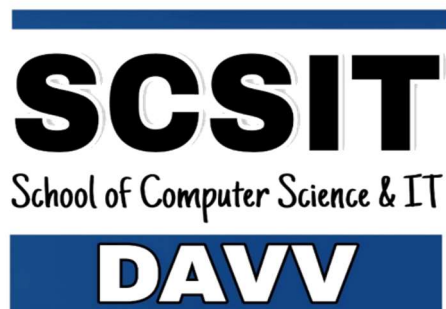# SYLLABUS

MTech (NM)

2nd SEMESTER

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore
www.scs.dauniv.ac.in

Course Name: **MTech (NM) 2nd Semester**

Subject Code: **CS-6628**

Subject Name: **Legal Aspects of Information Security**

Aim of the Subject

The aim of this course is to provide students with a background, foundation, and insight into the many dimensions of Legal Aspects of Information Security.

Learning Outcomes

The students are expected to learn following after completion of the course:

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Unit 1

Computer Ethics Introduction: Introduction to Social and Ethical behavior, Computer Ethics, Morality and the Law. Ethics and Ethical Analysis: Reasoning and Decision Making, Ethics and the Professions: Professionalism and Ethical Responsibilities.

Unit 2

Privacy: Definition, Types of Privacy, Ethical and Legal Framework for Information, Workplace Privacy, Corporate Information Security and Privacy Regulation.

Unit 3

Intellectual Property Rights in Cyberspace: Definitions, Foundations of Intellectual Property-Copyrights, Patents, Trademarks, Trade Secrets.

Unit 4

Computer Crimes: General Criminal Law Concepts, Common Criminal Laws Used in Cyberspace-The Computer Fraud and Abuse, Computer Trespass or Intrusion, Theft of Information, Interception of Communications, Spam and Phishing, Hacking, Identity Theft and Credit Card Fraud etc.

Unit 5

Information Technology Law: Evolution of the IT Act, Genesis and Necessity, Salient features of the IT Act, 2000, various authorities under IT Act and their powers: Penalties & Offences, amendments.

Text Book(s)

1.   Kizza, Joseph Migga, " Ethical and Social Issues in the Information Age", Springer

London Dordrecht Heidelberg, New York, 2010, Fourth edition.

2.   Grama, Joanna Lyn, "Legal and Privacy Issues in Information Security", Jones & Bartlett

Learning, USA, 2020, Third Edition.

Reference Material(s)

1. Baase, Sara, "A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology",

Prentice-Hall, USA, 2013, Fourth edition.

2. The Information Technology Act, 2000; Bare Act – Professional Book Publishers,

New Delhi.

Course Name: **MTech (NM) 2nd Semester**

Subject Code: **CS-5618**

Subject Name: **Network Security**

Aim of the Subject

To create security professionals who will be handling the real-life challenges and Problems the industry is facing today in connection with Networks.

Learning Outcomes

The students are expected to learn following after completion of the course:
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Unit 1

Obstacles to Security

Security is inconvenient, Computer Are Powerful and complex, Computer User Are Unsophisticated, Computer Created without a Thought to Security, Current Trend is to

Share, Not Project Data Accessible from Anywhere security Isn't, Hardware and Software. The Bad Guys Are Very Sophisticated, Management Sees Security as a Drain

on the Bottom Line.

Ten Steps to Building a Secure Organization

Evaluate the Risks and Threats, Beware of Common Misconceptions, Provide Security Training for IT Staff-Now and Forever, Think Employees: Develop a Culture of Security Identify and Utilize Built-In Security Features of the Operating System and Applications, Monitor System, Hire a Third Party to audit Security, Don't Forget the Basics, Patch.

Unit 2

Internet Security

Internet Protocol Architecture: Communications Architecture Basics, An Internet Threat Model: The Dolev-Yoa Adversary Model Layer Threats, Defending Against Attacks on the Internet: Layer Session Defences, Session Stratup Defences

Botnet Problem

Botnet Overview, Origin of Botnets, Botnet Topologies and Protocols, Typical Bot Life, Cycle, The Botnet Business Model, Botnet Defence, Detecting and Removing Individual Bots,

Detecting C&C Traffic, Detecting and Neutralizing C&C Channels,\Locating and identifying the Botmaster Botmaster Traceback: Traceback Challenges, Traceback Beyond the internet

Unit 3

Content Filtering

The Problem with Content Filtering, Categories, Issues and Problems with Content Filtering, Bypass and circumvention, Client –Based Proxies, Open Proxies, HTTP web-Based Proxies(Public and private),Secure Public Web-Based Proxies, Process Killing

Remote Pc Control Applications, Overblocking and Underblocking, Blacklist and Whitelist Determination, Casual Surfing Mistake, Getting the List Updated, Time-of-Day Policy Changing ,Override Authorization Methods, Hide Content in "Noise" or use Steganography, Detect Spyware and malware in the HTTP Payload, Scalability and Usability , Performance Issue, Technology and Techniques for Content-Filtering control ,Internet gateway-based Products Unified Threat Appliances

Virtual Private Network,

IPsec,,L2TP,L2TPv3,L2F,PPTP VPN,MPLS,MPVPN,SSH,SSL-VPN,TLS

Authentication Methods

Hashing, HMAC, MD5, SHA-1, Symmetric Encryption, Asymmetric Cryptography

Edge Devices, Password,

Unit 4

Instant-Massaging Security

The Evolution of Networking Technology, Game Theory and Instant Messaging, Your workforce, Generational Gaps, Transactions, The Nature of the Threat

Malicious Threat , Vulnerabilities, Man-in-the-Middle Attacks, Phishing and Social Engineering, Knowledge Is the Commodity, Data and Traffic Analysis, Unintentional Threats, Regulatory Concerns, Common IM Applications Consumer Instant Messaging, Enterprise Instant Messaging, Backdoor: Instant Messaging via Other Means(HTML),Mobile Dimension, Defensive Strategies: Asset Management, Built-in Security, Content Filtering, Classic Security, Compliance, Data Loss Prevention, Logging, Archival, Processes, Instant-Messaging Activation and Provisioning, Application Review, People, Revise ,Audit

Risk Management: The concept of risk, Expressing and Measuring Risk

The Risk Management Metholoy: Context Establishment, Risk Assement, Risk Treatment, Risk Communication, Risk Monitoring and Review, Integrating Risk Management into the

System Development Life Cycle, Critique of Risk Management as a Methology, Risk Management Methods

Risk Management Laws and Regulations, Risk Management standards

Unit 5

Vulnerability Assessment

Why Vulnerability assessment, Penetration Testing Versus Vulnerability Assessment,

Vulnerability Assessment Goal, Mapping the Network, Selecting the Right Scanner

Central Scans versus local Scans, Defence in Depth Strategy, Network Scanning Countermeasures, Vulnerability Disclosure Date, Find Security Hole before They Become Problem, Proactive Security versus Reactive Security, Vulnerability Causes, Conclusion.

Firewall, IDS/IPS, Honeypot

Text Book(s)

. 1.Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security", Prentice Hall,

2nd edition, 2002, ISBN-10: 0130460192, ISBN-13: 978-0130460196.

2. Charles Pfleeger," Security in Computing", Prentice Hall, 4 th Edition, 2006, ISBN-10:

0132390779, ISBN-13: 978-01323907744.

Reference Material(s)

1. Ulysess Black, "Internet Security Protocols: Protecting IP Traffic", Prentice Hall PTR;

1st edition, 2000, ISBN-10: 0130142492, ISBN-13: 978-0130142498.

2. Amir Ranjbar 2007, CCNP ONT Official Exam Certification Guide, Cisco Press

[ISBN: 978-1-58720-

Course Name: **MTech (NM) 2nd Semester**

Subject Code: **CS-6623**

Subject Name: **Mobile & Wireless Systems**

Aim of the Subject

To introduce the theory, architecture, protocols, techniques and applications in wireless and mobile networks.

Learning Outcomes

The students are expected to learn following after completion of the course:
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Unit 1

Overview of the emerging field of mobile computing: Historical perspectives (mainly from the perspective of radio), Land mobile vs. Satellite vs. In-building communications systems, RF vs. IR, Mobile applications, Limitations.

Mobile Radio Propagation: Introduction, Propagation mechanism, Path loss, Slow Fading, Fast Fading, Delay Spread, Inter-symbol Interference, Co-channel Interference.

Cellular Concept: Characteristic of Cellular Systems, Cell area, Capacity of a cell, frequency reuse, Reducing Co-channel Interference, Cell Splitting, Cell Sectoring.

Unit 2

Mobile communication: Fiber or wire based transmission, Wireless Transmission: Frequencies, Antennas and Signal Propagation, Modulation Techniques, Multiplexing techniques, Coding techniques.

Channel Allocation: Fixed Channel Allocation, Dynamic channel Allocation, Hybrid Channel Allocation, Allocation in Specialized System Structure.

Mobile Communication Systems: Cellular System Infrastructure, Registration, Handoff in cellular Systems, Roaming support, Mobile IP, Multicasting, Generation of Mobile Systems, Existing Wireless Systems, Case Study on GSM and CDMA.

MTech (NM) 2nd SEM

Unit 3

Satellite Systems: Types of Satellite Systems, Characteristic of Satellite Systems, Satellite System Infrastructure, Call Setup, Global Positioning System, limitations and beneficiaries of GPS.

Unit 4

Ad Hoc and Sensor Networks: Characteristic of MANETs, Applications, Need of Routing, Routing Classification, Wireless Sensor Networks.

Unit 5

Wireless LANs and PANs: IEEE802.11, HIPERLAN, Bluetooth. Case Study on Wireless LAN infrastructure, Wireless security.

Text Book(s)

1. Jochen Schiller, Mobile Communications, John Willy & Sons, Ltd.

2. D. P. Agrawal and Qing-An zeng, Introduction to Wireless and Mobile Systems, Thomson publication.

Reference Material(s)

1. P. Nicopotidis, Wireless Networks, Addision –Wesley publication.

2. Raj Kamal, Mobile Computing, Oxford University press, 2007.

3. U. Hansmann, L. Merk, M.S. Nicklons and T. Stober, Principles of Mobile Computing, Springer, 2003.

Course Name: **MTech (NM) 2nd Semester**

Subject Code: **CS-6518**

Subject Name: **Cloud Computing**

Aim of the Subject

To impart knowledge with a solid theoretical foundation, and strong practical skills in the fields of computer technology, communications networks and IT, that are required to develop a wide range of IoT applications.

Learning Outcomes

The students are expected to learn following after completion of the course:

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Unit 1

Introduction to IoT: Definition, Characteristics, Conceptual framework, Architectural view.

Technology involved - Server-end technology, Hardware and Software components, Development tools & Open source framework, APIs & Device interfacing components, Platforms & Integration tools, Sources of IoT, Advantages and Disadvantages of IoT.

Machine-to-Machine Communication: Definition, M2M Vs. IoT, M2M architecture.

Unit 2

Design principles for connected devices: Communication Technologies – Near-field communication, RFID, Bluetooth, Zigbee (ZigBee IP/ZigBee SE 2.0), Wi-Fi, GPRS/GSM cellular Networks-Mobile Internet.

Design principles for web connectivity: Constrained Application Protocol (CoAP), MQTT, XMPP.

Data formats: JSON, XML, TLV, MIME.

Connectivity Models: Request/Response, Publish/Subscribe, Pull/ Push Data, Message cache, Message queue.

Gateway Protocols for Web Connectivity: HTTP, SOAP, REST, RESTful HTTP and WebSockets.

Unit 3

Data Acquiring: Data generation, Data Acquisition, Data validation, Data categorization for storage, Data Store – definition, Key/value store, Document store, tabular store (Column Family & Big Table), Object store, Graph Stores-Graph Databases

Data Organizing: Definition, DBMS-ACID rules, Distributed database, CAP theorem , Query processing, SQL, NoSQL, ETL, MPP, in-memory databases , columnar database.

Unit 4

Data Processing: Definition, Online tractions and processing (OLTP), Stream processing, Real-Time processing, Event Stream processing, Business process, Business Intelligence, Distributed Business Process, Enterprise Systems, Service Oriented Architecture(SOA).

Data Analytics: Definition, Analytics phases- Descriptive, Predictive, Prescriptive), Online analytical processing (OLAP), Statistical tools for data analysis -descriptive and inferential statistics, random analysis, sampling concept, Sampling distribution techniques, statistical inference, regression analysis.

Machine Learning basics: Supervise and un-supervised techniques,

Big Data analytics - Big data definition, Characteristics, Big data Classifications on the basis of: sources, format, stores, analysis, type, users, rate.

Big data Analytics: Architecture, Hadoop components, Berkley Data Analytics Stack (BDAS) Architecture.

Knowledge Management: Definition, Knowledge Management Reference Architecture.

Unit 5

Cloud Storage models and communication APIs for IoT, IoT Privacy, Security and Vulnerabilities Issues and Solutions, Prototyping and designing the software for IoT applications, Interoperability in IoT.

Introduction to Arduino Programming: Integration of Sensors and Actuators with Arduino.

IoT Case Studies: Agriculture, Healthcare, SCM, Connected Cars, Smart city, Smart Home.

Text Book(s)

1. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Thing", Wiley

2. Rajkamal, "Internet of Things: Architecture and Design Principles", McGraw Hill Education, 2017.

Reference Material(s)

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

2. Dr. Ovidiu Vermesa

Course Name: **MTech (NM) 2nd Semester**

Subject Code: **CS-6630**

Subject Name: **Internet of Things**

Aim of the Subject

This course aims to provide sound foundation to fundamental concepts of Data Science and its application and prepare students for advanced research and real time problem solving in Data Science.

Learning Outcomes

The students are expected to learn following after completion of the course:

- Understand IoT concepts, Its software, hardware components and communication technologies involved in IoT.
- Challenges of IoT application deployment in secured cloud environments.
- Exposure to real life projects and applications.
- Handling voluminous data through Data Analytics techniques.

Unit 1

Introduction: What is Data Science?, The Data Science Process, Different Types of Data:

Quantitative, Categorical. Graphical Summaries of Data: Pie Chart, Bar Graph, Pareto Chart, Histogram. Measuring the Center of Quantitative Data: Mean, Median, Mode. Measuring the Variability of Quantitative Data: Range, Standard Deviation, and Variance.

Unit 2

Overview of R, R data types :Vectors, Matrices, Factors, Lists, Data Frames, reading and writing data, Control structures, functions, scoping rules, dates and times

Unit 3

Introduction to Data Cleansing, Missing and Repeated Values, Feature Engineering, Outliers and Errors, Finding Outliers, Cleaning Data with R.

Unit 4

Machine Learning : Definition and overview, Regression, Simple Linear Regression, Multiple Regression, Assessing Performance, Ridge Regression, Feature Selection & Lasso, Nearest Neighbors & Kernel Regression

Unit 5

Machine Learning : Classification, Linear Classifiers & Logistic Regression, Learning Linear Classifiers, Overfitting & Regularization in Logistic Regression, Decision Trees, Handling Missing Data, Boosting.

Text Book(s)

[1] Allan G. Bluman, Elementary Statistics: A Step By Step Approach,10th Edition,McGraw-Hill, 2017.

[2] Paul Teetor, R Cookbook, First Edition, O,ReillyMedia, 2011.

[3] Tom Mitchell, Machine Learning, First Edition, McGraw Hill. 1997

Reference Material(s)

MOOCS of Coursera