLEWARE TECHNOLOGIES (3-0-2) 4

Introduction to Middleware Technologies, General Middleware, Service Specific Middleware, Client/Server Building blocks: RPC, Messaging – P2P, Java RMI, Computing standards, OMG, Introduction to CORBA, EJB and .NET, XML Technologies - XML, DTD, XSD, XSLT, XQUERY, XPATH, Web Services and SOA.

G. Sudha Sadasivam, Distributed Component Architecture, Wiley India Edition.

Thomas Erl, Service Oriented Architecture: Concepts, Technology & Design, Prentice Hall

G. Brose, A Vogel and K. Duddy, Java programming with CORBA, 3rd Edition, Wiley India John Wiley and Sons

Ed Roman, Mastering Enterprise Java Beans, John Wiley & Sons Inc.

IT407 COMPUTER VISION (3-0-2) 4

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

IT408 PATTERN RECOGNITION (3-0-2) 4

Pattern and features. Pattern recognition approaches. Discriminant functions. Statistical pattern recognition, Gaussian model. Parametric estimation. Bayesian parameter estimation, pattern classification by distance functions Cluster analysis, Syntactics pattern recognition. Features extraction and recent advances.

Earl Gose, Richard Johnsonbaugh, Steve Jost, Pattern Recognition and Image Analysis, Prentice Hall 1999.

Duda RO and Hart PE, Pattern Classification and Scene Analysis, Wiley 1973.

IT409 CLOUD COMPUTING (3-0-2) 4

Introduction to Cloud Computing, Cloud Computing Delivery Models, Open Source and Industry Case Studies of Cloud (Apache VCL, Amazon, IBM and Eucalyptus), 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.

IT410 WIRELESS SENSOR NETWORKS

(3-0-2) 4

Introduction to wireless communication and wireless sensor networks, Network architecture and design principles, MAC and link layer protocols, Topology control in WSN, Routing protocols, Information Aggregation, Information Storage, Query, Localization, Security issues, Applications and recent trends: Wireless multimedia sensor networks.

F. Zhao and L. Guibas, Wireless sensor networks: An information Processing Approach, Elsevier/Morgan-Kaufmann, 2004.

Carlos de Moraes Ciordeiro nad Dharma Prakash Agrawal, Adhoc and Sensor Networks: Theory and Applications, World Scientific Publications, 2006.

IT411 MOBILE ADHOC NETWORKS

(3-0-2) 4

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.

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.

IT412 SEMANTIC WEB TECHNOLOGIES

(3-0-2) 4

Introduction to the Semantic Web – What is Semantics; Syntax, Structure and Semantics, Layered Cake Architecture; Structured Web Documents and Resource Description Framework – Understanding content, Metadata, metadata standards, XML + metadata specification, RDF and metadata processing; Programming with RDF/XML; Web Ontology Language (OWL) - Ontology, Domain Modeling, Logic, Inferencing, Context; Logic Reasoning for the Semantic Web - Classification and semantic metadata extraction techniques: statistical, statistical learning/AI, lexical and natural language, knowledge based; Programming with Ontology; 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) and Recent Trends.

Pascal Hitzler et al, Foundations of Semantic Web Technologies, Chapman & Hall, 2009.

Karin Breitman et al, Semantic Web: Concepts, Technologies and Applications, Springer, 2010.

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

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

IT413 VIRTUAL REALITY

(3-0-2) 4

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; Overview of Virtual Humans, Face Cloning & Face Motion Capture/Analysis 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, M W. Haas, *Virtual & Adaptive Environment: Apps, Human Performance*, Lawrence Erlbaum, 2003.

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

IT414 RICH INTERNET APPLICATIONS

(3-0-2) 4

Web2.0 concepts, SaaS model, Evolution of Web 2.0, Web Programming concepts, HTML, XHTML, CSS, Javascript. JS Execution Environment, Overview of XML, Web Services, Building Rich Internet Applications, AJAX, XML HTTP Object, ActionScript, Products from Industry like Flex (Adobe), Flash/AIR (Adobe), Silverlight (MS), JavaFX (SUN), OpenLazzlo technologies, Recent Trends.

Robert Sebesta, *Programming the World wide web*, Pearson Education, Third Edition

Nicholas C Zakas et al, *Professional AJAX*, Wrox publications, 2006

Chafic Kazoun, *Programming Flex 2*, O'Reilly publications, 2007

Colin Mook, *Essential Action script 3.0*, O'Reilly Publications, 2007

Steven Holzner, *Ajax Bible*, Wiley India edition, 2007

Justin Gethland et al, *A Web 2.0 primer Pragmatic Ajax*, SPD Publications, 2006.

IT440 PRACTICAL TRAINING

2

The Student has to undergo a practical training programme or carrying out a research/practical oriented project or any equivalent training programme fixed by the DUGC of IT department. This practical training will be done during vacation period (6-8 wks) before the evaluation semester. Final evaluation is based on the report/seminar by the student.

IT449 MAJOR PROJECT – I

(0-0-3) 2

The Student has to select a project based on a topic of interest. This project work will be commencing in VII semester and continued in VIII semester, at the end of each semester, the project work will be evaluated internally and externally.

IT450 WEB SERVICES

(3-0-0) 3

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

Alonso G, Casati F, *Web Services - Concepts, Architectures and Application Series: Data-Centric Systems and Applications*, 2004

S Weerawarana et al, *Web Services Platform Architecture: SOAP, WSDL, WS-Policy and More*, Prentice Hall, 2005.

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

R. Allen Wyke et-al, *XML Programming*, WR Publishers.

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

IT451 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/Evaluating Software Architecture and its reuse, Case studies and Recent 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.

IT452 COMPUTER ARCHITECTURE

(3-0-0) 3

Flynn's Classification, RISC Vs CISC, Data and control flow, Pipelining: Linear and non linear, pipeline hazards, instruction scheduling, Branch handling techniques, Arithmetic pipeline, VLIW architecture, Superscalar processors. Instruction level Data-Parallel architectures: SIMD architectures, Systolic and Vector architecture; MIMD architectures, Systems interconnect architecture: Network properties/routing, Static/dynamic interconnection networks. Multiprocessor architectures, models of memory consistency, cache coherence/directory protocols.

Dezso Sima, Peter Karsuk, Advanced Computer Architectures: A Design Space Approach, Addison-Wesley.

K.Hwang and F.A. Briggs, Computer Architecture and Parallel Processing, McGraw Hill Publication.

J. Hennessy and D. Patterson, Computer Architecture –A Quantitative Approach, Morgan Kaufmann, 2003

IT453 TRANSACTION PROCESSING

(3-0-0) 3

Introduction and need of transaction processing, online transaction process (OLTP), OLTP program design, OLTP and system Reliability, OLTP and CICS standards in OLTP, current trends.

Gary McClain, OLTP handbook, McGraw Hill, 1997.

IT454 SOFTWARE QUALITY ASSURANCE

(3-0-0) 3

Overview of Software Engineering. Requirement Engineering Analysis, software reliability. Definition and concepts of

software reliability, software quality. Introduction to software quality principles, total quality management, Quality Assurance Standards. ISO 9000 Tick-It method. Miscellaneous Issues: Software maintenance. Future OF SQA

John J. Marciniak, Encyclopedia of Software Engineering. - Vol. I & II. John Wiley & Sons, 1994.

Ince Darrel. ISO 9001 and Software Quality Assurance. McGraw Hill, 1994

Pankaj Jalote, An Integrated Approach to Software Engineering Narosh Publications, 1995

Isabel Evans, Achieving software Quality through team work, Allied publishers, 2004.

IT455 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.

IT456 ENTERPRISE RESOURCE PLANNING & SYSTEMS

(3-0-0) 3

ERP: Needs, Models, Commercial ERP Packages, Client Server and Open Technology Solutions, Supply Chain Management-Issues, Drivers and Obstacles, Coordinating SCM and ERP in E-Business

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

Pete Loshin, Paul A. Murphy, Electronic Commerce, A JAICO Book.

IT499 MAJOR PROJECT – II

(0-0-9) 6

The Student has to select a project based on a topic of interest. This project work will be commencing in VII semester and continued in VIII semester, at the end of each semester, the project work will be evaluated internally and externally.