Motilal Nehru National Institute of Technology Allahabad

Course Structure of M.Tech. (Information Security)

I - Semester :

Sl. No.	Subject Name	L	T	P	Credits	Distribution of Marks out of 100		
						TA	Mid Sem. Exam.	End Sem. Exam
1.	Topics in Computer Engineering	4			4	20	20	60
2.	Advance Data Structure and System Programming Lab			6	4	20	20	60
3.	Elective – I			6	4	20	20	60
4.	Elective – II	4			4	20	20	60
5.	Elective – III	4			4	20	20	60

Total Credits = 20

II - Semester :

Sl. No.	Subject Name	L	T	P	Credits	Distribution of Marks out of 100		
						TA	Mid Sem. Exam.	End Sem. Exam
1.	Network Programming & Lamp Stack			6	4	20	20	60
2.	Secure E-Commerce	4			4	20	20	60
3.	Elective – IV	4			4	20	20	60
4.	Elective – V	4			4	20	20	60
5.	Elective – VI	4			4	20	20	60

Total Credits = 20

III – Semester

S. No.	Subject Name	Credits	Eval. (100)
1.	Colloquim	**4**	**Marks**
2.	Thesis/Project	**16**	**Marks**

IV – Semester

S. No.	Subject Name	Credits	Eval. (100)
1.	Thesis/Project	**20**	**Marks**

Note : The distribution of thesis evaluation marks will be as follows :

1. Supervisor(s) evaluation component : 60%
2. Oral Board evaluation component : 40%

List of Electives

M.Tech. (Information Security)

Semester - I

1. Network Security
2. Advanced Data Modeling
3. Advanced Computer Network
4. Multimedia Systems
5. Intellectual Property Rights
6. Cryptography
7. Advance Computer Architecture

Semester – II

1. Advanced Algorithms
2. Forensics & Cyber Crime
3. Cloud Computing
4. Semantic Web
5. Object Oriented Modeling & Design
6. Information Retrieval
7. Advanced Database

Advanced Computer Networks (4L 2P)
Syllabus

Course Description

The area of computer networking is undergoing rapid development; it's important to focus not only on what computer networks are today, but also on *why* and *how* they are designed the way they are. The aim of this course is to provide a sound conceptual foundation to computer networks and its design principles. The focus of the course is on the protocols, algorithms and tools needed to support the development and delivery of advanced network services over networks.

Course Outline (to be covered in 40 lectures)

UNIT-1: Review of Networking Concepts. (10)

MAC layer issues, Ethernet 802.3, ARP, IP addressing and Subnetting, NAT and PAT, Variable Length Subnet Masking, CIDR

UNIT-2: End to End protocols (10)

TCP connection establishment and termination, Sliding window concepts, other issues: wraparound, silly window syndrome, Nagle's algorithm, adaptive retransmission, TCP extensions. Congestion and flow control, Queuing theory, TCP flavors: Tahoe, Reno, New-Reno, TCP-SACK, TCP-RED and TCP-Vegas.Transport protocol for real time (RTP), Quality of service: Integrated Services, Differentiated services

UNIT-3: Routing and Multicast. (10)

Structure of internet: Autonomous systems, Intra-domain routing: OSPF and RIP, Inter-domain routing: BGP. Multicasting: Group Management (IGMP), Internet scale multicasting: Reverse path broadcast, MOSPF, DVMPRP, PIM.

UNIT-4 : Peer to peer and overlay networks. (10)

Concept of overlays, Unstructured Overlays: Gnutella, Concepts of Distributed Hash Table, Structured Overlays: Chord, CAN, Pastry.

Text Books

1. Computer Networks: A Systems Approach, by Peterson and Davie, 5th Ed. Morgan Kauffman, 2011
2. Computer Networking: Top Down Approach, by Kurose and Ross, 6th Ed. Pearson, 2011

Reading List

1. V. Paxson. "End-to-end Internet packet dynamics," in IEEE/ACM Transactions on Networking, Vol 7, No 3, June, 1999.
2. W. Stevens, "TCP Slow Start, Congestion Avoidance, Fast Retransmit, and Fast Recovery Algorithms," RFC2001 .
3. K. Fall and S. Floyd, "Simulation-based comparison of Tahoe, Reno, and SACK TCP," Computer Communication Review, vol. 26, pp. 5--21, July 1996.
4. L. Brakmo and L. Peterson, "TCP Vegas: End-to-End Congestion Avoidance on a Global Internet," IEEE Journal on Selected Areas in Communications, 13(8), October 1995, 1465--1480.
5. Stoica, I., Morris, R., Karger, D., Kaashoek, F., Balakrishnan, H.: Chord: A scalable peer-to-peer lookup service for Internet applications.
6. Rowstron, A., Druschel, P.: Pastry: Scalable, decentralized object location and routing for large-scale peer-to-peer systems.

Advanced Database Systems (4L)

Syllabus

Course Description

Database systems used to provide convenient access to disk-resident data through efficient query processing, indexing structures, concurrency control, and recovery. This traditional view of database systems has recently changed due to the emergence of a wide variety of new applications and technologies that include web applications, sensor networks, location-based services, multimedia, and context-aware systems, and new hardware that include map flash storage, map reduce environments, and sensor devices. Students will understand and master relevant concepts and techniques of current databases and processing based on databases. They will understand the potentials, limitations, and risks inherent in assembling, combining, and processing huge amounts of heterogeneous data in globally interconnected environments. They will be able to design such databases and connectivity and relevant methods for combining and enriching data, and work with concrete examples of such data collection/processing.

Course Outline (to be covered in 40 lectures)

1. Modeling data; Recap: ER Model, UML, semantic networks, logic;
2. XML databases; Object relational databases;
3. Temporal databases; Queries and relational operators; Temporal indexes: persistent B-trees;
4. Spatial databases and spatio-temporal databases; Representing space / spatial entities; Queries and relational operators;
   Recap: Spatial indexes: B+ trees, kd trees, R-trees; Spatial Database Management Systems (SDBMS);
5. Spatio-temporal queries; map reduce /cloud; Data management on cloud;
6. Defining and combining heterogeneous databases, schemas and ontologies;

Text *Books*

1. A reading list of research papers relevant to above topics may be given to students.
2. Database System Concepts, Avi Silberschatz, Hank Korth, and S.Sudarshan. 6th Ed. McGraw Hill, 2010.
3. Principles of Data and Knowledge Base Systems, Volume 1, J.D. Ullman, Computer Science Press.
4. Spatial Database Systems: Design, Implementation and Project Management; edited by Albert K. W. Yeung, George Brent Hall.

Network Security (Elective 4L)

Syllabus

Course Description

The course covers the Security Principles and practices include Information System Security Principles, Information System Security Management, Operating System and Applications Security. The Topic includes Network Security Fundamentals, Security protocols, security devises, Cryptographic algorithms and protocols, Communication security and threats and its assessment, testing and evaluations.

Course Outline (to be covered in 40 lectures)

1. Introduction to Information System Security Management , Key security principles, Risk Management(6)
2. Operating System and Applications Security: Web browser security, E-mail Security, Web security, DNS Security, Linux Security, Windows security (10)
3. Network Security: Network Security Protocol, Wireless security, Network Security architecture (10)
4. Secure Communication: Cryptography protocols and Algorithms. (8)
5. Steganography, digital watermarking (2)
6. Security threats and Response: Intrusion detection system, Intrusion prevention system, Firewall, honey pots and incidence response. (4)

Text Books

1. Eric Cole, "Network Security Bible", John Wiley & Sons, 31-Mar-2011.
2. William Stallings, "Cryptography and Network Security": Principles and Standards", Prentice Hall India, 5th Edition, 2007.
3. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security: Private Communication in a public world", Prentice Hall India, 2nd Edition, 2011.
4.

Multimedia systems (4 L)

Syllabus

Course Description

In this course students will study multimedia technologies, both standard and newly developed. Course coverage will include both theoretical understanding of multimedia technologies, and hands-on experience with applications and hardware. Topics may include perception, cognition, and communication issues, multimedia interface standards, multimedia evaluation, digitizing and manipulating images, voice, and video materials. Courses namely Computer graphics, Operating System and Computer Networks are prerequisites. A lab course is associated with it to strengthen the concepts.

Course Outline (To be covered in 40 lectures)

1. Introduction, Multimedia Information, Multimedia Objects, Convergence of Computer, Communication and Entertainment products, Digital representation (6)
2. Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools (6)
3. Introduction to Text, hypertext & hypermedia, Sound, MIDI, Digital Audio concepts, audio file formats Sampling Variables, Loss less compression of sound, Audio Capture. (6)
4. Introduction to video& images :Multiple monitors, bitmaps, Vector drawing, Image format conversion, image compression, JPEG Compression, image & video file formats, animation, animation file formats. Video representation, Video Compression, color models, MPEG standards, Video Streaming on net, Video on demand. (6)
5. Introduction to multimedia communications. multimedia over I.P, multimedia Over ATM Networks, multimedia Data Base, content based retrieval in Digital libraries, multimedia over wireless networks. Serial port programming and interrupts (6)
6. Latest Research topics (10)

Text Books

1. Fundamental of Multimedia by Li and Drew PHI
2. Principle of Multimedia by Rajan Parekh TMH
3. Multimedia, Making it Work by Tay Vaughan TMH
4. Multimedia communication Fred Hallsal Pearson Education

Cryptography (4L)

Syllabus

Course Description

The course covers the introduction and overview of cryptography, Symmetric key algorithm, Asymmetric key algorithm, Mathematical foundation of cryptography, Message integrity, message authentication and authentication protocols. This course also includes Digital Signature Mechanism and Advanced topics of Cryptography.

Course Outline (to be covered in 40 lectures)

1. Introduction: History and overview of cryptography, Probability and randomized algorithms, Number Theory.
2. Basic symmetric-key encryption: One time pad and stream ciphers, Block ciphers, Attacks on block ciphers. AES, DES and other symmetric algorithms (9)
3. Public key cryptography: Arithmetic modulo primes, Cryptography using arithmetic modulo primes, Arithmetic modulo composites, RSA.
4. Message integrity and authentication protocols: definition and applications, Collision resistant hashing, authenticated encryption: security against active attacks, Digital Signature.
5. Advanced Topics -, ECC, DNA cryptography, quantum cryptography, Digital Watermarking and Steganography etc.

Text Books

1. Introduction to Modern Cryptography by J. Katz and Y. Lindell.
2. Handbook of Applied Cryptography by A. Menezes, P. Van Oorschot, S. Vanstone
3. Cryptography and Network Security: Principles and Practice – William Stallings

Advance Computer Architecture

Syllabus

Course Description

This course enables us to understand the more efficient architectures, and makes us understand the impact of parallelism over simple Von Neumann Architecture. It also gives idea of multi processor, multi core architectures, as well threading in processor and their simulation environments.

Prerequisites: Digital Logic, Computer Architecture and Organization

---

Course Outline (40 lectures)

1. Review of Computer Organization and Architecture, RISC-CISC architecture, Instruction Set Principles and Examples, Memory addressing modes. [10]

2. Advance Pipelining and Instruction level parallelism, Hardware and Software technique for ILP, **Dynamic Instruction Scheduling**. [7]

3. Memory Hierarchy, Cache design issues, Virtual memory addressing, memory protection mechanisms, Multiprocessor memory architecture. [9]

4. Multi Core Architectures: Multi processor systems and interconnection networks, Software and Hardware multithreading, Case studies. [9]

5. Simulators in Computer Architecture, And Latest Research Paper Topics. [5]

Text Books

1. ACM SIGARCH Computer Architecture News.
2. The WWW Computer Architecture page http://www.cs.wisc.edu/arch.
3. Hennessy J. L., D. Patterson, Computer Architecture – *A quantitative Approach*, Morgan Kuffman (5/e), 2011.
4. K. Hwang, *Advanced Computer Architecture: Parallelism, Scalability, programmability*, McGraw Hill 2001.

Advanced Algorithms

Syllabus

Objective

. Students will develop the necessary skills from both a theoretical perspective as well as applying their knowledge on various problem sets. Particularly, the course objectives: Develop mathematical skills for algorithm design, analysis, evaluation and computational cost; Develop the skills to design and implement efficient programming solutions to various problems;

Outline

UNIT 1 Overview of Divide and Conquer, Greedy and Dynamic Programming strategies. Basic search and traversal techniques for graphs, Backtracking, Branch and Bound. Point location Convex hulls and Voronoi diagrams

UNIT II Advanced Algorithms for Graph and Combinatorial Optimization Problems, Shortest path problems: Single source SP problem, SP tree, Ford's labelling method, labelling and scanning method, efficient scanning orders – topological order for acyclic networks, shortest first search for non-negative networks (Dijkstra), BFS search for general networks, correctness and analysis of the algorithms;

UNIT III Flows in Networks: Basic concepts, maxflow-mincut theorem, Ford and Fulkerson augmenting path method, integral flow theorem, maximum capacity augmentation, Edmond-Karp method, Dinic's method and its analysis, String processing: String searching and Pattern matching,

UNIT IV Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing subset-sum problem etc. simple lower bound results.NP-completeness: Informal concepts of deterministic and nondeterministic algorithms, P and NP, NP-completeness, statement of Cook's theorem, some standard NP-complete problems, approximation algorithms.

UNIT V: Latest Research Paper Topics: To be decided by subject coordinator

References:

1- Introduction to Algorithms, third edition

By Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein

2- Algorithms, 4th Edition by Robert Sedgewick and Kevin Wayne

Semantic Web (4L)
Syllabus

Course Description

This course discusses fundamental concepts of information structure, representation, presentation, as well as information exchange on the World Wide Web. It gives students knowledge of how semantics of the Web information as well as its metadata is formed, structured and represented/presented, and how the Web semantics is acquired and organized so that machines can understand information and assist human being to make better use of the Web information. It gives and understanding of languages for semantic web, specification of a conceptualization, and reasoning with ontologies.

Course Outline (to be covered in 40 lectures)

1. Introduction to Semantic Web Vision; Metadata and XML Schema.
2. RDF, RDF Schema.
3. Introduction to description logics, Reasoning with description logics.
4. Ontology; Ontology building methodologies.
5. Ontology Languages for the Semantic Web, From RDFS to OWL, OWL, Reasoning with OWL.

Text *Books*

1. *A First Step towards the Semantic Web* by Wei Song and Min Zhang, Higher Education Press, 2004.
2. *A Semantic Web Primer*, Gregoris Antoniou & Frank Van Harmlen, The MIT Press, second edition.
3. *The Language of First-Order Logic*, Jon Barwise & John Etchemendy, Cambridge University Press, Third edition.
4. *Practical RDF*, Powers S., O'Reilly Associates, Inc. Sebastopol, CA, USA 2003.
5. *Foundations of Semantic Web Technologies,* Pascal Hitzler, Markus Kroetzsch and Sebastian Rudolph, *Chapman & Hall, 2009.*
6. *The Description Logic Handbook: Theory, Implementation and Applications,* Franz Baader, Diego Calvanese, Deborah McGuinness, Daniele Nardi and Peter Patel-Schneider, Cambridge University Press, 2003.
7. *Explorers Guide to the Semantic Web, Thomas Passin,* Manning, 2004.

Information Retrieval (4L)
Syllabus

Course Description

The course focuses on the basic concepts and methods of information retrieval including capturing, representing, storing, organizing, and retrieving unstructured or loosely structured information. Students will learn how effective information search and retrieval is interrelated with the organization and description of information to be retrieved. Learning the process of indexing and retrieving text documents. Information retrieval is a critical aspect of Web search engines. This course will examine the design, implementation, and evaluation of information retrieval systems, such as Web search engines, as well as new and emerging technologies to build the next generation of intelligent and personalized search tools and Web information systems.

Course Outline (to be covered in 40 lectures)

1. Introduction to information retrieval, Information Retrieval Models; Basic Tokenizing, Indexing, and Implementation of Vector-Space Retrieval, Performance metrics.
2. Text Representation Models; Query Operations and Languages.
3. Web Search; Search engines; spidering; metacrawlers; directed spidering; link analysis; Social Networks.
4. Text Categorization; Text Classification; Applications to information filtering and organization.
5. Language-Model Based Retrieval; Using naive Bayes text classification for ad hoc retrieval. Improved smoothing for document retrieval.

Text *Books*

1. *Introduction to Information Retrieval*, Christopher Manning, Prabhakar Raghavan and Hinrich Schutze, Cambridge University Press. 2008.
2. *Search Engines: Information Retrieval in Practice*, W. B. Croft, D. Metzler, and T. Strohman, Pearson Education, 2009.
3. *Modern Information Retrieval*, Ricardo Baeza-Yates and Berthier Ribeiro-Neto, Addison-Wesley Professional; Second edition, 2011.
4. *Mining the Web: Discovering Knowledge from Hypertext Data*, Soumen Chakrabarti, Morgan-Kaufmann Publishers, 2003.
5. *Managing Gigabytes: Compressing and Indexing Documents and Images*, Ian H. Witten, Alistair Moffat, and Timothy C. Bell, Morgan Kaufmann, Second Edition, 2013.

Forensics and Cyber Crime (Elective 4L)

Syllabus

Course Description

The course covers the fundamental concepts of cyber crime and cyber laws to mitigate and prevent those crimes. The topics include Computer forensics, e-mail forensics, evidence collection, preservation and investigation using various forensics tools. This course also contains IT laws and introduction and types of cyber crimes including types of security threats and attacks and its jurisdiction.

Course Outline (to be covered in 40 lectures)

1. Introduction to cyber forensics basics, Types of cyber crime and cyber laws (6)
2. Data and Evidence Recovery, Deleted file recovery, recovery Tools, Forensics Tools (8)
3. Introduction to IT laws and Cyber Crimes, Security Attacks (9)
4. Digital Evidence collection, preservation and investigation (7)
5. Cyber Security, Hardware based security, Software base Security, Incidence response. (6)
6. Methodologies of forensics: Case Studies. (4)

Text Books

1. Amelia Phillips , Bill nelson, Guide to Computer Forensics and Investigations, 2009, Course Technology, Cengage Learning.
2. Eoghan Casey, Digital Evidence and Computer Crime, Third Edition: Forensic Science, Computers, and the Internet, Elsevier, 2011.
3. Chuck Easttom and Jeff Taylor , Computer Crime, Investigation, and the Law ,2010 Technology, Cengage Learning.

Cloud Computing (4L)

Syllabus

Course Description

Shortening of product development lifecycle coupled with alignment of the user needs in a shared manner paved way for cloud computing. It addresses the issues like scalability, large scale data, high performance computing, automation, response time, rapid prototyping, and rapid time to production. This effectively addresses the ever shortening cycle of obsolescence, heterogeneity and rapid changes in requirements.

Course Outline (to be covered in 40 lectures)

Unit1: Introduction to distributed and cluster computing, Basics of the emerging cloud computing paradigm, Cloud Benefits (10)

Unit 2: Virtualization concepts and types, KVM, VM Scheduling (8)

Unit 3: Disaster Recovery, Scaling (6)

Unit 4: Cloud security, Regulatory and compliance issues, VM Security Issues (6)

Unit 5: Latest Research Paper Topics (10)

Text Books

1. Cloud Computing, Michael Miller, Pearson, 2012
2. Cloud Computing: Implementation, Management, and Security, , John Ritting house and James F.Ransome, CRC Press Taylor and Francis Group, 2009
3. www.linux-kvm.org
4. www.redhat.com/rhecm/rest-rhecm/jcr/repository/.../rh:pdfFile.pdf

Intellectual Property Right

Syllabus

Course Description

The scope of this course to be covered includes: Intellectual property right issues, WIPO treaties, copyright act 1957, patent act 1970 and trademark act 1999 and their registration and infringement conditions.

Course Outline (to be covered in 40 lectures)

1. Intellectual Property rights: Introduction to IP, Copyright, Related Rights, Trademarks Geographical Indications, Industrial Design, Patents, WIPO Treaties (8).
2. Copyright Act, 1957: Basic definitions, Registration and Infringement of Copyright, Remedies and Offences governed under the Copyright Act 1957. (8)
3. Patents Act, 1970**:** Basic definitions, inventions that can and cannot be patented in India, grant and infringement, revocation of lapsed patents, miscellaneous rights and duties. (8)
4. Trademarks Act, 1999: Basic definitions (included amended definitions), items that can be registered under Trademarks Act, registration conditions, duration of trademarks, (8).
5. Cases on intellectual property rights.(8)

Recommended Books & References

1. www.wipo.org
2. W. William Rodolph Cornish, , Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights, Sweet and Maxwell.
3. William Rodolph Cornish, Cases and materials on intellectual property, Sweet & Maxwell, 2003 – Law.
4. David I. Bainbridge, Intellectual Property, Pearson Longman, 2006 – Law.

Object-oriented Modeling and Design (4L)
Syllabus

Course Description

The objective of this course is to learn basic OO analysis and design skills through an elaborate case study. To use the UML design diagrams and to apply the appropriate design patterns in application development.

Course Outline (to be covered in 40 lectures)

UNIT I (10)

Introduction to OOAD – What is OOAD? – What is UML? What are the Unified process(UP) phases, Case study – the NextGen POS system, Inception-Use case Modeling, Relating Use cases. Elaboration - Domain Models, Finding conceptual classes and description classes, Associations, Attributes, Domain model refinement – Finding conceptual class hierarchies, Aggregation and Composition, UML activity diagrams and modeling

UNIT II (10)

System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram, Logical architecture refinement, UML class diagrams, UML interaction diagrams

UNIT III (10)

GRASP: Designing objects with responsibilities – Creator, Information expert, Low Coupling, Controller, High Cohesion, Designing for visibility, Applying GoF design patterns – adapter, singleton, factory and observer patterns.

UNIT IV (10)

UML state diagrams and modeling - Operation contracts, Mapping design to code, UML deployment and component diagrams.

Text Book

REFERENCES:

1. Craig Larman,"Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education,
2. Mike O'Docherty, "Object-Oriented Analysis & Design: Understanding System Development with UML 2.0", John Wiley & Sons, 2005.
3. James W- Cooper, Addison-Wesley, "Java Design Patterns – A Tutorial", 2000.
4. Micheal Blaha, James Rambaugh, "Object-Oriented Modeling and Design with UML", Second Edition, Prentice Hall of India Private Limited, 2007
5. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides,"Design patterns: Elements of Reusable object-oriented software", Addison-Wesley, 1995.
6. **Object-Oriented Analysis and Design with Applications** - Grady Booch et al, 3rd Edition, Pearson, 2007.

Advanced Data Modeling (4L)
Syllabus

Course Description

The objective of this course is to learn basic fundamental techniques of using various data models in application development. In particular, the focus will be over various ways of developing computer applications with different kinds of data models.

Course Outline (to be covered in 40 lectures)

UNIT I (10)

What is data modeling, The History of Data Modeling , Data Modeling Fundamentals, Entity Relationship Model, Enhanced Entity Relationship Models, UML, Physical Data Models.

UNIT II (10)

Mathematical Foundation of the Relational Model, Keys and Referential Integrity, Functional dependencies and normalization, Relational Algebra, Relational Mappings.

UNIT III (10)

Object Oriented Databases – Introduction, Weakness of RDBMS, Object Oriented Concepts Storing Objects in Relational Databases, Next Generation Database Systems – Object Oriented Data models, OODBMS Perspect – Issues in OODBMS, Advantages and Disadvantages of OODBMS, Object Oriented Database Design, OODBMS Standards and Systems – Object Management Group, Object Database Standard ODMG, Object Relational DBMS, Comparison of ORDBMS and OODBMS.

UNIT IV (10)

XML Fundamentals, XML Schema and DTD document definitions, XSLT transformations and programming, Parsing XML.

Text Books

1. Ramez Elmasri & Shamkant B.Navathe, "Fundamentals of Database Systems", Sixth Edition , Pearson Education , 2010.
2. Peter Rob and Corlos Coronel, "Database Systems – Design, Implementation and Management", Thompson Learning, Course Technology, 5th Edition, 2003.
3. Graeme Simsion & Graham Witt, "Data Modeling Essentials, Third Edition", Morgan Kaufmann
4. David Hunter, Jeff Rafter, Joe Fawcett, and Eric van der Vlist " Beginning XML Fourth Edition, Wrox Publications.
5. A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts ", Fifth Edition, McGraw-Hill

Topics in Computer Engineering (4 L)

Syllabus

Course Description

The course covers the fundamental concepts and practical aspects of all the courses credited by a student in various branches of M.Tech offered by Computer Science and Engineering Department. The syllabus includes topic from Data Structures, Data Base Management Systems, Algorithms, Operating System and Computer networks. These topics form the foundation of the students.

Course Outline

Unit I: Topics in Data Structures

Unit II: Topics in Data Base Management Systems

Unit III: Topics in Algorithms

Unit IV: Topics in Operating System

Unit V: Topics in Computer networks

Text Books

1. Data structure using C, AM Tanenbaum, Y Langsam & MJ Augustein, PHI Learning Pvt. Ltd., India.
2. Data Structures : A Programming Approach with C, Dharmender Singh Kushwaha & Arun Kumar Misra, PHI Learning Pvt. Ltd., India, 2012
3. Fundamentals of Database Systems, Ramez Elmasri, Shamkant B. Navathe, Addision Wesley.
4. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, McGraw Hill.
5. Advanced Programming in the UNIX® Environment, W. Richard Stevans, Pearson, 2009
6. Operating System Concepts, Avi Silberschatz, Peter Baer Galvin, Greg Gagne, John Wiley & Sons, Inc., 2012

Advance Data Structure and System Programming Lab (6P)
Syllabus

Objectives

To make student learn and polish his/her basics of programming with emphasis on solving real time problems. Focus is to make the student learn object oriented way of solving problems. The lab will cover programming of important data structures. Further it also covers programming using system call interface to write efficient programs.

Outline

UNIT-1: (a) Programming Data Structures using C++: Array, Stack, Queues, Linked Lists, Trees, Graphs, Searching, Sorting, Binary Trees, AVL trees, Red-Black Trees, B-Trees, Hashing, Dynamic programming, Backtracking, Branch and Bound.

(b) Learning the use of STL (Standard Template Library) to write generic programs.

UNIT-2: Programming of Inter Process Communication (IPC) either by Posix or System V: Fork, Pipe, FIFO, Message Queues, Semaphore, Shared Memory

References

1. Fundamentals of Data Structures in C++, by Elis Horowitz, Sartaz Sahni, Dinesh Mehta, Galgotia
2. Data Structures, Algorithms and Applications in C++, by Sartaz Sahni, Mcgraw Hill
3. UNIX Network Programming, Vol.2 (Inter Process Communication), by Richard Stevens, Pearson
4. Resources on WWW for Linux System Programming.

Advance Computer Architecture

Syllabus

Course Description

This course enables us to understand the more efficient architectures, and makes us understand the impact of parallelism over simple Von Neumann Architecture. It also gives idea of multi processor, multi core architectures, as well threading in processor and their simulation environments.

Prerequisites: Digital Logic, Computer Architecture and Organization

---

Course Outline (40 lectures)

1. Review of Computer Organization and Architecture, RISC-CISC architecture, Instruction Set Principles and Examples, Memory addressing modes. [10]

2. Advance Pipelining and Instruction level parallelism, Hardware and Software technique for ILP, **Dynamic Instruction Scheduling**. [7]

3. Memory Hierarchy, Cache design issues, Virtual memory addressing, memory protection mechanisms, Multiprocessor memory architecture. [9]

4. Multi Core Architectures: Multi processor systems and interconnection networks, Software and Hardware multithreading, Case studies. [9]

5. Simulators in Computer Architecture, And Latest Research Paper Topics. [5]

Text Books

1. ACM SIGARCH Computer Architecture News.
2. The WWW Computer Architecture page http://www.cs.wisc.edu/arch.
3. Hennessy J. L., D. Patterson, Computer Architecture – *A quantitative Approach*, Morgan Kuffman (5/e), 2011.
4. K. Hwang, *Advanced Computer Architecture: Parallelism, Scalability, programmability*, McGraw Hill 2001.

Secure E-Commerce (4L)

Syllabus

Course Description

The growth of the Internet continues to have a tremendous influence on business. Companies and organizations of all types and sizes are rethinking their strategies and how they run their operations. The course introduces students to a wide range of electronic commerce issues for marketers, as a foundation for continual learning in the dynamic and secure e-commerce environment.

Course Outline (To be covered in 40 lectures)

1. Introduction to e-Commerce and Network Infrastructure for e-commerce. [6]
2. Basics of User Interface, Web Interface, Transaction Processing, Web 3.0, Game Theory [10]
3. E-commerce Models, e-Advertising & Marketing, Auctions [8]
4. Information Security foundations and E-commerce Security, Electronic Payment Systems, Electronic Data Exchange, Internet Banking, Mobile Commerce [12]
5. Requirement Analysis of E-commerce Initiatives in different domains [4]

Text Books

1. Introduction to E-commerce by Jeffrey F. Rayport & Bernard J. Jaworski
2. Effortless E-commerce with PHP and MYSQL by Larry Ullman
3. E-Commerce- Strategy technologies and Applications by David Whiteley
4. E-Commerce-Concepts, Models & Strategies by C.S.V. Murthy
5. E-Commerce by Laudon

Network Programming and LAMP Stack (6P) Syllabus

Course Description

Network programming module of this lab presents a systematic introduction to the principles and practices of configuring and maintaining computer systems and networks. It offers a top-down approach to investigating the layers and components of network technology and provides an understanding of networked systems.
LAMP stands for Linux, Apache, MySQL, and PHP, which are, respectively, an open source operating system, web server, database, and programming language(s), such as PHP/Perl/Python. The "stack" part means that LAMP is a full service that should cover everything for a personal computer.The course focuses on using all the components of LAMP for application development.

Outline

Module1:
Sockets programming; client/server; peer-to-peer; Internet addressing; TCP sockets; UDP sockets; raw sockets. Finger, DNS, HTTP, and ping clients and servers
Internetwork setup: network topology, wireless internetworking,
Packet Sniffers: Network protocol analyzers, traffic generation.
Introduction to Network Simulation: NS-2, OMNET++
Module 2:
1. HTML/CSS Basics ;
2. PHP ; Introduction, Basics, Data types, Operators, Flow control, Arrays, Array functions, Strings and Regular expressions, Generators, OOP in PHP -- Classes, Objects, Constructors and Destructors, Access Modifiers, Methods, Inheritance, Error and Exceptional Handling , File Handling, PEAR, Security
2. Databases; MySQL ; query, transactions
3. I/O, JSON, XML, SESSIONS; Reading from and Writing to files, parsing XML and JSON data, Creating and Accessing Webservices, Simulating user Login and Logout.
4. Javascript; Syntax Overview, DOM Manipulation, eval, closures, objects, AJAX
5. jQuery; Selectors, DOM Manipulation with jQuery, AJAX with jQuery, Plugins; Other Javascript Frameworks;
6. The ZEND Framework; Other PHP Frameworks;
7. Server Administration, Virtual Host Setup, Eclipse IDE, XAMPP, Linux
8. Web 2.0; Overview of the technologies involved in building today's web applications

Text Books

1. W. R. Stevens, UNIX Network Programming, Prentice Hall
2. Beginning PHP5, Apache, and MySQL Web Development,Elizabeth Naramore, Jason Gerner , Yann Le Scouarnec, Jeremy Stolz, Michael K. Glass, Wrox, 2 edition.
3. PHP for the Web, Larry Ullman, Peachpit Press, Fourth Edition, 2011
4. Programming PHP, Creating Dynamic Web Pages, Kevin Tatroe, Peter MacIntyre, Rasmus Lerdorf, O'Reilly Media, 3rd Edition, 2013