

University of Mysore
Center for Information Science and Technology
Syllabus copy of Cyber Security 2017-2018
FCBCS

Scheme of Study and Examinations:

I SEMESTER M.Sc. - Cyber Security								
Subject Code	Subjects	Theory Hours/Week	Practical/Tutorial Hrs/Week	Duration of exams (Hrs)	Marks & Credits			
					IA C1,C2,C3	Exam	Total	Credits
HARD CORE								
MSCS-101	Foundations of Information Systems and Technology	4L	-	3	60	40	100	4
MSCS-102	Algorithmics	4L	-	3	60	40	100	4
MSCS-103	Advanced Operating System	4L	-	3	60	40	100	4
MSCS-104	Data Communications and Computer Networks	4L	-	3	60	40	100	4
SOFT CORE								
MSCS-105	Java Technology/ OO Design and Analysis	4L	-	3	60	40	100	4
MSCS-106	Algorithmics/ Problem Solving Lab	-	4P+2T=6	3	60	40	100	3
MSCS-107	Java/OOP Lab	-	4P+2T=6	3	60	40	100	3
	Total	20	8P+4T=12	21	210	490	700	26

L: Lectures, P: Practical, T: Tutorials

II SEMESTER M.Sc. M.Sc.-Cyber Security								
Subject Code	Subjects	Theory Hours/Week	Practical/Tutorial Hrs/Week	Duration of Exam (Hours)	Marks & Credits			
					IA C1,C2,C3	Exam	Total	Credits
HARD CORE								
MSCS-201	Software Engineering	4L	-	3	60	40	100	4
MSCS-202	Computer Graphics and Multimedia	4L	-	3	60	40	100	4
MSCS-203	Advanced Database Management Systems	4L	-	3	60	40	100	4
SOFT CORE								
MSCS-204	Object Oriented Programming in C ++ & JAVA	4L	-	3	60	40	100	4
MSCS-205	Operating System/ Advanced Architecture/ System Software Lab	-	4P+2T=6	3	60	40	100	3
MSCS-206	DBMS/Computer Graphics / Principles of	-	4P+2T=6	3	60	40	100	3

	Programming Languages Lab							
OPEN ELECTIVE								
MSCS-207	OPEN Elective-I (E1-E3)							
MSCS-207 OE-1	MSCS-207-OE-1-INTERNET TECHNOLOGIES	3L	--	3	60	40	100	3*
MSCS-207 OE-2	MSCS-207-OE-2-COMPUTER NETWORKS	3L	--	3	60	40	100	3*
MSCS-207-OE-3	MSCS-207-OE-3-Object Oriented Programming in C ++ & JAVA	3L	--	3	60	40	100	3*
	Total Semester	19	8P+4T=12	21	210	490	700	22+3*

* Not included for CGPA.

MSCS-207-	:	OPEN ELECTIVES
OE-1	:	Internet Technologies
OE-2	:	Computer Networks
OE-3	:	Overview of Programming Languages

SYLLABUS:

MSCS-101- FOUNDATIONS OF INFORMATION SYSTEMS AND TECHNOLOGY

UNIT-I: Information Technology – 1:

Computer Hardware-Computer System Concept-Computer Peripherals-Input-Output and Storage Technologies-Case Studies.

UNIT-II: Information Technology-2: Computer Software-System Software-Operating Systems-Network Management Systems-Database Management Systems Programming Language-Programming Packages-Case Studies.

UNIT-III: Importance of Information Systems-A Global Information Society Fundamental Roles of Information Systems-Business Process Reengineering Case Studies.

UNIT-IV: Fundamentals of Information Systems: System Concepts-Components of an Information Systems-Information Systems Resources and Activities Recognizing Information Systems-Case Studies. Overview of Information Systems: A Expanding Roles of Information Systems-Corporations Support Systems-Transactions Processing-Process control and Enterprise Collaboration System-Management Support System-DSS and EIS-Expert Systems-Knowledge Management System-Strategic Information Systems.

References:

1. Management Information Systems by James O’Brean (Galgotia)
2. Laudon, Kenneth C., and Jane P. Laudon. 2007. Management Information Systems: Managing the Digital Firm, 10th Edition, Upper Saddle River, New Jersey: Prentice-Hall, Incorporated. ISBN: 0132337746
3. Information Technology for Management by Henry Lucas (McGraw Hill)
4. Corporate Information Systems Management by Applegate, Mcfarlan&Makenny (McGraw Hill)
5. E-Commerce by C.S.V. Murthy (Himalaya Publishing House)
6. Carol V. Brown, Daniel W. DeHayes, Jeffrey A. Hoffer, Martin, E. Wainright, and William C. Perkins. 2008. Managing Information Technology, 6th edition. Upper Saddle River, New Jersey: Prentice-Hall, Incorporated.
7. Turban, Efraim, Ephraim McLean, and James Wetherbe. 2007. Information Technology for Management: Transforming Organizations in the Digital Economy. New York, New York: John Wiley & Sons.

MSCS-102- Algorithmics

Hard Core: ALGORITHMICS

UNIT-I

Introduction: Algorithms, performance analysis-time complexity and space complexity, O-notation, Omega notation and Theta notation, Review of basic data structures , priority queues-heaps, definition, insertion and deletion, application-heap sort, Introduction to Skip List, skip list representation, operations- insertion, deletion and searching , Hashing, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing and comparison of hashing and skip lists.

UNIT-II

Search Trees: Binary Search Trees, definition, ADT, implementation, operations- searching, insertion and deletion, Balanced search trees- AVL trees, definition, height of an AVL tree, representation, operations-insertion, deletion and searching. Introduction to Red – Black trees and Splay Trees, B-Trees, insertion, deletion and searching, Comparison of Search Trees.

UNIT-III

Divide and Conquer: General Method – Binary Search – Finding Maximum and Minimum– Merge Sort, Greedy method: General method, Minimum cost spanning trees, Job sequencing with deadlines, Backtracking: General Method – 8 Queens problem – sum of subsets – graph coloring – Hamiltonian problem – knapsack problem.

UNIT-IV

Dynamic Programming: General method, Optimal binary search trees, 0/1 knapsack problem, Travelling sales person problem. Graphs: Graph Traversals – Connected Components – Spanning Trees – Bi-connected components – Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problem – Introduction to NP-Hard and NP-Completeness.

REFERENCE BOOKS:

1. Mark A. Weiss, “Data structures and Algorithm analysis in C++(Java)”, Fourth Edition, PHI ,2013
2. Michael T.Goodrich, R.Tamassia and D.Mount “Data structures and Algorithms in C++”, Wiley student edition, John Wiley and Sons.
3. Data Structures and Algorithms in C++, Second Edition, Adam Drozdek, Vikas Publishing House, Thomson International Student Edition.
4. Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran, “Computer Algorithms/C++”, Second Edition, Universities Press, 2007.

MSCS-103- Advanced Operating System

UNIT I

FUNDAMENTALS OF OPERATING SYSTEMS

Overview – Synchronization Mechanisms – Processes and Threads - Process Scheduling – Deadlocks: Detection, Prevention and Recovery–Models of Resources–Memory Management Techniques.

UNIT II

DISTRIBUTED OPERATING SYSTEMS

Issues in Distributed Operating System – Architecture – Communication Primitives – Lamport’s Logical clocks – Causal Ordering of Messages – Distributed Mutual Exclusion Algorithms – Centralized and Distributed Deadlock Detection Algorithms – Agreement Protocols. Distributed File Systems – Design Issues - Distributed Shared Memory – Algorithms for Implementing Distributed Shared memory–Issues in Load Distributing – Scheduling Algorithms – Synchronous and Asynchronous Check Pointing and Recovery – Fault Tolerance – Two-Phase Commit Protocol – Nonblocking Commit Protocol – Security and Protection.

UNIT III REAL TIME AND MOBILE OPERATING SYSTEMS

Basic Model of Real Time Systems - Characteristics- Applications of Real Time Systems – Real Time Task Scheduling - Handling Resource Sharing - Mobile Operating Systems – Micro Kernel Design - Client Server Resource Access – Processes and Threads - Memory Management - File system.

UNIT IV

CASE STUDIES

Linux System: Design Principles - Kernel Modules - Process Management Scheduling
-
Memory Management - Input-Output Management - File System - Interprocess Communication. IOS and Android: Architecture and SDK Framework - Media Layer
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Services Layer - Core OS Layer - File System.

OUTCOMES:

Upon Completion of the course, the students should be able to:

- Discuss the various synchronization, scheduling and memory management issues
- Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
- Discuss the various resource management techniques for distributed systems
- Identify the different features of real time and mobile operating systems
- Install and use available open source kernel
- Modify existing open source kernels in terms of functionality or features used

REFERENCES:

1. MukeshSinghal and Niranjana G. Shivaratri, “Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems”, Tata McGraw-Hill, 2001.
2. Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, “Operating System Concepts”, Seventh Edition, John Wiley & Sons, 2004.
3. Daniel P Bovet and Marco Cesati, “Understanding the Linux kernel”, 3rd edition, O’Reilly, 2005.
4. Rajib Mall, “Real-Time Systems: Theory and Practice”, Pearson Education India, 2006.
5. Neil Smyth, “iPhone iOS 4 Development Essentials – Xcode”, Fourth Edition, Payload media, 2011.

MSCS-104- Data Communications and Computer Networks

UNIT-I

Introduction : Data communications fundamentals, computer communications architecture, Data Communication tasks, Data Communication Systems Applications , Data Communication System Characteristics features, Data Communication network criteria, Protocols and standards, Transmission mode, Analog and Digital Signals,. Bit rate, Baud rate, Channel capacity using

Nyquist and Shannon's relation. Modulation, encoding and decoding techniques. Transmission media characteristics, Transmission impairments, multiplexing.

UNIT-II

Introduction to Computer Networks, Application and goals, Classification of Computer Networks, ISO-OSI Architecture, Services of Physical, Data link, Network, Transport, Session, Presentation and Application Layers., TCP /IP reference Model, Topology. Physical and Data Link Layer Services, Network Layer Services: Networking and Internetworking Technology. Devices, Repeaters, Bridges, Routers, Gateways and Other Devices.

UNIT-III

TCP/IP Protocol Suit: Overview of TCP/IP, TCP/IP and the Internet, TCP/IP and OSI, Internet Protocol (IP), Classes of IP, Addressing, Protocols in the Network Layer, Address Resolution Protocol (ARP), Reverse Address Resolution Protocol (RARP), Internet Control MESSAGE Protocol (ICMP), Internet Group Message Protocol (IGMP), Transport Layer Services, Functionalities of the Transport Layer.

UNIT-IV

Upper OSI Layers: Session Layer Services, SPDU. Presentation Layer Services: Application layer Services, PPDU. Application Layer Services: Client / Server Model,, BOOTP, Dynamic Host Configuration Protocol(DHCP), Domain Name System (DNS), Telnet, File transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP), Simple Mail Transfer Protocol (SMTP), Post Office Protocol (POP), Simple Network Management Protocol (SNMP), Hyper Text Transfer Protocol (HTTP) , World Wide Web (WWW).

REFERENCE BOOKS:

1. Prakash C. Gupta, Data Communications and Computer Networks, PHI (Latest Edition), 2013.
2. Behrouz A Forouzan, Data Communications and Networking, McGraw Hill, (Fourth Edition), 2007.
3. Behrouz A Forouzan and Firouz, Computer Networks A Top - Down Approach, McGraw Hill, (Special Indian Edition), 2012.
4. Tananbaum A.S., "Computer Networks", 3rd Ed, PHI, 1999.
5. Black U., "Computer Networks-Protocols, Standards and Interfaces", PHI, 1996.
6. Stallings W., "Computer Communication Networks", PHI.
7. Stallings W., "SNMP, SNMPv2, SNMPv3, RMON 1&2", 3rd Ed., Addison Wesley, 1999.
8. Michael A. Miller, "Data & Network Communications", Vikas Publication, 2008

9. William A. Shay, "Understanding Data Communications & Networks", Vikas Publication, 2008.

MSCS-105- Java Technology/ OO Design and Analysis

UNIT I:

Introduction to Java and Java programming Environment: Object Oriented Programming, Fundamental Programming Structure: Data Types, variable, Typecasting Arrays, Operators and their precedence. Control Flow, Java's Selection statements, (if, switch, iteration, statement, while, do while, for, nested loop). Concept of Objects and Classes, Using Existing Classes building your own classes, constructor overloading, static, final, this keyword.

UNIT II:

Inheritance, Packages & Interfaces: Using Super to Call Super class constructor, Method overriding, dynamic method Dispatch, Using Abstract Classes, Using final with inheritance. The Object Class, Packages, Access Protection, Importing package, Interface, Implementing Interfaces, variables in Interfaces, Interfaces can be extended.

UNIT III:

Exception Handling, Multi Threading, & String Handling: Fundamentals, Types Checked, Unchecked exceptions, Using try & catch, Multiple catch, throw, throws, finally, Java's Built in exceptions, user defined exception. Multi Threading, Java Thread Model, Thread Priorities, Synchronization, Creating a thread, Creating Multiple threads, Using join(), wait() & notify(). String handling, String constructors, String length, Character Extraction, String Comparison, Modifying a string, Java I/O.

UNIT IV:

Applets, AWT: Basics, Architecture, Skeleton, The HTML APPLET Tag, Passing Parameters to Applets, Applet context and show documents(). AWT: AWT Classes window fundamentals, component, container, panel, Window, Frame, Canvas, Creating a frame window in an Applet, working with Graphics, Control Fundamentals, Layout managers, Handling Events by Extending AWT components.

Textbooks:

1. Y. Daniel Liang, Introduction to Java Programming Comprehensive Version, Prentice Hall, 7th Edition, 2009.
2. Herbert Schildt, Java: The Complete Reference, TMH, 5th Edition. Reference Books: 1. E. Balguruswamy, Programming with JAVA, TMH, 4th Edition
3. Cay S. Horstmann, Big Java: Early Objects, 5th Edition, International Student Version.
4. Wigglesworth Joe, Java Programming: Advanced Topics, Cengage Learning.
5. H.M. Deitel & Paul J. Deitel, Java How to Program, PHI, 8th Edition

MSCS-106- Algorithmics/ Problem Solving Lab

MSCS-107- Java/OOP Lab

SECOND SEMESTER

MSCS-201-SOFTWARE ENGINEERING

UNIT I

Overview of System Analysis & Design , Business System Concept, System Development Life Cycle, Waterfall Model , Spiral Model, Feasibility Analysis, Technical Feasibility, Cost-Benefit Analysis, COCOMO model.

Unit II

System Requirement Specification – DFD, Data Dictionary, ER diagram, Process Organization & Interactions. System Design – Problem Partitioning, Top-Down And Bottom-Up design; Decision tree, decision table and structured English; Functional vs. Object- Oriented approach.

Unit III

Coding & Documentation - Structured Programming, OO Programming, Information Hiding, Reuse, System Documentation. Testing – Levels of Testing, Integration Testing, Test case Specification, Reliability Assessment. , Validation & Verification Metrics, Monitoring & Control.

Unit IV

Software Project Management – Project Scheduling, Staffing, Software Configuration Management, Quality Assurance, Project Monitoring. CASE TOOLS: Concepts, use and application.

Books:

Text books:

1. R. G. Pressman – Software Engineering, TMH
2. Behforooz, Software Engineering Fundamentals, OUP
3. Ghezzi, Software Engineering, PHI
4. Pankaj Jalote – An Integrated Approach to Software Engineering, NAROSA.
5. Object Oriented & Classical Software Engineering(Fifth Edition), SCHACH, TMH
6. Vans Vlet, Software Engineering, SPD
7. Uma, Essentials of Software Engineering, Jaico
8. Sommerville, Ian – Software Engineering, Pearson Education
9. Benmenachen, Software Quality, Vikas

Reference: 1. IEEE Standards on Software Engineering. 2. Kane, Software Defect Prevention, SPD

MSCS-202- COMPUTER GRAPHICS AND MULTIMEDIA

UNIT I

Introduction to computer graphics & graphics systems

Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters,

printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software. Scan conversion: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

UNIT II

2D transformation & viewing Basic transformations: translation , rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines , parallel lines, intersecting lines. Viewing pipeline, Window to viewport co-ordinate transformation , clipping operations , point clipping , line clipping, clipping circles , polygons & ellipse.

3D transformation & viewing

3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, viewport clipping, 3D viewing.

UNIT III

Curves

Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves. Hidden surfaces Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal - geometry. Color & shading models Light & color model; interpolative shading model; Texture;

UNIT IV

Multimedia

Introduction to Multimedia: Concepts, uses of multimedia, hypertext and hypermedia. Image, video and audio standards. Audio: digital audio, MIDI, processing sound, sampling, compression. Video: MPEG compression standards, compression through spatial and temporal redundancy, inter-frame and intraframecompression. Animation: types, techniques, key frame animation, utility, morphing. Virtual Reality concepts.

Text Books:

1. Hearn, Baker – “ Computer Graphics (C version 2nd Ed.)” – Pearson education
2. Z. Xiang, R. Plastock – “ Schaum's outlines Computer Graphics (2nd Ed.)” – TMH
3. D. F. Rogers, J. A. Adams – “ Mathematical Elements for Computer Graphics (2nd Ed.)” – TMH
4. Mukherjee, Fundamentals of Computer graphics & Multimedia, PHI
5. Sanhker, Multimedia –A Practical Approach, Jaico
6. Buford J. K. – “Multimedia Systems” – Pearson Education
7. Andleigh&Thakrar, Multimedia, PHI
8. Mukherjee Arup, Introduction to Computer Graphics, Vikas
9. Hill, Computer Graphics using open GL, Pearson Education

Reference Books:

1. Foley, Vandam, Feiner, Hughes – “Computer Graphics principles (2nd Ed.) – Pearson Education.
2. W. M. Newman, R. F. Sproull – “Principles of Interactive computer Graphics” – TMH.
3. Elsom Cook – “Principles of Interactive Multimedia” – McGraw Hill

MSCS-203- ADVANCED DATABASE MANAGEMENT SYSTEMS

Unit I

Models and Query Languages, Relational Model - DRC and TRC, Historical Models
Network Model, Hierarchical Model

Unit II Cloud, Pig Latin, Logic/Deductive, Datalog, OODBMS, OQL, XML and semi
structured, XPath, XQuery, Concurrency Control, ACID, Serializability, Two-phase locking
Unit III Recovery, Systemlog, Undoing and redoing, Security, Roles, Properties

Unit IV odds and ends, Temporal and spatial databases, Datawarehousing, Datamining,
Distributed databases

Text

Elmasri and Navathe, *Fundamentals of Database Systems*, 6th Edition, Addison Wesley

MSCS-204 -Object Oriented Programming in C ++ & JAVA

Unit-I:

Introduction, need of object oriented Programming characteristics of object-oriented
languages C and C++. Data abstraction and encapsulation, Inheritance, Polymorphism,
Dynamic binding, Message communication; Benefits of OOP; Applications of OOP, Output
using cout, Directives, Input with cin, Type bool. Type conversions, Writing a Program in
C++: Declaration of variables, Statement Simple Programs, Features of I/O stream. Keyboard
and screen, Manipulator Functions, Predefined manipulators, Input and Output (I/O) Stream
Flags.

Unit-II:

Returning values from functions, Reference arguments, Overloaded function. Inline function,
Default arguments, returning by reference. core object concepts (Encapsulation, Abstraction,
Polymorphism, Classes, Messages Association, Interfaces) Implementation of class in C++,
C++ Objects as physical object, C++ object as data types constructor. Object as function
arguments. The default copy constructor, returning object from function, Structures and
classes, Classes objects and memory static class data.

Unit-III:

Overloading unary operations, Overloading binary operators, data conversion, pitfalls of
operators, overloading and conversion keywords. Explicit and Mutable, Concept of
inheritance. Derived class and based class. Derived class constructors, member function,
Virtual Function, friend function, Static function, Assignment and copy initialization, this
pointer, dynamic type information. Function templates, Class templates Exceptions. JAVA
EVOLUTION:- Java History; Java Features, The Java Virtual Machine, Variables and data
types, Conditional and looping constructs, Arrays, operators and expression.

Unit-IV:

Fields and Methods, Constructors, Overloading methods, Garbage collection, Nested classes, Overriding methods, Polymorphism, Making methods and classes final, Abstract classes and methods, Interfaces, The Object class: Cloning objects, The JDK Linked List class, Strings, String conversions, Packages, Applets.

Books:

1. Object Oriented Programming in C++ by Robert Lafore Techmedia
2. Publication.
3. The complete reference C – by Herbert shieldt Tata McGraw Hill
4. Publication.
5. Object Oriented programming with C++ , E Balagurusamy , Third Edition , Tata McGraw Hill.
6. Pure C++ programming , Amir Afzal, Pearson Education.
7. **Java Programming Language** By *Ken Arnold, James Gosling, David Holmes*
8. **Head First Java** By *Kathy Sierra, Bert Bates*

**MSCS-205 Operating System/
Advanced Architecture/ System Software Lab**

**MSCS-206 DBMS/Computer Graphics / Principles of Programming
Languages Lab**

Open Elective Papers

MSCS-207-OE-1-INTERNET TECHNOLOGIES

UNIT I

The basic principles of WWW sites planning and creation, the basics of sites creation using language HTML, Cascading Style Sheets

Unit II

Client-side programming, Server-side programming

UNIT III

Dynamic Web pages creation, Services creation, which based on databases Languages for description and data representation

UNIT IV

Web sites testing and publications and also management by it The Management systems

TEXTBOOK AND REQUIRED MATERIALS:

1. Ian S. Graham The HTML Sourcebook Fifth edition A complete Guide to HTML, Wiley Computer Publishing, John Wiley & Sons, Inc., New York, Chichester, Brisbane, Toronto, Singapore
2. Daniel J. Berlin, et al, CGI Programming, 201 West 103rd Street Indianapolis, IN46290
3. Lynda Weinman Designing Web Graphics.2 How to Prepare Images and Media for the Web
4. Jason J. Mangerssential Java Developing Interactive Applications for the World-Wide Web, McGRAW-HILL BOOK COMPANY, London
5. Piet A. M. Kommers, Alcindo F. Ferreira, Alex W. Kwarck Document Management for Hypermedia Design, Springer

MSCS-207-OE-2-COMPUTER NETWORKS

UNIT - I:

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

Physical Layer: Guided transmission media, wireless transmission media.

Data Link Layer - design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window protocol

Network Layer: Network Layer Design issues, store and forward packet switching connection less and connection oriented networks-routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Control to Infinity Problem, Hierarchical Routing, Congestion control algorithms, admission control

UNIT - II:

Multi Access Protocols - ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

UNIT - III:

. **Internetworking:** Tunneling, Internetwork Routing, Packet fragmentation, IPv4, IPv6 Protocol, IP addresses, CIDR, ICMP, ARP, RARP, DHCP.

Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Connection Release, Crash Recovery.

UNIT - IV:

The Internet Transport Protocols UDP-RPC, Real Time Transport Protocols, The Internet Transport Protocols- Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP Sliding Window, The TCP Congestion Control, The future of TCP.

Application Layer- Introduction, providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS, SSH

TEXT BOOKS:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCES BOOKS:

1. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.
3. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press.
4. Computer Networks, L. L. Peterson and B. S. Davie, 4th edition, ELSEVIER.
5. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

MSCS-207-OE-3- Object Oriented Programming in C ++ & JAVA

Unit-I:

Introduction, need of object oriented Programming characteristics of object-oriented languages C and C++. Data abstraction and encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication); Benefits of OOP; Applications of OOP, Output using cout, Directives, Input with cin, Type bool. Type conversions, Writing a Program in C++: Declaration of variables, Statement Simple Programs, Features of I/O stream. Keyboard and screen, Manipulator Functions, Predefined manipulators, Input and Output (I/O) Stream Flags.

Unit-II:

Returning values from functions, Reference arguments, Overloaded function. Inline function, Default arguments, returning by reference. core object concepts (Encapsulation, Abstraction, Polymorphism, Classes, Messages Association, Interfaces) Implementation of class in C++, C++ Objects as physical object, C++ object as data types constructor. Object as function arguments. The default copy constructor, returning object from function, Structures and classes, Classes objects and memory static class data.

Unit-III:

Overloading unary operations, Overloading binary operators, data conversion, pitfalls of operators, overloading and conversion keywords. Explicit and Mutable, Concept of inheritance. Derived class and based class. Derived class constructors, member function, Virtual Function, friend function, Static function, Assignment and copy initialization, this pointer, dynamic type information. Function templates, Class templates Exceptions. JAVA EVOLUTION:- Java History; Java Features, The Java Virtual Machine, Variables and data types, Conditional and looping constructs, Arrays, operators and expression.

Unit-IV:

Fields and Methods, Constructors, Overloading methods, Garbage collection, Nested classes, Overriding methods, Polymorphism, Making methods and classes final, Abstract classes and methods, Interfaces, The Object class: Cloning objects, The JDK Linked List class, Strings, String conversions, Packages, Applets.

Books:

9. Object Oriented Programming in C++ by Robert Lafore Techmedia
10. Publication.
11. The complete reference C – by Herbert shieldt Tata McGraw Hill
12. Publication.
13. Object Oriented programming with C++ , E Balagurusamy , Third Edition , Tata McGraw Hill.
14. Pure C++ programming , Amir Afzal, Pearson Education.
15. **Java Programming Language** By *Ken Arnold, James Gosling, David Holmes*
16. **Head First Java** By *Kathy Sierra, Bert Bates*

III SEMESTER M.Sc. Cyber Security								
Subject Code	Course	Theory Hours / Week	Practical/ Tutorial Hrs/Week	Duration of Exam (Hours)	Marks & Credits			
					IA C1,C2,C3	Exam	Total	Credits
HARD CORE								
MSCS-301	<u>Cyber Security Threats</u>	3L	01	3	60	40	100	4
MSCS-302	<u>Cryptography</u>	3L	01	3	60	40	100	4
MSCS-303	<u>Cyber Crime and Digital Forensic</u>	4L	-	3	60	40	100	4
MSCS-304	<u>Secured Network Protocols and Standards</u>	4L	-	3	60	40	100	4
SOFT CORE – Any two from Soft-core electives								
MSCS-305	Elective-I	3L	-	3	60	40	100	3
MSCS-306	Elective-II	3L	-	3	60	40	100	3
OPEN ELECTIVE								
MSCS-307	OPEN Elective-II (E1-E3)	3L		3	60	40	100	3*
	Total	19	8P+4T=12	21	210	490	700	22+3*

IV SEMESTER M.Sc. Cyber Security								
Subject Code	Course	Theory Hours / Week	Practical Hours / Week	Duration of Exam (Hours)	Marks & Credits			
					IA C1,C2,C3	Exam	Total	Credits
SOFT CORE – Any two from Soft-core electives								
MSCS-401	Elective-I	3	--	3	60	40	100	3
MSCS-402	Elective-II	3	-	3	60	40	100	3
MSCS-403	Project		20	-	100	100	200	10
	Project Report					200	200	

	Total	06	20	06	160	440	600	
Total Marks of IV Semester							600	16
Total Marks off I Semester							700	26
Total Marks off II Semester							600	22+3*
Total Marks off III Semester							600	22+3*
Grand Total Marks and Credits of all the Four Semesters							2500	86+6*

MSCS-307-	:	OPEN ELECTIVES
OE-1	:	<u>Fundamentals of Data Science</u>
OE-2	:	<u>Open Source Technologies</u>
OE-3	:	<u>Fundamentals of Cyber Crime and Security</u>

SOFT ELECTIVESin III and IV Semester - Specialization-Cyber Security [MSCS-305/MSCS-306/MSCS-401/MSCS-402]		
SE-1	:	<u>Operating system security</u>
SE-2	:	<u>Cloud security</u>
SE-3	:	<u>Security Assessment and Testing</u>
SE-4	:	<u>IoT / IET Security</u>
SE-5	:	<u>Social Network Analysis</u>
SE-6	:	<u>Internet Packet And Application Analysis</u>
SE-7	:	<u>Cyber Law</u>
SE-8	:	<u>Ethical Hacking and digital forensic</u>

Note: Any other course offered in other streams could be chosen as soft-core as appropriate to this stream.

SYLLABUS

MSCS-301 CYBER SECURITY THREATS

UNIT I

Introduction: Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Cyber crimes. Network Threats: Active/ Passive – Interference – Interception – Impersonation – Worms – Virus – Spam’s – Ad ware - Spy ware – Trojans and covert channels – Backdoors – Bots – IP, Spoofing - ARP spoofing - Session Hijacking - Sabotage-Internal treats Environmental threats - Threats to Server security.

UNIT II

Security Threat Management: Risk Assessment - Forensic Analysis - Security threat correlation – Threat awareness - Vulnerability sources and assessment- Vulnerability assessment tools – Threat identification - Threat Analysis - Threat Modeling - Model for Information Security Planning.

UNIT III

Security Elements: Authorization and Authentication - types, policies and techniques – Security certification - Security monitoring and Auditing - Security Requirements Specifications – Security Policies and Procedures, Firewalls, IDS, Log Files, Honey Pots

UNIT IV

Access control, Trusted Computing and multilevel security - Security models, Trusted Systems, Software security issues, Physical and infrastructure security, Human factors – Security awareness, training, Email and Internet use policies.

References:

1. Swiderski, Frank and Syndex, “Threat Modeling”, Microsoft Press, 2004.
2. William Stallings and Lawrie Brown, “Computer Security: Principles and Practice”, Prentice Hall, 2008.
3. Joseph M Kizza, “Computer Network Security”, Springer Verlag, 2005
4. Thomas Calabres and Tom Calabrese, “Information Security Intelligence: Cryptographic Principles & Application”, Thomson Delmar Learning, 2004.

MSCS-302 CRYPTOGRAPHY

UNIT 1: Introduction to Cryptography, Securecommunication, privacy, authenticity, integrity, Why is cryptography hard?

Classical Ciphers, One-time pad Shannon's perfect security, Limitation of perfect security

UNIT 11: Block cipher and their cryptanalysis, AES, Pseudo-random functions

Pseudo-random functions II Security Reduction

Modes of Operation

Symmetric key Encryption , Symmetric Key Encryption II, Symmetric Key Encryption III, INC-CCA-Security, Hash Functions, Hash Function II

UNIT III

Message Authentication Scheme, Authenticated Encryption

Message Authentication II, Computational Number Theory, Computational Number Theory I

UNIT IV:

Public Key Encryption and El Gamal

Public Key Encryption and RSA

Textbook by

- D. Stinson, and the lecture slides by MihirBellare.
- D. Stinson Cryptography, Theory and Practice (Third Edition)
- M. Bellare Introduction to Modern Cryptography

REFERENCES:

- R. Pass and a. shelat. A Course in Cryptography
- M. Bellare: Introduction to Modern Cryptography
- O. Goldreich. The Foundations of Cryptography
- J. Katz and Y. Lindell. Introduction to Modern Cryptography

MSCS-303 CYBER CRIME AND DIGITAL FORENSIC

UNIT I

Cyber Crimes and Cyber Laws- Introduction to IT laws & Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Pornography, Software Piracy, Intellectual property, Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits, and Cyber Security

UNIT II

Computer and Cyber Forensic Basics- Introduction to Computers, Computer History, Software, Hardware, Classification, Computer Input-Output Devices, Windows, DOS Prompt Commands, Basic Computer Terminology, Internet, Networking, Computer Storage, Cell Phone / Mobile Forensics, Computer Ethics and Application Programs, Cyber Forensic Basics- Introduction to Cyber Forensics, Storage Fundamentals, File System Concepts, Data Recovery, Operating System Software and Basic Terminology

UNIT III

Data and Evidence Recovery- Introduction to Deleted File Recovery, Formatted Partition Recovery, Data Recovery Tools, Data Recovery Procedures and Ethics, Preserve and safely handle original media, Document a "Chain of Custody", Complete time line analysis of computer files based on file creation, file modification and file access, Recover Internet Usage Data, Recover Swap Files/Temporary Files/Cache Files, Introduction to Encase Forensic Edition, Forensic Tool Kit (FTK) etc, Use computer forensics software tools to cross validate findings in computer evidence-related cases.

UNIT IV

Cyber Forensics Investigation- Introduction to Cyber Forensic Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers, Recovering deleted evidences, Password Cracking

MSCS-304 SECURED NETWORK PROTOCOLS AND STANDARDS

UNIT I:

Network services and applications: DNS, HTTP, SMTP, peer-to-peer systems , Network transport architectures, TCP, UDP, ICMP, TCP congestion control, Routing and forwarding, intra-domain and inter-domain routing algorithms, Link layers and local area networks

UNIT II

Ethernet, Wi-Fi, and mobility, Multimedia communications and quality of service, Network measurement, inference, and management, Network experimentation and performance analysis.

UNIT III

Security: ARP attacks and ARP poisoning, DNS attacks, SYN flood attacks and its mitigation, UDP ping-pong and fraggle attacks, TCP port scanning and reflection attacks.

UNIT IV

Standards, and Implementing AR &IoT security References

1. James F Kurose and Keith W. Ross, "Computer Networking - A Top Down Approach", Fifth Edition, Addison-Wesley, 2010.
2. L. Peterson and B. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Elsevier Inc., 2011.

3. W. Richard Stevens, "TCP/IP Illustrated, Volume 1: The Protocols", AddisonWesley,1994.
4. Cyber Security Standards, Practices and Industrial Applications: Systems and Methodologies -Junaid Ahmed Zubairi (SUNY at Fredonia, USA) and AtharMahboob (National University of Sciences & Technology, Pakistan)

Open Elective Papers

MSCS-307-OE-1: FUNDAMENTALS OF DATA SCIENCE

UNIT I

Introduction to Python, Data acquisition and wrangling, Python libraries for data analysis

UNIT II

Data stream analysis (count-distinct sketch, 1st moment sketch, 2nd moment sketch ...)
Link analysis (random walks, PageRank, Hubs and Authorities ...)

UNIT III

Clustering (shingles, k-means, dimensionality reduction, impossibility of clustering, LSH, nearest neighbor, correlation clustering ...),Parallel frameworks (MapReduce, Giraph)

UNIT IV

Large-scale data algorithms
Machine learning basics and their use in computational intensive data analysis, Case studies (Milgram's experiment, Netflix Challenge, The Human Genome Project, ...)

TEXT BOOK

Leskovec, Rajaraman, Ullman, Mining of Massive Datasets
Easley, Kleinberg, Networks, Crowds, and Markets
vanRossum, The Python Tutorial

MSCS-307-OE-2: OPEN SOURCE TECHNOLOGIES

UNIT I

Need of Open Sources –Advantages of Open sources –Over View of Applications- FOSS – FOSS usage –Free Software, Movement – Commercial Aspect of Open Source,Open Source Movement – Licensing – Certification – Open Source, Software- Software Development Model – comparison with close source / Proprietary software – Free Software – Open source vs. source –available –Widely used open Source software license: Apache License, BSD license, GNU General Public License, GNU Lesser General Public License, MIT License, Eclipse Public License and Mozilla Public License.

UNIT II

Installation of Linux (Redhat-CentOS): Theory about Open Source Multi-boot Environment, Hard disk Partitioning, Swap Space, LVM, and Boot loader Operating System, Command Line: Basic File System Management Task, Working with files, Piping and Redirection, Working with VI editor, use of sed and understanding FHS of Linux Job management, Process Management, Mounting Open Source Devices and file system working with Linux, Backup,

UNIT III

Working with user, group and permission, Managing Operating System: Software. Understanding Boot process and related System files, Common kernel Managed Task Administrator task, Basic networking commands, Configuration of Apache Open source, Web servers, DNS servers, DHCP servers, mail Servers, NFS, FTP servers.

Operating System: Securing servers with IP tables. Setting up Network and cryptographic services, SSL, Managing Certificate Security with OpenSSL, working with the GNU Privacy guard.

UNIT IV

Bash Shell Scripting, Executing Script, Working with Open Source, Variables and Input, Using Control Structures, Script control, handling with signals, Creating functions, Operating System: working sed and gawk Shell-Working with web using shell script: Downloading Programming web page as formatted text file and parsing for data, working URL etc.

Text Books:

1. Red hat Linux 6.0 Administration Wiley
2. Linux Shell scripting Cookbook: SarathLakshman PACKT
3. Linux Lab - Open source Technology: Ambavade -Dreamtech
4. Beginning Android Development Word Press

References:

1. Drupal guide to Planning and Building Web Site: Word Press

MSCS-307-OE-3- FUNDAMENTALS OF CYBER CRIME AND SECURITY

UNIT I

Overview, what is Cybercrime?, Computer Intrusions and Attacks (Unauthorized Access) Computer Viruses, Time Bombs, Trojans, Malicious Code (Malware), Online Fraud and Identity Theft; Intellectual Property Theft; Virtual Crime, Online Vice: Gambling; Pornography; Child Exploitation, International Aspects and Jurisdiction

UNIT II:

Infrastructure and Information Security; Risk Management

UNIT III:

Investigating Cybercrime: Digital Evidence and Computer Forensics,Interception, Search and Seizure, and Surveillance

UNIT IV:

Information Warfare, Cyber terrorism, and Hacktivism,Terrorism, Radicalization, and The War of Ideas, Trade Secret Theft and Economic Espionage, National Security

TEXT BOOK

1. David J. Loundy, COMPUTER CRIME, INFORMATION WARFARE, AND ECONOMIC ESPIONAGE, Carolina Academic Press (2003) (ISBN:0890891109).
2. Jack Balkin, et al. eds., CYBERCRIME: Digital Cops in a Networked World (NYU Press 2007) (ISBN:0814799833).

REFERENCES

1. Orin S. Kerr, COMPUTER CRIME LAW: AMERICAN CASEBOOK SERIES (2006) (ISBN:0314144005).
 2. Ralph D. Clifford, CYBERCRIME: THE INVESTIGATION, PROSECUTION AND DEFENSE OF A COMPUTER-RELATED CRIME (Second Edition 2006) (ISBN:0890897239).
 3. Samuel C. McQuade, III, UNDERSTANDING AND MANAGING CYBERCRIME (2006) (ISBN:020543973X).
 4. Peter Stephenson, INVESTIGATING COMPUTER RELATED CRIME (2000) (ISBN:0849322189).
 5. Joel McNamara, SECRETS OF COMPUTER ESPIONAGE: TACTICS AND COUNTERMEASURES (2003) (ISBN:0764537105).
-

Elective Papers

MSCS-305-SE-1 OPERATING SYSTEMS SECURITY

UNIT 1

Introduction:

Operating Systems Concepts – System Calls – OS Organization – Factors in OS Design – Basic Implementation Considerations – Time Sharing and Multi Programming – Real Time Systems. Process Management: Process Concepts, Model – Process Synchronization – Process Scheduling, Threads. Dead Lock: Detection & Recovery, Avoidance, Prevention- Two Phase Locking Issues.

UNIT II

Memory Management:

Basic Memory Management – Swapping – Virtual Memory – Page Replacement Algorithms-Segmentation. File System And I/O Management: Files – Low Level File Implementations – Memory Mapped Files – Directories, Implementation – Principles of I/O Hardware & Software – Device Drivers – Disks Hardware, Formatting & Arm Scheduling Algorithms.

UNIT III

Windows Management Mechanisms

The registry, Registry usage, Registry data types, Local structure, Trouble shooting Registry problems, Registry Internals, Services, Applications, Accounts, Service control Manager, Windows Management Instrumentation, Processes, Threads, and Jobs: Process Internals, Flow of create process, Thread Internals, Examining Thread creation, Thread Scheduling, Job Objects.

UNIT IV

Secure Operating Systems:

Access control and file system security. Remote file system security.NFS, SMB, SFS, User authentication, Passwords, Biometrics, Smartcards. Intrusion Detection And Virus Protection: Trusted Computing, TCPA and NGSCB, Digital Rights Management.

References:

1. Andrew S.Tanenbaum, “Modern Operating Systems”, 2nd edition, Addison Wesley, 2001.
2. Gary Nutt, “Operating Systems A Modern Perspective “, 2nd edition, Pearson Education, 2001.
3. Maurice J. Bach, “The Design of the Unix Operating System”, Prentice Hall of India, 1991.

MSCS-305-SE-2 CLOUD SECURITY

UNIT I

Overview of Computing Paradigm, Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Evolution of cloud computing, Business driver for adopting cloud computing

Introduction to Cloud Computing Cloud Computing (NIST Model)Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Properties, Characteristics &Disadvantages, Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing, Role of Open Standards, Cloud Computing Architecture, Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used Role of Web services.

UNIT II

Service Models (XaaS), Infrastructure as a Service (IaaS), Platform as a service (PaaS), Software as a Service (SaaS), Deployment Models-Public cloud, Private cloud, Hybrid cloud, Community cloud,

Infrastructure as a Service (IaaS), Introduction to IaaS, IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine (VM) Resource Virtualization, Server, Storage, and Network

Virtual Machine (resource) provisioning and manageability, storage as a service, Data storage in cloud computing (storage as a service) Examples: Amazon EC2, Renting, EC2 Compute Unit, Platform and Storage, pricing, customers, Eucalyptus

Platform as a Service(PaaS) -Introduction to PaaS, What is PaaS, Service Oriented Architecture (SOA)Cloud Platform and Management, Computation, Storage, Examples: Google App Engine, Microsoft Azure,SalesForce.com s Force.com platform, Software as a Service(PaaS),Introduction to SaaS,Webservices,Web 2.0,Web OS,Case Study on SaaS

UNIT III

Service Management in Cloud Computing, Service Level Agreements(SLAs),Billing &Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data-Looking at Data, Scalability & Cloud Services, Database& Data Stores in Cloud Large Scale Data Processing

UNIT IV

Cloud Security,InfrastructureSecurity,Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity& Access Management,AccessControl,Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations, Case Study on Open Source & Commercial Clouds –Eucalyptus,MicrosoftAzure,Amazon EC2

Reference Books

Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wile, 2011

Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012

Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

MSCS-305-SE-3: SECURITY ASSESSMENT AND TESTING

UNIT 1: Introduction a brief tour of the course Setting up the testing environment - Kali Linux Overview, Static Analysis for Security

UNIT II Security Testing of Web-based Systems, OS Kernel Security and Exploitation, Architecture/Design Analysis for Security Attack Patterns, Dynamic Analysis for Security

UNIT III Fuzz Testing, Security Testing and Analysis for Regulatory Compliance and Standards

UNIT IV: Assessing Enterprise Security Risks using Vulnerability Scanners, Password Analysis and Testing, Design Patterns for Security, Security Testing of Network Protocols

TEXTBOOK

Michael Sutton, Adam Greene, PedramAmini. Fuzzing: Brute Force Vulnerability Discovery. TediHeriyanto, Lee Allen, Shakeel Ali. Kali Linux: Assuring Security By Penetration, Testing

MSCS-305-SE-4: IOT / IET SECURITY

UNIT 1

IoT Networking Core: Technologies involved in IoT Development:

Internet/Web and Networking Basics, OSI Model, Data transfer referred with OSI Model, IP Addressing, Point to Point Data, transfer, Point to Multi Point Data transfer & Network Topologies, Sub-netting, Network Topologies referred with Web, Introduction to Web Servers, Introduction to Cloud, Computing, Iota Platform overview, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex, Processors, Arduino and Intel Galileo boards.

UNIT II

Network Fundamentals: Overview and working principle of Wired Networking equipment's – Router, Switches, Overview and working principle of Wireless Networking equipment's – Access Points, Hubs etc. Linux Network configuration Concepts: Networking configurations in Linux Accessing Hardware & Device Files interactions.

UNIT III:

IoT Architecture: History of IoT, M2M – Machine to Machine, Web of Things, IoT protocols Applications: Remote Monitoring & Sensing, Remote Controlling, Performance Analysis, The Architecture the Layering concepts, IoT Communication Pattern, IoT protocol Architecture, The6LoWPAN, Security aspects in IoT, IoT Application Development: Application Protocols MQTT, REST/HTTP, CoAP, MySQL

UNIT IV

Back-end Application Designing, Apache for handling HTTP Requests, PHP & MySQL for data processing, MongoDB, Object type Database, HTML, CSS & jQuery for UI Designing, JSON lib for data processing, Security & Privacy during development, Application Development for mobile Platforms: Overview of Android / IOS App Development tools

Case Study & advanced IoT Applications: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipments. Use of Big Data and Visualization in IoT, Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi / Intel Galileo/ARM Cortex/Arduino), **IOT SECURITY CHALLENGES**

TEXT BOOKS:

1. 6LoWPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley
2. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers
3. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann

REFERENCES:

1. The Internet of Things: From RFID to the Next-Generation Pervasive Networked Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning
2. Internet of Things (A Hands-on-Approach) , Vijay Madiseti , Arshdeep Bahga
3. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally
4. Asoke K Talukder and Roopa R Yavagal, "Mobile Computing," Tata McGraw Hill, 2010.
5. Computer Networks; By: Tanenbaum, Andrew S; Pearson Education Pte. Ltd., Delhi, 4th Edition
6. Data and Computer Communications; By: Stallings, William; Pearson Education Pte. Ltd., Delhi, 6th Edition
7. F. Adelstein and S.K.S. Gupta, "Fundamentals of Mobile and Pervasive Computing," McGraw Hill, 2009.
8. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
9. Practical Internet of Things Security, By Brian Russell, Drew Van Duren, Publisher: Packt Publishing

MSCS-305-SE-5: SOCIAL NETWORK ANALYSIS

UNIT I : Introduction to social network analysis, Descriptive network analysis, Network structure

UNIT II: Node centralities and ranking on network, Network communities, Affiliation networks

UNIT III: Information and influence propagation on networks, Network visualization

UNIT IV: Social media mining, SNA in real world: FB/VK and Twitter analysis

TEXT BOOK

1. David Easley and John Kleinberg. "Networks, Crowds, and Markets: Reasoning About a Highly Connected World." Cambridge University Press 2010.
2. Eric Kolaczyk, Gabor Csardi. "Statistical Analysis of Network Data with R (Use R!)" Springer, 2014.
3. Stanley Wasserman and Katherine F Press, 1994 15.2.

REFERENCES

1. Maarten van Steen. "Graph Theory and Complex Networks. An Introduction", 2010.
2. Reza Zafarani, Mohammed Ali Abbasi, Huan Liu. "Social Media Mining: An Introduction". Cambridge University Press 2014.

3. MaksimTsvetovat and Alexander Kouznetsov. "Social Network Analysis for Startups". O'Reilly Media, 2011.

MSCS-305-SE-6: INTERNET PACKET AND APPLICATION ANALYSIS

UNIT I

Introduction: Protocols and standards, Standards Organizations, Internet Standards, Internet Administration; Overview of reference models: The OSI model, TCP/IP protocol Suite, Addressing, IP versions. Connectors, Transceivers and Media converters, Network Interface cards and PC cards, Repeaters, Hubs, Bridges, Switches, Routers and Gateways etc. H/W selection.

Optical Networking: SONET/SDH standards, Dense Wavelength division multiplexing (DWDM), Performance and design Considerations.

ATM: The WAN Protocol: Faces of ATM, ATM Protocol operations (ATM cell and Transmission) ATM Networking basics, Theory of Operations, B-ISDN reference model, PHY layer, ATM Layer (Protocol model), ATM layer and cell, Traffic Descriptor and parameters, Traffic Congestion control defined, AAL Protocol model, Traffic contract and QoS, User Plane overview, Control Plane AAL, Management Plane, Sub-DS3 ATM, ATM Public services.

UNIT II

Packet Switching Protocol: X.25, theory of Operation and Network Layer functions, X.75, Internetworking protocols, SMDS, Subscriber Interface and Access Protocol, Addressing and Traffic Control.

Common Protocols and interfaces in upper Layer: TCP/IP suite, Network Layer, Transport Layer, Applications Layer, Addressing and routing design, Socket programming
Routing in the Internet: Intra and interdomain routing; Unicast Routing Protocols: RIP, OSPF, BGP; Multicast Routing Protocols: MOSPF, DVMRP. Drawbacks of traditional routing methods, Idea of TE, TE and Different Traffic classes. IP over ATM, Multi protocol Label switching (MPLS), Storage Area Networks (SAN).

UNIT III

Network Management and Services: SNMP: Concept, Management components, SMI, MIB, SNMP format, Messages

Traffic Engineering and Capacity Planning: Traffic engineering basics: Requirement Definitions: Traffic sizing, characteristics, Protocols, Time Delay considerations, Connectivity, Reliability, Availability and Maintainability, Throughput calculations
Quality of Service: Introduction, Application, Queue Analysis: M/M/1 as a packet processing Model, QoS Mechanisms Queue management Algorithms, Feedback, Resource reservation; Queued data and Packet switched traffic modeling. Application and QoS, Network

Performance Modeling, Creating Traffic Matrix, Capacity Planning and Network vision, Design Tools

UNIT IV

Multi-Media over Internet: RTP, RSVP, IP Multicasting, Voice Digitization standards, G.729 and G.723 and H.323 Enterprise Network Security: DMZ, NAT, SNAT, DNAT, and Port, Forwarding, Proxy, Transparent Proxy, Packet Filtering and Layer Filtering. Backbone Network Design: Backbone Requirements, Network Capacities Topologies, Topologies Strategies, Tuning Networks

Text Books:

1. B. A. Forouzan, "TCP/IP Protocol Suite", Tata McGraw Hill edition, Third Edition.
2. N. Olifer, V. Olifer, "Computer Networks: Principles, Technologies and Protocols for Network design", Wiley India Edition, First edition.

References:

1. W. Richard Stevens, "TCP/IP Volume 1, 2, 3", Addison Wesley.
2. D.E. Comer, "TCP/IP Volume I and II", Pearson Education.
3. W.R. Stevens, "Unix Network Programming", Vol. 1, Pearson Education.
4. J. Walrand, P. Varaiya, "High Performance Communication Networks", Morgan Kaufmann
5. A.S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.

MSCS-305-SE7-CYBER LAW

UNIT I:

Introduction Computers and its Impact in Society • Overview of Computer and Web Technology • Need for Cyber Law • Cyber Jurisprudence at International and Indian Level •

UNIT II: Cyber Law - International Perspectives UN • & International Telecommunication Union (ITU) Initiatives Council of Europe - Budapest Convention on Cybercrime • Asia-Pacific Economic Cooperation (APEC) • Organization for Economic Co-operation and Development (OECD) • World Bank • Commonwealth of Nations •

UNIT III:

Constitutional & Human Rights Issues in Cyberspace Freedom of Speech and Expression in Cyberspace • Right to Access Cyberspace – Access to Internet • Right to Privacy • Right to Data Protection

Cyber Crimes & Legal Framework Cyber Crimes against Individuals, Institution and State • Hacking • Digital Forgery • Cyber Stalking/Harassment • Cyber Pornography • Identity Theft • & Fraud Cyber terrorism • Cyber Defamation • Different offences under IT Act, 2000 •

UNIT IV:

Cyber Torts Cyber Defamation • Different Types of Civil Wrongs under the IT Act, 2000 • Intellectual Property Issues in Cyber Space Interface with Copyright Law • Interface with

Patent Law• Trademarks• & Domain Names Related issues Module VII: E Commerce Concept• E-commerce-Salient Features• Online approaches like B2B, B2C• & C2C Online contracts• Click Wrap Contracts• Applicability of Indian Contract Act, 1872• Dispute Resolution in Cyberspace 1. Concept of Jurisdiction 2. Indian Context of Jurisdiction and IT Act, 2000. 3. International Law and Jurisdictional Issues in Cyberspace. 4. Dispute Resolutions

REFERENCES

1. Chris Reed• & John Angel, Computer Law, OUP, New York, (2007).
2. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012).• Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, New• Delhi, (2004)
3. JonthanRosenoer, Cyber Law, Springer, New York, (1997). •
4. SudhirNaib, The Information Technology Act, 2005: A Handbook, OUP, New York, (2011)
5. S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd., Jaipur (2003).
6. Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi, (2003).

MSCS-305-SE-8-ETHICAL HACKING AND DIGITAL FORENSIC

UNIT I

Hacking windows – Network hacking – Web hacking – Password hacking. A study on various attacks – Input validation attacks – SQL injection attacks – Buffer overflow attacks - Privacy attacks.

UNIT II

TCP / IP – Checksums – IP Spoofing port scanning, DNS Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Firewalls – Packet filter firewalls, Packet Inspection firewalls – Application Proxy Firewalls. Batch File Programming

UNIT III

Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks –Managing the threat – Strategic Planning Process. Architecture strategies for computer fraud Prevention – Protection of Web sites – Intrusion detection system – NIDS, HIDS – Penetrating testing process – Web Services – Reducing transaction risks.

UNIT IV

Key Fraud Indicator selection process customized taxonomies – Key fraud signature selection Process –Accounting Forensics – Computer Forensics – Journaling and it requirements – Standardized logging criteria – Journal risk and control matrix – Neural networks – Misuse detection and Novelty detection.

References:

1. Kenneth C.Brancik “Insider Computer Fraud” Auerbach Publications Taylor & Francis Group, 2008.
2. AnkitFadia“ Ethical Hacking” 2nd Edition Macmillan India Ltd, 2006
