

## CS302

### INFORMATION SECURITY

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1. **Information Security concepts** - Introduction to security, security services, vulnerabilities, malicious code, goals of security- prevention, detection and recovery.
2. **Cryptography** - Types of encryption, classical encryption techniques, IDEA, block ciphers and data encryption standard, advanced encryption standard, confidentiality using symmetric encryption, PKI, RSA, Key management, Diffie-Hellman, Elliptic curve cryptography, certificate authority etc., identification and authentication protocols.
3. **Securing the Systems** - Network security protocols: SSL, IPSEC, Kerberos, X.509, Authentication service, Electronic Mail security S/MIME, Application security: SSL, PGP, SET.
4. **Network perimeter security** - Understanding Network Security Perimeter, Secured router configuration, firewall, design principles, trusted systems, virtual private network, intrusion detection system, vulnerability assessment penetration testing, intrusion prevention system, network address translation.
5. **Computer Forensics and Cyber Laws** - Computer Forensics, data recovery, security policies and procedures, security lifestyle management, security awareness, enforcement, information classification, documentation, security audit, managed security services, cyber laws, legal issues- the law affecting information.

#### TEXT:

- RICK LEHTINEN, G.T. GANGEMI, SR., "Computer Security Basics, Second Edition", O'Reilly Pubs, June 2006
- BRUCE SCHNEIER, "Applied Cryptography, Second Edition", John Wiley and Sons 1994
- CHARLIE KAUFMAN, RADIA PERLMAN, MIKE SPECINER, "Network Security: Private Communication in a Public World", Second edition. Prentice Hall, 2002
- STEPHEN NORTHCUTT, KAREN KENT, LENNY ZELTSER, "Inside Network Perimeter Security", Sams Pubs 2005

## CS304

### OPERATING SYSTEMS

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1. **Basic OS Concepts** - User's view of the OS - Architectural support - Thread and process scheduling - Preemptive and non-preemptive - FCFS, SJF, Round Robin, Multilevel Queue.
2. **Synchronization** - Peterson's solution - Bakery algorithm - Hardware-based solutions - Semaphores - Critical regions - Problems of synchronization - Deadlock prevention and recovery - Banker's algorithms.
3. **Memory Management** - Segmentation, Paging and Virtual memory - Case study of x86 32-bit memory management unit - FCFS, FRU - Belady's anomaly - Stack-based algorithms - Thrashing - Working set.
4. **Design of the Unix File System** - Buffer caches - File system organization - Inodes - Super blocks - File access algorithms - File tables - Inode tables - Network file systems.

5. **I/O Organization** - Block and character device drivers - Unix system file protection mechanism - Access and capability lists - Authentication - Spoofing - Case study of a virus on UNIX.

#### TEXT:

- A.SILBERCHATZ, P.B.GALVIN, "Operating System Concepts", Addison Wesley, VI Edition, 2005
- W.STALLINGS, "Operating Systems", Prentice Hall, V Edition, 2005

## CS306

### DATABASE MANAGEMENT SYSTEMS

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1. **Databases** - Need - Concepts - Architecture - Data independence - Data modeling: Entity-relationship model - Weak entity sets - Mapping ER model to Relational model.
2. **Concepts** - Integrity constraints - Relational algebra - Relational calculus - Tuple relational calculus - Domain relational calculus - Overview of QBE.
3. **SQL Queries** - Nested queries - Aggregate operators - Null values - Embedded SQL - Database security - Views - Queries on views.
4. **Schema Refinement** - Functional dependencies - Normalization - Decomposition - Armstrong's axioms - 3NF, BCNF, 4NF - Multi-valued dependencies.
5. **Object-oriented data model** - Object identity and pointers - Object definition and manipulation language - Object-oriented databases - Object relational databases - Recent trends.

#### TEXT:

- A.SILBERCHATZ, F.KORTH, S.SUDARSHAN, "Database System Concepts", IV Edition, McGraw Hill, 2002
- R.ELMASRI, S.B.NAVATHE, "Fundamentals of Database Systems", III Edition, Pearson Education, 2000

## CS310

### ADVANCED MICROPROCESSOR SYSTEMS

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1. **80286 Architecture** - Instruction set - Addressing modes - Real mode - Protected mode - 80386 Architecture - Address segmentation - Paging - Segment registers.
2. **Basic 486 Architecture** - 486 memory system and memory management - Features of Pentium memory and I/O systems - Pentium memory management - Introduction to Pentium Pro features.
3. **Introduction to PCs** - Study of PC system layout - SCSI, CD-ROM & multimedia - Development of PC - PC components - Features and system design - Motherboards - Buses - BIOS.

4. **IDE Interface** - Magnetic storage principles - Hard disk storage - Floppy disk storage - Optical Storage - Physical drive installation and configuration - Video hardware - Audio hardware.
5. Input devices - Power supply chassis - Building/upgrading systems - PC diagnostics - Testing and maintenance.

## TEXT:

- D.V.HALL, "Microprocessor and Interfacing Programming and Hardware", Mc Graw Hill, II Edition, 1999
- B.B.BREY, "The Intel Microprocessors 8086/8088, 80186/ 80188, 80286, 80386, 80486 and Pentium and Pentium Pro Processor", Prentice Hall of India, V Edition, 2006

## CS312

### OPERATING SYSTEMS LABORATORY

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- Designing a command shell in Java
- Synchronization of processes
- Study of scheduling algorithms
- Implementation of a file system
- Advanced file system implementation

## CS314

### DATABASE LABORATORY

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Exercises to be based on Sybase / Oracle / Postgres / VB / Power Builder / DB2 / MS-Access.

- Applications involving vendor development systems, stores management system, finance management etc.
- Creation and querying of database tables
- Design of tables by normalization and dependency analysis
- Writing application software with host language interface

## CS308

### ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

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1. **Search Strategies** - Hill climbing - Backtracking - Graph search - Properties of A\* algorithm - Monotone restriction - Specialized production systems - AO\* algorithm.
2. **Searching game trees** - Minimax procedure - Alpha-beta pruning - Introduction to predicate calculus.
3. **Knowledge Representation** - Reasoning - STRIPS - Structured representation of knowledge - Dealing with uncertainty.

4. **Introduction to Expert Systems** - Inference - Forward chaining - Backward chaining - Languages and tools - Explanation facilities - Knowledge acquisition.
5. **Natural Language Processing** - Introduction - Understanding - Perception - Machine learning.