

**DEPARTMENT OF INFORMATION & COMMUNICATION ENGINEERING
FACULTY OF APPLIED SCIENCE AND TECHNOLOGY
ISLAMIC UNIVERSITY**

**COURSES FOR M. PHIL. DEGREES
SESSION : 2010 – 2011**

The admission to the M.Phil Courses in the Department of Information & Communication Engineering shall be in accordance with the ordinance for the degree of Master of Philosophy. A student admitted to the M.Phil degree shall be required to undertake any 3(three) of the following courses of 100 marks each as determined by his/her research supervisor and 50 marks oral examination. The pass mark for each course will be 50%. The duration of examination shall be 4(four) hour for each course. A student admitted to the M. Phil course shall be required to complete his/her course work as a fulltime student by the end of the first academic year. An M.Phil student complete his/her MPhil work in two academic years. After qualifying the course examination the student shall have to submit a thesis on the approved topic and attend in an oral examination in accordance with the respective ordinances.

Course No.	Course Title	Marks
ICE 601:	Computer Peripherals and Interfacing	100
ICE 602:	Digital Signal Processing	100
ICE 603:	Digital Switching Systems	100
ICE 604:	Data Communications and Computer Networking	100
ICE 605:	Computer Graphics and Animation	100
ICE 606:	Multimedia Technology and Applications	100
ICE 607:	Web Techniques and Applications	100
ICE 608:	High-Speed and Broadband Networks	100
ICE 609:	Software and Database in Telecommunication	100
ICE 610:	Optical Communications	100
ICE 611:	Advanced Artificial Intelligence	100
ICE 612:	E-commerce and E-governance	100
ICE 613:	Wireless Communication	100
ICE 614 :	Telecommunication Management & Policy	100
ICE 615 :	Data Mining	100
ICE 616 :	Neural Networks	100
ICE 617 :	Oral Examination	50

Department of Information & Communication Engineering

Syllabus for M. Phil. Courses

ICE 601 : Computer Peripherals and Interfacing

Full Marks : 100 Time : 4(four) Hours

Microprocessor Basics: A basic microprocessor system: the CPU, memory, I/O, and buses subsystems, basic operation of a microprocessor system: fetch and execute cycle, the architecture of some typical 8-bit microprocessors, microprocessors and micro-controllers, some typical 8-bit micro-controllers and their features

The Intel 8051 Micro-controller: Features of the 8051 family, block diagram and definitions of the pin of the 8051, I/O port structure, memory organization: general purpose RAM, bit addressable RAM, register bank, special function registers, external memory, memory space mapping and decoding, bus control signals timing, a typical 8051 micro-controller based system.

Instruction Set and Assembly Language Programming: Addressing modes, the 8051 instruction set and typical examples, assembler operation, assembly language format, assembler directives, operation of assemblers and linkers, programming examples.

On-chip Peripheral Devices: I/O ports: operations and uses of port 0, port 1, port 2, port 3, timers: their operations, programming, and applications, serial port: operations and programming, typical applications.

Interrupt System: Organization of the interrupt system, interrupt vectors, interrupt timings, serial port interrupts, and external interrupts, implementation of single and multiple interrupts.

Interfacing Examples: Interfacing to external memory, keypad, seven-segment LED display, ADC and DAC chips, and input / output port expansion, description and uses of hardware development tools. Design and operation of interface between computer and the outside world; sensors, transducers and signal conditioning circuits, interfacing memory, and I/O devices such as monitors, printers, disk drivers, optical displays, some special interface cards, stepper motors and other peripheral devices, IEEE-488, RS-232 and other buses, Study and applications of peripheral chips including 8212, 8155, 8255, 8251. Character peripherals: Key boards, printers (dot-matrix, laser, ink-jet) VDUS, computer graphics hardware, plotters, disk-drivers, CD-ROM.

Books Recommended:

ICE 602: Digital Signal Processing

Full Marks : 100

Time : 4(four) Hours

Discrete Time Signals & Systems: Discrete-time signals, Discrete-time systems, Linear Time-Invariant systems and their properties, Linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems, Fourier transform of discrete sequences, Discrete time processing of continuous signals.

z-Transform and Its Applications: Definition of z-transform, Region of Convergence, Properties of z-Transform, Inversion of the z-Transform, Analysis of Linear Time-Invariant Systems in the z-Domain.

Structure of Discrete Time Systems: Block diagram representation of constant coefficient difference equations, IIR and FIR systems and their basic structures, Stability of discrete time systems.

Discrete-Time Fourier Analysis: Discrete Fourier Transform and its properties, Inverse Discrete Fourier Transform, Linear Convolution using Discrete Fourier Transform, Fast Fourier Transform, Decimation in time and Decimation in frequency.

Digital Filter Design and Applications: IIR filter design, bilinear z-transform design approach, IIR filter realization, FIR filter design, realization of FIR filter, application examples.

Books Recommended:

1. Allen V. Oppenheim & Randal W. Schaffer, "Discrete-Time Signals & Systems", Prentice Hall.
2. Lonnie C. Ludeman, "Fundamentals of Digital Signal Processing", John Wiley and Sons.
3. J.G. Proakis & D.G. Manolakis, "Introduction to Digital Signal Processing", Maxwell Macmillan, 1988.
4. Proakis, Manolakis, "Digital Signal Processing"

ICE 603: Digital Switching Systems

Full Marks : 100

Time : 4(four) Hours

Evolution of Switching Systems: step by step and crossbar, stored program control (SPC); digital and time division switching

Switching System Architecture: subscriber and line interface, switching network, control unit; timing and synchronization, operation and maintenance; switching process: call detecting, number analysis, call routing; supervision and metering; environmental requirements and power feeding

Internal Structure of the Digital Switch: time switches and space switches, matrix and channel graph representations; path searching, non-blocking networks

Control Units and Software: processor systems architecture and functions, reliability and fault recovery; software organization, man machine interface (MMI)

Signaling Equipment and Systems: signaling functions, analog and digital subscriber signaling; signaling within an exchange, voice frequency and out band register and line signaling; common channel signaling

New Trends in Switching Systems: switching systems with ISDN capability, broadband switching; synchronous digital hierarchy (SDH), Asynchronous Transfer Mode (ATM); Intelligent Networks

References:

1. B.E. Briley *An Introduction to Telephone Switching* Addison-Wesley, 1983.
2. J.C. McDonald *Fundamentals of Digital Switching*, Plenum Publishing, 1983.
3. R.O. Onvural *Asynchronous Transfer Mode Networks* Artech House, 1994.

ICE 604: Data Communications and Computer Networking
Full Marks : 100 Time : 4(four) Hours

Introduction to Data Communications: Simple data communications network. Transmission definitions, one way transmission, half duplex transmission, transmission codes, transmission modes, parallel transmission, serial transmission, bit synchronization, character synchronization, synchronous transmission, asynchronous transmission, efficiency of transmission. error detection methods and data compression.

Interfacing: Interfaces for simple computer system and terminal to terminal. MODEM, terminal interfaces, CCITT V.24/RS-232, CCITT V.28, V.35, GPIB, EIA, RS-232C standard, speed and distance limitations for V.24, RS-232C, RS-449/422/423 interfaces and standards, signal propagation delay, ISDN interface.

Protocols: Introduction to network protocol. Seven Layer ISO-OSI standard protocols and network architecture. Transport protocols, session services protocols, and other protocols.

Local Area Networks: Distributed system, PBX and cable based LANs. Topology: star, ring, bus. Medium access control methods: CSMA/CD, control token, token ring, and token bus. Fiber Distributed Data Interface and ATM technologies. High speed and bridged local area networks. Cyclic redundancy check (CRC). Network operating system.

Wide Area Networks: Characteristics of public data networks, packet-switched data networks, circuit switched data networks, ISDN.

Inter-networking: Internetworking architectures, internetworking issues, network layer structure. Router and gateway. Internet protocol standards. Internet IP, routing protocols. Addressing. Domain Name System. Connectionless datagram delivery. Internet protocol suite. Internet application protocols. Internet management.

Network management systems: fault, accounting, configuration and name, performance and security. Network management protocol. LAN network-control center.

ICE 605: Computer Graphics and Animation
Full Marks : 100 Time : 4(four) Hours

Advanced Graphic Techniques: Graphic basics, Three dimensional drawings. Geometric forms and models. Hidden surfaces, Fractals; Advanced rendering Techniques: Shadow generation techniques, Texture and environment mapping techniques; procedural texture mapping and modeling. Ray tracing, Radiosity methods, Global illumination models. Volume rendering technique; Advanced animation : animation articulated structures. Soft object animation, Procedural animation.

ICE 606: Multimedia Technology and Applications
Full Marks : 100 Time : 4(four) Hours

Introduction: Multimedia today, The impact of multimedia, Bit technology, Multimedia systems, components and technology, applications.

Multimedia Components: Text, data, audio, image, video.

Multimedia Systems: Integration, storing and presentation of multimedia; Comparison of analog and digital recording; System integration and coordination; Real-time recording and transmission; Error recovery; Video conferencing systems: configuration, functions, transmission, and technology.

Multimedia Over the Networks: Hypertext: concepts, Hypertext Markup Language (HTML), HTML programming and multimedia document design. An introduction to XML; Uniform Resource Locators (URL); Protocols; Common Gateway Interface (CGI) processing; MIME specification; Script language; Platform independent language, byte-code and interpreter; Multimedia application over the Intranet and the Internet.

Books Recommended:

Prabhat K. Andleigh and Kiran Thakrar, "Multimedia system design" Prentice Hall, 1996.

Ralf Steinmetz and Klara Nahrstedt, "Multimedia Computing", Prentice Hall, 1995.

S.V. Raghavan and Satish K. Tripathi, "Networked Multimedia systems: concept, Architecture and design" Prentice Hall, 1998.

John F. Koegal Buford, "Multimedia systems", Addison wesley, 1994.

Francois Fluckiger, Understanding Networked Multimedia: Applications and Technology", Prentice Hall, 1995.

Bodhan O.Szuprowicz, "Multimedia Networking" Mc Graw Hill, 1995.

Thomas A. Powell, "The complete Reference HTML Osborne Mc Graw Hill, 1998.

Alex Homer, XML IE 5 : Programmer's Reference, 1999.

Wrox Press Laura Lemay, "Teach Yourself with HTML 4, 4th edition Sams.net Publishing, 1996.

Jason J. Manger, "Java Script Essentials" McGraw Hill, 1996.

ICE 607: Web Techniques and Applications
Full Marks : 100 Time : 4(four) Hours

Introduction to the World Wide Web (3 hours): The Internet, The Transmission Control Protocol, The Hypertext Transfer Protocol, Hypertext, Client-Server environment: Browsers and Web Servers, Uniform Resource Locators, Web Navigation, Net Information Space Searching.

Web Software, Connections, and Hardware (6 hours): Internet Service Providers, Types of Internet Connections, Intranets & Extranets, Browsers: Netscape Communicator, Internet Explorer, Browser Plug-Ins, Helper Applications, Web Authoring Tools, Internet Hardware Requirements.

Introduction to Web Programming and Scripting (10 hours): Introduction to Hypertext Markup Language, HTML Standards, HTML Extensions, Types of Web pages, Web page Basics: HTML Tags, Text and Information, Links, Lists, Tables, Multimedia: Graphics, Audio, Video, Enhanced Features: Image Maps, Counters, User Interaction: Forms, CGI, PERL, Java, Design Considerations, Dynamic Web pages, Active Server Page, XML, WML, WAP-enabled databases, Webpage Design Tools.

Website Maintenance (6 hours): Designing and Managing Websites, Connecting to the Web Provider, Publishing Web pages, Website Maintenance Tools, Factors Affecting Website Performance, Interfacing with Other Information Servers, Internet and WWW Standardization Activities, Guidelines for the Evaluation of New Technologies, Strategies for Integrating New Technologies in a Web Environment.

Web Applications (5 hours): Transactions through the Web, Web Portals: Internet Marketing Basics; Developing and Integrating Internet Communication Strategy; Creative Strategies, Business Models, Online Databases, VRML, Security and Legal Considerations, Future Trends.

ICE 608: High-Speed and Broadband Networks
Full Marks : 100 Time : 4(four) Hours

Evolution and Technical Foundation: Evolution and Convergence, Telecommunications, Computer Data Networks, Broadcast Networks, Technical Foundation, Modulation Techniques, Error Detection and Correction Techniques, Challenges and Limitations of the transmission Medium.

DSL Access Networks: The State of Affairs, Challenges of the Local Loop, The DSL Family.

Emerging Broadband Access Technologies: Emerging Passive Optical Network Technologies, Ethernet Optical Networks (EPONs), Gigabit Ethernet as a Broadband Access Technology, HPPI.

Frame Relay: Frame Relay: protocol architecture, UNI, call control, congestion control. Multi-protocol encapsulation, Voice over Frame Relay, NNI, multicasting.

ATM Architecture and Protocols: Basic concepts: services, protocol layers, cell, virtual path, virtual channel, VPC, VCC, service categories and QoS parameters. Physical Layer: functions, PDH, FDDI, and SDH alternatives. ATM Layer: functions and protocol operation. AAL: functions, AAL types, operational details of each type. ATM Interfaces: public and private UNI and NNI, DXI, user plane, control plane, and management plane functions.

ATM Switching and Signaling: ATM switching requirements. ATM switch architectures: input module, output module, switch fabric, queuing and buffering options. ATM signaling: SAAL, BISUP, Q.2931, PNNI.

ATM Traffic Management, Congestion Control, and Traffic Engineering: Traffic contract, QoS classes and parameters, traffic descriptors and tolerances, leaky bucket algorithm. Usage/Network parameter control, priority control, traffic shaping, connection admission control, resource management. Congestion control categories, congestion management, congestion avoidance, tagging, blocking, window-based, rate-based, and credit-based flow controls, congestion recovery. Traffic source models, performance of buffering methods, performance of CBR and VBR .

Books Recommended:

"Broadband Networking: ATM, SDH and SONET", Mike Sexton and Andy Reid, Artech House Publishers, Norwood, MA.

"Broadband Networking", Glen Carty.

D.Minoli, "Broadband Network Analysis and Design", Artech House, 1993.

R.O.Onvural, "Asynchronous Transfer Mode Networks, Performance Issues", Artech House, 1995.

L.G.Cuthbert, J.C.sapanel, "ATM", IEE, 1993.

P. Bocker, "ISDN The Integrated Service Digital Network", Springer-Verlag, 1988.

ATM Networks: Concepts, Protocols, Applications, Rainer Handel, Manfred N. Huber, Stefan Schroder, Addison-Wesley, 1994.

ATM switching systems, Thomas M. Chen, Stephen S. Liu, Artech House, 1995.

Broadband Integrated Networks, Mischa Schwartz / Hardcover / Published 1996.

Telecommunication Networks : Protocols, Modeling, and Analysis, Mischa Schwartz / Hardcover / Published 1986.

Computer-Communication Network Design and Analysis, Mischa, Schwartz / Published 1977.

ICE 609: Software and Database in Telecommunication
Full Marks : 100 Time : 4(four) Hours

Part I: Software in Telecommunication

Introduction to telecommunication systems: Historical background: from simple switching machines to intelligent systems. Hardware and software evolution. System architecture examples of typical telecommunication system: the GSM system.

Architecture of telecommunication systems: Mapping of software components in a telecommunication system. Software components of telecommunication systems: database, distributed database, real-time software,

etc. Constraints on the software components: real-time behavior, service continuity, hardware limitations, software and hardware integration, software and hardware dimensioning, hardware price vs. software price, standardization, legacy constraints, etc.

Telecommunication software development: Introduction. Examples of life cycles (V life cycle, Y life cycle, spiral life cycle, etc. Methods and tools for: requirement capture, analysis, specification, architecture, design and development.

Introduction: issues regarding the choice of a specific design technique.

Finite state machines: the SDL language. OO modeling: the UML language, design patterns, standardization trends.

Programming: Overview of programming languages (C, C++, Java) in telecommunication. Real-time programming. Programming for embedded systems. Performance and memory management. Configuration management.

Interfaces definition: Problem overview. Transparency of distribution. Distributed OO: the CORBA solution, the Java solution. Interface specification in TMN.

System tests: Introduction. Unit tests. Software integration tests. Hardware integration tests. Embedded software tests. Performance and conformance tests. Testing of OO software. CASE to test: Attols, Insure, Hindsight, etc.

Project management: Introduction. Project organization, teams, methods and tools for project management. Organization constraints on development (location, teams competencies, tools, etc.) Metrics: quality measurement (GQM), and prediction (Cocomo, function point's analysis, etc).

Part II - Database in Telecommunication

Introduction to database: Database in telecommunication systems. The Switch example. Constraints on a Switch database (size, real-time aspects, security, etc).

Database environment: Traditional file-based systems, database approach, roles in database environment, the history of database systems, advantage and disadvantage of database systems The three level ANSI-APAC architecture, database languages, data models and conceptual modeling, functions of a DBMS, concepts of a DBMS, multi-user DBMS architecture, data dictionary.

Relational Databases: The concepts of entity-relationship models, structural constraints, problems with ER models, and the enhanced ER model, Normalization. (Practice and examples based on Oracle or Access). Introduction to SQL, writing SQL commands, data manipulation and definition, comparison with QBE.

Object Database: Object programming and relational databases: mapping of objects to tables (examples based on JDBC). OODBMS, extended relational systems, OO database design. (Practice and Examples based on O2 or Objectstore).

Database planning, design and administration: Overview of the information systems life cycle, the database application life cycle, database design, CASE support, DMS selection, data and database administration.

Database trends in telecommunication: Real-time database, Multimedia database, WWW servers and database, 3D image

Books Recommended:

Edited by Salah Aidarous and Thomas Plevyak, "Telecommunication network management into 21st century: techniques, standards, technologies and applications", Institute of Electrical and Electronics Engineers, Inc.

Thomas Connolly, Carolyn Beggs, Ann Strachan, "Database systems", Addison-Wesley, 1996.

Abraham Silberschatz, Henry F.Korth, S.Sudarshan, "Database system concepts" 3rd ed., Macgraw-Hill.

Thomas J. Mowbray and Ron Zahavi. "The essential CORBA - Systems integration using distributed objects." John Wileys & Sons, 1995. ISBN 0-471-10611-9.

ISO/IEC/JTC1/SC7/WG7. "ISO/IEC 12207, Information Technology - Software life cycle process." 1995.

David Whitgift. "Methods and tools for software configuration management." 1991.

M. Awad, J Kuusela, J. Ziegler. "Object-oriented technology for real-time systems. A practical approach using OMT and Fusion". Prentice Hall.

J. Rumbaugh, M. Blaha, F. Eddy, W. Premerlani. W. Lorenzen. Object oriented modeling and design." Prentice Hall, 1991.

Barry Boehm. "A spiral model of software development and enhancement." Computer, 1988.

Grady Booch, Ivar Jacobson and James Rumbaugh. "The unified modeling language for object-oriented languages". Documentation set version 0.91. Appendix. UML update. September 1996.

Bruce I. Blum. "Software engineering: an Holistic View." 1992.

Erich Gamma, Richard Helm, Raph Johnson and John Vlissides. " Design Patterns - Elements of reusable object-oriented software." Addison-Wesley, 1995

ICE 610: Optical Communications

Full Marks : 100 Time : 4(four) Hours

Introduction: Fundamentals of optical communications, Five generations of optical communications;

Fiber geometry: step-index and graded-index fibers, wave propagation in fiber, dispersion in optical fibers: first order and higher order dispersions, dispersion induced self-phase modulation, nonlinear effects in optical fibers, fiber loss characteristics, dispersion shifted fibers;

Optical Receivers: Block diagram of direct detection receivers, P-I-N and Avalanche photodiode receivers, receiver design considerations;

Coherent Light-wave Systems: Principles of coherent and non-coherent detection, Modulation formats: ASK, PSK, FSK, PPM, DPSK; Demodulation schemes, Bit error rate performance analysis, Performance degradation due to laser phase noise, group velocity dispersion, self phase modulation, polarization mode dispersion, relative intensity noise, effect of timing jitter;

Optical Amplifiers: Basic principles of optical amplifiers, Amplifier noise, Amplifier gain characteristics, Amplifier performance analysis, System applications.

Multi-channel Light wave Systems: Optical multiplexing schemes, WDM components, Cross-talk in multi-channel systems.

Free space Optical Links, Optical Networks: Network topology, Network building blocks; LAN and WAN, Broadcast and select optical networks: single hop and multi hop networks

Books Recommended:

1. Fiber-optic Communication Systems - Gobind P. Agrawal, Wiley Series in Microwave and Optical Engineering, Second Edition, John Wiley & Sons Inc.
2. Coherent Optical Communication Systems - S. Betti, G. D. Marchis, E. Iannone, Wiley Series in Microwave and Optical Engineering, Second Edition, John Wiley & Sons Inc.
3. Optical Communication networks - B. Mukherjee, McGraw Hill, 1997.
4. Optical Networks- A Practical Perspective - R. Ramaswami and K. N. Sivarajan, Morgan Kaufmann Publisher, Inc., San Francisco

ICE 611: **Advanced Artificial Intelligence**

Full Marks : 100 Time : 4(four) Hours

Introduction, Advanced search techniques in AI, Knowledge based system design, advanced plan generating systems, Bayesian network and probabilistic reasoning Learning in neural belief networks, practical natural language processing, Computer vision, Introduction to Robotics.

ICE 612: **Electronic Commerce and Governance**

Full Marks : 100 Time : 4(four) Hours

Introduction to e-commerce : Overview, Candidate Models, web Resources; **Security and Encryption :** Computer and Network Security Risks, Digital Certificates, Encryption and PGP, Firewalls, Transaction Security; **Electronic Payment Systems :** Web based payment Systems : Web based payment system based on credit cards, checking accounts and cash; **Business to consumer e-commerce :** e-commerce business models, On-line publishing, On-line customer Service and Support, On-line Banking; **Legal Issues:** Intellectual Property, Copyright, Trademark and Patents, Cyber Crime and Money Laundering.

Introduction to e-governance : Overview, Understanding the basic concepts of e-governance.

Books Recommended:

Charles Trepper, E-Commerce Strategies, Prentice -Hall.

ICE 613: Wireless Communication

Full Marks : 100

Time : 4(four) Hours

Introduction to Wireless Communication: evolution of mobile communications, mobile radio systems around the world, trends in cellular radio and personal communications.

Modern Wireless Communication Systems: Second Generation (2G) Cellular Networks, Third Generation (3G) Wireless Networks, Wireless Local Loop (WLL) and LMDS, Wireless Local Area Networks (WLANs), Bluetooth Personal Area Networks (PANs).

The Cellular Concept-System Design Fundamentals: Introduction, frequency reuse, channel assignment Strategies, handoff Strategies, interference and system capacity, trunking and grade of service, improving coverage and capacity in cellular systems.

Mobile Radio Propagation-Large scale path loss: Introduction to radio wave propagation, Free space propagation model, relating power to electric field, basic propagation mechanisms, Reflection, Ground reflection (Two Ray), Diffraction, Scattering, Practical Lin Budget design using path loss models, outdoor and indoor propagation models.

Mobile Radio Propagation- Small Scale Fading and Multi-path: Small scale multipath propagation, Impulse response model of a multipath channel, Small-scale multipath measurements, Parameters of mobile multipath channels, types of small scale fading, Rayleigh and Ricean distributions, statistical models for multipath fading channels, Theory of multipath shape factors for small scale fading wireless channels.

Modulation Techniques for Mobile Radio: Frequency modulation vs. Amplitude modulation, Amplitude modulation, angle modulation, digital modulation, digital modulation, line coding, pulse shaping techniques, geometric representation of modulation signals, linear modulation techniques.

Equalization, Diversity, and channel coding: Introduction, fundamentals of equalization, linear inequalities, nonlinear equalization, algorithms for adaptive equalization, diversity techniques, interleaving, fundamentals of channel coding.

Speech Coding: Introduction, Characteristics of speech signals, quantization techniques, ADPCM, Frequency domain coding of speech, vocoders, linear predictive coders.

Multiple Access techniques for Wireless communications: Introduction, FDMA, TDMA, spread spectrum multiple access, SDMA, packet radio, reservation protocols, capacity of cellular systems.

Recommended Books:

Wireless Communications, Theodore S. Rappaport

Wireless and Mobile Network Architectures, Yi-Bing Lin, Imrich Chlamtac.

ICE 614 : Telecommunication Management & Policy

Full Marks : 100

Time : 4(four) Hours

Topic covered:

Technologies for Telecommunications Network Management: Introduction and overview, Management Information Models, Access and distribution Paradigm.

Management platforms: Introduction, Methods and Tools, Standards and Platform Building Blocks .

Management of PCS networks: Introduction, Management Approaches, Reference Models, Requirements, Management Functions.

Managing Mobile Networks: Introduction, Managing the Elements, Managing different layers.

Architectural Integrity: Introduction, TMSs in the context of the S&NI Life Cycle, Architectural Integrity as a countermeasure to complexity.

Telecommunications Network Management: Introduction, TMN functions, TMN reference points, Interconnecting functions through reference points, TMN manager and agent.

Telecommunication Policy : Introduction, Policy adapted by different telecommunication system approach.

Books Recommended:

Salah Aidarous, Thomas Plevyak, Telecommunications Network Management, IEEE Press, 1998

Uyless Black, Network Management Standards, McGraw-Hill, 1994 .

ICE 615 : Data Mining

Full Marks : 100

Time : 4(four) Hours

Data Mining Concepts

Learning from Data

Data Preparation

Data Reduction

Statistical Methods

Cluster Analysis

Decision Trees and Decision Rules

Artificial Neural Networks

Association Rules

Genetic Algorithm

Fuzzy Sets and Fuzzy Logic

Network Structure Learning

Visualization Methods

Performance Evaluation

Resources

[Kantardzic 2003] M. Kantardzic, Data Mining – Concepts, Models, Methods, and Algorithms, IEEE Press, 2003

[Ye 2003] N. Ye, The Handbook of Data Mining, Lawrence Erlbaum, 2003

[Orengo 2003] C. Orengo, D. Jones, and J. Thornton, Bioinformatics – Genes, Proteins, and Computers, BIOS, 2003

[Baldi 2002] P. Baldi and G. Harfield, DNA Microarrays and Gene Expression, Cambridge Univ. Press, 2002

ICE 616 : Neural Networks

Full Marks : 100

Time : 4(four) Hours

Overview and Basics Course Overview, Single-layer Perceptron,

Artificial Neural Networks with Supervised Learning Rules, Multi-layer Perceptron.

Radial basis Function Networks, Support Vector Machines (1), Support Vector Machines (2), Committee Machines

Artificial Neural Networks, with Unsupervised Learning Rules, Non-negative Matrix Factorization

Competitive Learning and Self-Organizing Map

Information-Theoretic Models (1), Information-Theoretic Models (2)

Statistical Neural Networks Belief Networks, Temporal Neural Networks

Neurodynamic Programming, Temporal Processing, Neurodynamics

Recurrent Neural Networks, Advanced Topics, More Biologically-Motivated Neural Networks

Textbook

Simon Haykin, Neural Networks, Prentice-Hall, New Jersey.

References

List of references and reading materials will be presented at class.