Course Contents of MSIT

ITC-701: Advanced Database Management System **Cr. Hrs. 3(3+0)**
Prerequisite: Database Management System/Equivalent

Theory:

Overview of Databases Management Systems, Object-Oriented Databases, Object-Relational Databases, Mobile Databases, Temporal, Spatial Databases, Geographic Databases, Distributed Database Design, Distributed Multimedia Database Systems, Data Warehouse and OLAP Systems, XML Data Models, XML Documents and DTD, XML Query Languages, Advance Database Designing Techniques and Trends. Modeling Tools and Techniques for Advance Database Systems. Implementation anda pplications of Advance Database Systems. Research Trends in database systems.

Recommended Books:

1. Advanced Database Systems by Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T. ano Ceri (Chapter 5, 6)5. Foundations of Semantic Web Technologies by Pascal Hitzler. ISBN:142009050X. Snodgrass, V. S. Subrahmanian, Roberto Zicari,Morgan Kaufmann; 1st Edition (May 15, 1997). ISBN-10:155860443X, 2. XQuery by Priscilla Walmsley ISBN: 0596006349,3. Spatial Databases: With Application to GIS by Hilippe Rigaux. ISBN:1558605886,4. Advanced Database Systems by Carlo Zaniolo, Stef

ITC-703: Information Security **Cr. Hrs. 3(3+0)**
Prerequisites: Data Communication and Computer Networks

Theory:

Basic notions of confidentiality, integrity, availability; authentication models; protection models; security kernels; Encryption, Hashing and Digital 33Signatures; audit; intrusion detection and response; database security, host based and network-based security issues operational security issues; physical security issues; personnel security; policy formation and enforcement; access controls; information flow; legal and social issues; identification and authentication in local and distributed systems; classification and trust modeling; risk assessment

Recommended Books:

1. *Computer Security: Art and Science*, Matthew Bishop
2. *Cryptography and Network Security* by William Stalling 6th Edition, 2012
3. *Principles of Information Security* 3rd E by Michael E. Whitman and Herbert J. Mattord

ITC-705: Object Oriented Software Engineering **Cr. Hrs. 3(2+1)**

Prerequisites: Operating Systems, Web Systems and Technologies

Theory:

Mobile and Pervasive Computing Basics, Vision and Challenges, Wireless Technologies, Mobile and Pervasive Computing Environments: Mobile Computing Infrastructure, Characteristics of Mobile Computing Environments, Challenges of Mobile Computing, Infrastructure of Pervasive Computing, Characteristics of Pervasive Computing Environments, Pervasive Computing Applications. Requirements of Pervasive Computing Applications, Smart Devices and Services, HCI Aspects of Smart Devices Tagging, Sensing and Controlling, Context-Aware Computing and Systems, Intelligent Systems and Interaction, Ubiquitous Communication, Overview of P2P Computing, RFID, Smart Home, Autonomic Systems and Artificial Life, Utility Computing, Management of Smart Devices.

Practical:

About Android, Preparing the Environment, Installing the SDK, Creating Android Emulator, Installing Eclipse, Installing Android Development Tools, Hello Sheep, Creating a project, Working with the AndroidManifest.xml, Using the log system, Activities, UI Architecture, Application context, Intents Activity life cycle, Supporting multiple screen sizes, User Interface Widgets, Text controls , Button controls, Toggle buttons, Images, Notification and Toast, Status bar notifications, Toast notifications , Menus, Localization, Options menu , Context menu, Lists, Using string arrays, Creating lists, Custom lists, Working with data storage, Files access, SQLite database, Web Services , HTTP Client, XML and JSON, Services, Publishing App.

Recommended Books:

1. *Ubiquitous Computing: Smart Devices, Environments and Interactions* by Stefan Poslad, Wiley; 1st Edition (April 27, 2009). ISBN-10: 0470035609
2. *Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML* by Reza B'Far and Roy T. Fielding, Cambridge University Press (2004). ISBN-10: 0521817331.
3. *Fundamentals of Mobile and Pervasive Computing* by Frank Adelstein, Sandeep KS Gupta, Golden Richard III and Loren Schwiebert, McGraw- Hill Professional; 1st Edition (2004). ISBN-10: 071412379.
4. *Fundamentals of Mobile and Pervasive Computing* by Golden Richard,McGraw-Hill Professional Publishing; December 2004.

ITC-707: Communication Systems **Cr. Hrs. 3(2+1)**
Prerequisite: None

Theory:

Comprehensive overview of the fundamental principles of telecommunications, including current status and future directions of the public switched telephone network, cellular networks, satellite networks, and computer networks.

Practical:

Demonstration of telecom networks and identifying various Network Cables and their Accessories, Generation of Commonly used signals and performing Basic Operations on signals, To establish the spectrum of Amplitude Modulated Signals, Demonstration of Amplitude Modulation with and without the suppression of the carrier, Demonstration of AM demodulation, Demonstration of Frequency Modulation and its applications, Demonstration of FM Demodulation, To be familiar with the basic structure and applications of Optical Fiber Cable, Introduction to Microwave Communication and identification of different waveguide components, Generation of signals and observing the effect of noise on signals.

Recommended Books:

Telecommunications and Data Communications Handbook by Ray Horak Published by Wiley-Interscience2007

ITC-709: IT Planning and Management Cr. Hrs. 2(2+0)

Prerequisites: **Probability and Statistics**

Theory:

Research: introduction to the nature of research, and types of Research; Research questions, and the nature of evidence: deciding what type of question to ask, and how to handle the various types of answer; Mud pits and how to avoid them: things that go wrong; Isms: necessary assumptions, dubious assumptions, and being caught in crossfire; Searching the literature: why, where, what for and how; Research in society agendas, context and the like: things we take for granted, and things that can cause you trouble; Research design: Types of design: which to use and how to use them; Surveys and sampling; Field experiments: doing research in the world. Controlled experiments: changing things systematically and seeing what happens; Summary and technical terms; Generic advice; Arranging a study:subjects, equipment, procedures, things to remember, things to beware; 54 Handling subjects; Recording; Data collection; Data collection methods: the methods, and choosing and using the appropriate method; Reports: getting respondents to talk about how things happen; Observation: watching what happens; Card sorts: getting respondents to categories things; Laddering: unpacking the respondents' concepts systematically; Repertory grids: a systematic representation for respondents' knowledge interviews: asking people questions; Face-to-face interactions with respondents: the nuts and bolts of asking questions; Questionnaires: when to use, when not to use, which questions to ask, what format to use; Data analysis; Content analysis: what is said in a text, how it is said, and how often it's said; Discourse analysis: who says what, about what, to whom, in what format. Knowledge representation: formats, structures and concepts for making sense of knowledge; Statistics: describing things with numbers, and assessing the odds; Descriptive statistics: giving a systematic description of the numbers you've found; Measurement theory: types of measurement and their implications; Inferential statistics: what are the odds against your findings being due to random chance? Conclusion: the end game; Writing up: demonstrating your excellence efficiently, and practical points to remember; References and referencing: using and citing the right texts to demonstrate your excellence; what next; thinking forward about what you really want your life to be?

Recommended Books:

1. *A Gentle Guide to Research*, Gordon Rugg & Marian Petre, Open University Press McGraw-Hill Education, 2007
2. *Practical Research Methods*, CATHERINE DAWSON, How To Books Ltd,
3.NewtecPlace,2002.

Track 1 (Software Engineering and Information System)

ITC-702: Advanced Web Services **Cr. Hrs. 3(2+1)**

Theory:

Model-driven Architecture, Enterprise-centric Computing, Distributed Computing, Enterprise Architecture, Application Middleware, Architectural Styles, Model Driven Enterprise Architecture, Modeling at Different Abstraction Levels, Role of UML in MDA, UML System Models, Beyond Basic Class Modeling, Meta-modeling, Mapping Between Models, The Meta Object Facility (MOF), Model-driven Metadata Management, Abstract and Concrete Syntax, XML Metadata Interchange (XMI), XMI and XML Schema, Extending and Creating Modeling Languages, UML Profiles, Stereotypes, Executable Models, Object Constraint Language (OCL), Modeling Transformation, Code Generation, MT Languages and Frameworks, MT Tools and Techniques, Model Checking and Validation, The future of MDA

Practical:

XML, XML Namespace, XML Schema, XML Schema Design Pattern, XPath, XSLT, XSLT Advanced Usage, Java APIs for XML Parsing and Transformation,JAXP, SAX, and DOM,StAX,SOAP and WSDL,SOAP Basics,SOAP Processing Model,SOAP Protocol Binding,WSDL Basics,WSDL Bindings,SoapUI Overview,SAAJ (SOAP with Attachments API for Java),UDDI,JAX-WS,JAX-WS 2.x Basics,JAX-WS over Java SE 6,JAX-WS with EJB,JAX-WS Handlers,Data binding (JAXB),JAXB Basics,JAXB 2.x,REST,RESTful Web Service Primer,Understanding RPC vs Document styles with examples,Understanding JAS-WS Header Security with examples,Understanding MTOM/MIME in JAX-WS,Create low-level SOAP web services-SAAJ

Recommended Books:

Model Driven Architecture: Applying MDA to Enterprise Computing by David S. Frankel
MDA Distilled by Stephen J. MELLOR, Kendall Scott, Axel Uhl, Dirk Weise
MDA Explained: The Model Driven Architecture: Practice and Promise by Anneke Kleppe, Jos Warmer, Wim Bast

ITC-704: Software Quality Assurance **Cr. Hrs. 3(3+0)**
Prerequisites: Software Engineering

Theory:

What Is Software Quality: Quality Assurance, Quality Engineering Software Testing: Testing: Concepts, Issues, and Techniques, Test Activities, Management, and Automation, Coverage and Usage Testing Based on Checklists and Partitions, Input Domain Partitioning and Boundary Testing, Coverage and Usage Testing Based on Finite-State Machines and Markov Chains, Control Flow, Data Dependency, and Interaction Testing, Testing Techniques: Adaptation, Specialization, and Integration. Quality Assurance Beyond Testing: Defect Prevention and Process Improvement, Software Inspection, Formal Verification, Fault Tolerance and Failure Containment, Comparing Quality Assurance Techniques and Activities.
Quantifiable Quality Improvement: Feedback Loop and Activities for Quantifiable Quality Improvement, Quality Models and Measurements, Defect Classification and Analysis. Risk Identification for Quantifiable Quality Improvement, Software Reliability Engineering

Recommended Books:

1. Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement, Jeff Tian, Wiley-IEEE Computer Society Press, 1st Edition, 2005(or Latest Edition).
2. "Mastering Software Quality Assurance: Best Practices, Tools and Techniques for Software Developers", Murali Chemuturi, J. Ross Publishing, 2010 (or Latest Edition).

ITC-706: Software Evolution **Cr. Hrs. 3(3+0)**

Prerequisites: None Course Outline:

Theory:

Role of requirements engineering in system development, Fundamental concepts and activities of requirements engineering, Information elicitation techniques, Fundamentals of goal-oriented requirements engineering, Modeling behavioral goals, Modeling quality goals, Goal modeling heuristics, Deriving operational requirements from goals, Requirements Specification, Requirements verification and validation, Management of inconsistency and conflict, requirements engineering risks, requirement change control board and process, the role of quality goals in the requirements selection process, Techniques for requirements evaluation, selection and prioritization; Requirements management; Requirements traceability and impact analysis.

Recommended Books:

1. Software Requirements, Karl E. Wiegers, Microsoft Press, 2003(or Latest Edition).
2. Software Requirements Specifictaion, David Tuffley, CreateSpace Independent Publishing Platform, 2010 (or Latest Edition).
3. System Requirements Engineering, Loucopoulos and Karakostas, McGraw-Hill, 1995(or Latest Edition).
4. Requirements Engineering: Processes and Techniques, Gerald Kotonya and Sommerville, John-Wiley Sons, 1998 (or Latest Edition).

ITC-708: Model Driven Software Development Cr. Hrs. 3(2+1)

Theory:

Introduction Web Services, Service-Oriented Development, SOA and Web Services, The Web Services Platform, Service Discovery—Registration and Lookup , Service-Level Communication and Alternative Transports , Atomic Services and Composite Services, Integration and Interoperability Using XML and Web Services, Web Services Composition, Web Services Orchestration and Choreography, Web Services Security, Message-Level Security , Reliable Messaging , SOA Design Patterns, Enterprise Integration Patterns (EIP), Developing Web Services with Java and Apache Axis2, Implementing and Deploying Web services

Practical:

Model-Driven Engineering (MDE) is a unified conceptual framework in which the whole software life cycle is seen as a process of model production, refinement and integration. Models are built representing different views of a software system using different formalisms, i.e. modelling languages. The formalism is chosen in such a way that the model concisely expresses the properties of the system that are important at the current level of abstraction. During development, high-level specification models are refined or combined with other models to include more solution details, such as the chosen architecture, data structures, algorithms, and finally even platform and execution environment-specific properties. The manipulation of models is achieved by means of model transformations. Model refinement and integration continues until a model is produced that can be executed.

Recommended Books:

Understanding SOA with Web Services by Eric Newcomer, Greg Lomow, Understanding Web Services: XML, WSDL, SOAP, and UDDI by Eric Newcomer, SOA Design Patterns by Thomas Erl
Web Services and Service-Oriented Architectures by Douglas K. Barry, Developing Web Services with Apache CXF and Axis2 by K. K. Iok Tong Web Services Essentials by Ethan Cerami

Track 2 (Communication Systems and Networks)

ITC-710: Advance Wireless Communication Cr. Hrs. 3(2+1)

Prerequisites: Internet Architecture and Protocols

Theory:

Course Outline:
Basics of Wireless Local Area Networks. Radio Transmitters and Receivers, Multiple Access Methods: FDMA, TDMA, CDMA, Random Access, ALOHA,Slotted ALOHA, Reservation-based ALOHA. Radio Propagation. Antennas and Transmission Lines. Communication Protocols and Modulation. High-Speed Wireless Data. GSM/Cellular Networks. Indoor Networks. Security in Wireless Local Area Networks. Voice Over Wi-Fi and Other Wireless Technologies. Mobile Ad Hoc Networks. Wireless Sensor Networks. Reliable Wireless Networks for Industrial Applications. Applications and echnologies. Conflict and Compatibility, Ultra-wideband Technology.

Practical:

Generate a real Gaussian noise sequence with zero mean and variance 1. Verify the sequence has a Gaussian distribution. Plot and compare it with the theoretical Gaussian function. What is the average symbol power of the sequence?Process a binary data stream using a Communication System that consists of a base-band modulator, channel and demodulator. Compute the system's BER (Assume 16-QAM)Assume BPSK modulation is used for SNR range of 0-15 dB with a step of 2 dB, length=1000 bits. Simulate BER of the system Plot BER vs. SNR performance for simulated results ,Plot power spectral density of the transmit sequence ,Simulate a QPSK modulation scheme and compare it with BPSK scheme. Plot Path loss curve with respect to distance for different values of path loss exponent between 2 to 6 ,Create a frequency-flat Rayleigh fading channel object. Uses it to process a DBPSK signal. Compare the BER of the system for different values of SNR ,Compare the empirical results with theoretical results and plot them. Create a Rician fading channel object. Uses it to process a DBPSK signal. Compare the BER of the system for different values of SNR Compare the empirical results with theoretical results and plot them.

Recommended Books:

1. Wireless Networking: Know It All by Praphul Chandra, Daniel M. Dobkin,Dan Bensky, Ron Olexa, David Lide, and Farid Dowla, Newnes (September 28, 2007). ISBN-10: 0750685824 (TB1)
2. Wireless Communications & Networks by William Stallings, Prentice Hall;184 2nd Edition (November 22, 2004). ISBN: 0131918354.
3. CCNA Wireless Official Exam Certification Guide by Brandon James, Carroll, Cisco Press; 1st Edition (November 2, 2008). ISBN-10: 1587202115
4. Wireless Crash Course by Paul Bedell, McGraw-Hill Professional; 3rd Edition (September 5, 2012). ISBN-10: 00717978905. Wireless and Mobile Data Networks by Aftab Ahmad, Wiley-Interscience; 1st Edition (July 20, 2005). ISBN-10: 0471670758

ITC-712: Wireless Adhoc & Sensor Networks **Cr. Hrs. 3(3+0)**

Pre-requisites: Multimedia Systems: Theory & Principles

Theory:

Multimedia Basic Concepts, Multimedia Building Blocks. Windows Multimedia Support, Multimedia Database Systems, Multimedia Authoring Tools. Text: Types Of Text, Text Compression. Digital Image Processing. Image Data Types, and Image File Formats. Image Acquisition, Storage Processing, Communication, And Display, Image Enhancement, Image Compression, Audio and Audio Compression. Video: Video Signal Formats, Video Transmission Standards. Video Recording Systems. Video File Formats, Virtual Reality and Multimedia, VR Applications, VR Devices. Virtual Objects Basics of VRML. Animation: Uses of Animation, Types of Animation, Principles of Animation, Techniques and Technologies of Animation. Animation on the Web, 3D Animation, Creating Animation Using Flash, 3DMAX, Maya. Latest developments and Research Trends in Animations Technologies.

Recommended Books:

1. *Principles of Multimedia* by Ranjan Parekh, McGraw-Hill Higher Education. ISBN-10: 0070588333
2. *Multimedia Computing, Communication and Applications* by Ralf Steinmetz and Klara Nahrstedt, Prentice Hall; US edition (July 27, 1995). ISBN-10: 0133244350
3. *Multimedia Making It Work* by Tay Vaughan, McGraw-Hill Osborne Media; 8th Edition (October 29, 2010). ISBN-10: 0071748466
4. *Fundamentals of Multimedia* by Ze-Nian Li, Marks S. Drew, Prentice Hall; 202 1st Edition (November 1, 2003). ISBN-10: 0130618721
5. *Digital Multimedia* by Nigel Chapman and Jenny Chapman, Wiley; 3rd Edition (March 31, 2009). ISBN-10: 0470512164

ITC-714: Internetworking Protocols **Cr. Hrs. 3(3+0)**

Prerequisites: Computer Communication and Networks

Theory:

Network architecture, Networking principles, Network services and Layered architecture, Future Networks. Advanced Technologies, Performance of Networks., Advanced Routing: Routing architecture , Routing between peers (BGP) , IP switching and Multi-Protocol Label Switching MPLS), MPLS Architecture and related protocols, Traffic Engineering (TE) and TE with MPLS, NAT and Virtual Private Networks (L2, L3, and Hybrid), CIDR – Introduction, CIDR addressing, CIDR address blocks and Bit masks. Mobile IP- characteristics, Mobile IP operation, Security related issues. Mobility in networks. Voice and Video over IP (RTP, RSVP, QoS) IPv6: Why IPv6, basic protocol, extensions and options, support for QoS, security, etc., neighbour discovery, auto-configuration, routing. Changes to other protocols, Application Programming Interface for IPv6, Ad Hoc Networking: An Introduction, A DoD Perspective on Mobile Ad Hoc Networks, DSDV: Routing over a Multihop Wireless Network of Mobile Computers, Cluster-Based Networks, DSR: The Dynamic Source Routing Protocol for Multihop Wireless Ad Hoc Networks.

Recommended Books:

1. *Computer Networks: A Systems Approach* by Larry L. Peterson, Bruce S,Morgan Kaufmann; 5th Edition (March 25, 2011). ISBN-10: 0123850592.
2. *Internetworking with TCP/IP Vol –I* by Douglas E. Comer, Addison-Wesley; 5th Edition (July 10, 2005). ISBN-10: 0131876716
3. *High Performance Communication Networks* by Jean Walrand and Pravin Varniya, Morgan Kaufmann; 2nd Edition (October 25, 1999). ISBN-10: 1558605746
4. *Metro Ethernet* by Sam Halabi Publisher: Cisco Press ISBN: 158705096X
5. *Computer Networks* by A. S. Tanenbaum, Prentice Hall; 5th Edition (October 7, 2010). ISBN-10: 0132126958

ITC-716: Virtual Reality& Interactive Communication Systems Cr. Hrs. 3(2+1)
Prerequisites: Enterprise Data Centre Design and Methodology

Theory:

Virtualization, Virtualization Types, Virtualization Management, Cloud Computing, Service Models, Cloud Adoption and Barriers, Return on Investment and Cloud Benefits; Typical Design Patterns and Use Cases, Design Patterns, Cloud Use Cases, Deployment Models, IaaS as a Foundation, Cloud Consumer Operating Model. Data Centre Architecture and Technologies. IT Services. The Cisco Cloud Strategy. Cloud Management Reference Architecture. Cloud Service Fulfilment. Cloud Service Assurance. Billing and Chargeback. Technical Building Blocks of IaaS. Automating and Orchestration Resources. Cloud Capacity Management. Case Study – Hybrid Cloud: Cisco Cloud Enablement Services, Company Profile, Business Goals, Cloud Strategy, Cloud Maturity, IT Platform, Cloud Reference Model, Private Cloud Services, Orchestration and Automation Transition Architecture, Telco Solution, Solution, Out-of-the-Box Services, Diggit Service Requirements.

Practical:
Introduction to Cloud Computing, Data center Architecture, Virtualization- XEN – KVM and VMWARE, Virtualization – VM Migration, Infrastructure as a Service - Eucalyptus and Nebulus, Cluster File Systems : GFS and Megastore, Security and Privacy in Clouds, Data Intensive Cloud Computing – MapReduce and Hadoop, Data Intensive Cloud Computing Hive, Cassandra, facebook, Cloud Computing Applications.

Recommended Books:

1. *Cloud Computing: Automating the Virtualized Data Centre* by Venkata Josyula, Malcolm Orr and Greg Page, Cisco Press; 1st Edition (December 9, 2011). ISBN-10: 1587204347.

2. *IT Virtualization Best Practices: A Lean, Green Virtualized Data Centre, Approach* by Mickey Iqbal, Mithkal Smadi, Chris Molloy, and Jim Rymarczyk, Mc Press; 1st Edition (January 1, 2011). ISBN-10: 1583473548

3. *Microsoft Private Cloud Computing* by Aidan Finn, Hans Vredevoort, Patrick Lownds, and Damian Flynn, Sybex; 1st Edition (July 10, 2012). ISBN-10: 1118251474

4. *Advanced Server Virtualization: VMware and Microsoft Platforms in the Virtual Data Centre* by David Marshall , Wade A. Reynolds, and Dave McCrory, Auerbach Publications; 1st Edition (May 17, 2006). ISBN-10: 0849339316

5. *Data Center Virtualization: A practical guide to successful deployments of a Virtualized Data Center Infrastructure* by Sukento Sukirya, Pete Gore, Brian Clay, and Pierre Vachon, Cisco Press (December 14, 2003). ISBN-10: 1587050234.

Note: -

3rd and 4th Semester/Term are Research work