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<th>Year</th>
<th>Frist Semester</th>
<th>Second Semester</th>
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<td>Sub Code</td>
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<td>I</td>
<td>MAT 5108</td>
<td>Computational Methods and Stochastic Processes</td>
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<td>CSE 5101</td>
<td>Advanced Data Structures and Algorithms</td>
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<td>CSE 5102</td>
<td>Advanced Data Base Systems</td>
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<td>CSE 5103</td>
<td>Advanced Computer Networks</td>
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<td>CSE 5121</td>
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<td>HUM 5101</td>
<td>Research Methodology and Technical Presentation</td>
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<td>CSE 5112</td>
<td>Information Systems Lab I</td>
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| II   | Sub Code      | Subject Name     | L | T | P | C | Sub Code      | Subject Name     | L | T | P | C |
|      | CSE 6099      | Project Work     |    |   |   |   |                |                  |    |   |   |   |
|      | Total         |                  |    |   |   |   |                |                  |    |   |   |   |

**Third and Fourth Semesters**

Programme Electives

1. CSE 5233 Big Data Analytics
2. CSE 5234 Cloud Computing
3. CSE 5236 Data Mining & Applications
4. CSE 5241 Secure E-Commerce
5. CSE 5244 Web Services
6. CSE 5245 Agent Systems and Security
7. CSE 5246 Biometric Security
8. CSE 5247 Cyber Security Standards and Best Practices
9. CSE 5248 Database and Application Security
10. CSE 5249 Information Security Management
11. CSE 5250 Intrusion Detection Systems
12. CSE 5251 Legal issues in Information Security
13. CSE 5252 Mobile and Wireless Security
14. CSE 5253 Object Oriented System Design
15. CSE 5254 PKI and Trust Management

Open Electives

1. CSE 5281 Information Storage and Management
2. CSE 5282 Multicore program optimization
MAT 5108 COMPUTATIONAL METHODS AND STOCHASTIC PROCESSES [3 1 0 4]


References:

6. Narasingh Deo “Graph Theory with Applications to Engg. and Computer Science”, PHI Learning Pvt.Ltd.

CSE 5101 ADVANCED DATA STRUCTURES AND ALGORITHMS [3 0 2 4]

References:


CSE 5102 ADVANCED DATA BASE SYSTEMS [3 0 2 4]


References:


CSE 5103 ADVANCED COMPUTER NETWORKS [3 0 2 4]


References:

CSE 5121 NUMBER THEORY & CRYPTOGRAPHY [3 0 2 4]

References:


CSE- 5112 INFORMATION SYSTEMS LAB I

Experiments/mini project based on the syllabus specified in first semester.

CSE 5221 DESIGN OF SECURE PROTOCOLS [3 0 2 4]


References:

CSE 5222 NETWORK SECURITY [4 0 0 4]

Classification of In-Memory Strategies, Basic Self-Protection Strategies, and Classification According to Payload, Antivirus Defense Techniques, Firewalls, Types of Firewall security Policy, Firewall Types, Intrusion Detection and Prevention; Intrusion Detection, Intrusion Detection System(IDS), Types of Intrusion Detection Systems, Intrusion Prevention systems, IPsec, IKE phases, Phase 1 IKE, Phase 2/Quick Mode, Traffic selectors, IKE Phase 1 protocols, Phase-2 IKE: Setting up IPsec’s SAs, ISAKMP/IKE Encoding, VPN, SSL/TLS protocol, Exportability, Encoding, PGP, S/MIME, HTTPS, SET, Security in Link Layer and over LANs. Kerberos V4, and Kerberos V5

References:
2. Peter Szor, “The art of Computer Virus Research and Defense”, (1e), Addison Wesley Professional, 2005

CSE-5212 INFORMATION SYSTEMS LAB-II

Experiments/mini project based on the syllabus specified in second semester

CSE-5299 TECHNICAL SEMINAR

Each student has to present a seminar individually, on any technical topic related to the subject, but not covered in the syllabus. The time duration for presentation is 45 minutes and 15 minutes is devoted for question and answer session. Slides have to be prepared for the presentation. A seminar report has to be submitted one week before the day of the presentation.

III/IV SEMESTER

CSE-6099 PROJECT WORK

The duration of this major project is one year. Students are required to undertake innovative and research oriented projects, which not only reflect their knowledge gained in the previous two semesters but also reflects additional knowledge gained from their own effort. They must show the phase wise development of their project submitting the appropriate documents at the end of each phase.
PROGRAM ELECTIVES

CSE 5233: BIG DATA ANALYTICS   [4 0 0 4]


References:
CSE 5234 CLOUD COMPUTING  [4 0 0 4]


References::

CSE 5236 DATA MINING AND APPLICATIONS  [4 0 0 4]


References:
1. Jiawei Han, Micheline Kamber,Jian Pei , “ Data mining concepts and Techniques”, (3e), Elsevier, 2011
4. Jiawei Han, Micheline Kamber, Jian Pei, “Data mining concepts and Techniques”, (2e), Elsevier, 2006

CSE 5241 SECURE E-COMMERCE [4 0 0 4]


References:

CSE 5244 WEB SERVICES [4 0 0 4]


References:

2. Leonard Richardson, Mike Amundsen and Sam Ruby, “RESTful Web APIs”, (1e), O'Reilly, 2013
5. Ethan Cerami, "Web Services Essentials, (1e), O'Reilly, 2002

CSE 5245 AGENT SYSTEMS AND SECURITY  [4 0 0 4]


References:


CSE 5246 BIOMETRIC SECURITY [4 0 0 4]


References:

CSE 5247 CYBER SECURITY STANDARDS AND BEST PRACTICES [4 0 0 4]

Security problem in computing: definition of secure, Attacks, the meaning of computer security, computer criminals, methods of defense. Administering security: Security planning, Risk analysis, Organizational security policies, Physical security The economics of cyber security: Making a business case, Quantifying security, Modeling cyber security, current research and future directions Privacy in computing: privacy concepts, privacy principles and policies, authentication and privacy, data mining, privacy on the web, e-mail security, impacts on emerging technologies. Legal and ethical issues in computer security: protecting programs and data, information and the law, rights of employees and employers, Redress for software failures, computer crime, Ethical issues in computer security, Case studies of ethics Cyber Security, Hacker Exploits, incident handling Basics, Focus Group, General Drivers of BPs, Cyber security

References:


CSE 5248 DATABASE AND APPLICATION SECURITY [4 0 0 4]

Introduction to Security, Information Systems, Database management systems, security and Architecture, database security, E-Mail security, Asset types and their value, Security methods, Operating systems overview, security environment, components, Authentication methods, user administration, password policies, Vulnerabilities of operating systems, Defining and using profiles, Designing and implementing password policies, Granting and revoking user privileges, creating, Assigning and revoking user roles. User authentication, operating system authentication, creating/removing/modifyinng users, default/remote users, Database links, Linked servers, remote servers, know where passwords are maintained, Obfuscate application code, Secure the database from SQL injection attacks, Work toward alignment between the application user model and the database user mode, Types of users, security models, application types, application security models and Data encryption, implementing VPD ,VPD policies and application, Database Auditing Model, Application Data Auditing, DML auction auditing architecture. Triggers, fine grained auditing, Secure database links and watch for link-based elevated privilege, Protect link usernames and passwords, Monitor usage of database links, Map and secure all data sources and sinks, Auditing Database Activities, project cases, case study for developing an online database, taking care of payroll, tracking database changes and developing a secured authentication repository

References:

5. Clark, Holloway, List, “The security Audit and control of Databases”, UK: Ashgate
CSE 5249 INFORMATION SECURITY MANAGEMENT


References:


CSE 5250 INTRUSION DETECTION SYSTEMS


References:


CSE 5251 LEGAL ISSUES IN INFORMATION SECURITY [4 0 0 4]


References:

CSE 5252 MOBILE AND WIRELESS SECURITY [4 0 0 4]

Introduction to Security and Privacy for Mobile and Wireless Networks, Pervasive Systems, Mobile system architectures and Security & Attacks, Wireless security, Scanning and Enumerating 802.11 Networks, Attacking 802.11 Networks, Attacking WPA protected

References:


CSE 5253 OBJECT ORIENTED SYSTEM DESIGN  [3 0 2 4]


References:

CSE 5254  PUBLIC KEY INFRASTRUCTURE (PKI) AND TRUST MANAGEMENT


References:

2. Suranjan Choudhary “Public Key Infrastructure Implementation and design” M&T books, 2002
3. David F. Ferraiolo “Role-Based Access Control”, (2e), Artech house, 2006
4. Request For Comments- RFC2510, RFC 2559, RFC 3280, RFC 3379, RFC 3647, RFC 4158, RFC 4476 etc
CSE 5281 INFORMATION STORAGE AND MANAGEMENT  [3 0 0 3]


References:


CSE 5282 MULTICORE PROGRAM OPTIMIZATION  [3 0 0 3]

Introduction to parallel computers; Instruction Level Parallelism (ILP); Data parallelism; Multiprocessors and thread level parallelism; Shared Memory Multiprocessors; Cache coherence problems; Snoopy protocols; Memory consistency models; Hyper threading technology architecture; multi-core architecture; Multi-threading on single core versus multi-core platforms; Amdahl’s law; Power consumption; Introduction to Basic optimization; Hot Spot, Faster Algorithms, Data Dependency, Branching, Memory, Loops, Slow Operations; Introduction to
Performance Tools (Intel Software Tools); Introduction to Multi-core Optimization; ILP vs TLP, Data vs Task Parallelism, Threading and Parallel programming constructs, Threading APIs, Multi Threading with OpenMP, Threading Goals and Issues; Multithreaded and Parallel Applications Case studies; Some applications in Integer Programming, Digital Signal Processing(Video Codec)

**References:**