M.E. Communication Engineering

Semester wise Pattern for Students Admitted to Higher Degree Programmes in the First Semester						
First Semester		U	Second Semester			U
M.E. Communication Engineering						
G613	Advanced Digital Signal Processing	5	BITS	G540	Research Practice	4
G581	RF and Microwave Engineering	5	EEE	G592	Mobile and Personal Communication	5
G612	Coding Theory and Practice	5	EEE	G622	Advanced Digital Communication	5
	Elective	*			Elective	*
		18				17
G591	Optical Communication	5	BITS	G629T	Dissertation	16
	Elective	*			or	Or
	Elective	*	BITS	G639	Practice School	20
	Elective	*				
		14				16/20

List of Core Courses

EEE G581   RF and Microwave Engineering
EEE G591   Optical Communication
EEE G592   Mobile and Personal Communication
EEE G612   Coding Theory and Practice
EEE G613   Advanced Digital Signal Processing
EEE G622   Advanced Digital Communication

List of Elective Courses (Any Five)

BITS F415   Introduction to MEMS
BITS G553   Real-Time Systems
BITS G554   Data Compression
CS F303   Computer Networks
CS F401   Multimedia Computing
CS F413   Internetworking Technologies
CS G541   Pervasive Computing
CS G553   Reconfigurable Computing
CS G555   System Specification and Modeling
EEE F414   Telecommunication Switching Systems and Networks
EEE F472   Satellite Communication
EEE F474   Antenna Theory and Design
EEE G510   RF Microelectronics
EEE G512   Embedded System Design
EEE G521   Optoelectronic Devices, Circuits, and Systems
EEE G522   Advanced Satellite Communication
EEE G582   Telecom Network Management
EEE G613   Advanced Digital Signal Processing
EEE G626   Hardware-Software Co-Design
EEE G627   Network Embedded Application
EEE G641   Applied Estimation Theory
IS F462   Network Programming
MEL G621   VLSI Design
MEL G622   Introduction to Artificial Neural networks

Course Descriptions

EEE G581 RF & Microwave Engineering   [3 2 5]

Introduction to radio frequency engineering; advantages; various frequency bands; propagation; transmission lines; microwave waveguides and components; their characterizations; s-parameters and their use; microwave transistor; FETs, Gunn diode, IMPATT diodes; microwave tubes; Klystron; two cavity Klystron amplifier analysis; reflex Klystron; TWTs; high power tubes; cross field tubes; microstrip lines; MMICs; microwave measurements; microwave antennas and microwave communication system; microwave applications; ISM applications; introduction to EMI and EMC; microwave hazards.

EEE G591 Optical Communication   [3 2 5]

Optical communication systems and components optical sources and transmitters (basic concept, design, and applications); modulators (electrooptic, acousto-optic and laser modulation techniques); beamforming; focussing and coupling schemes to optical repeaters; optical amplifiers; optical field reception; coherent and non-coherent lightwave systems; fiber optic communication system design and performance; multichannel lightwave systems; long haul communications; fiber-optic networks.

EEE G592 Mobile & Personal Communication   [3 2 5]

History of mobile radio; the mobile radio signal environment; review of statistical techniques; path over flat as well as hilly terrain; effects of RF system design on propagation; received signal envelope and phase characteristics; modulation schemes employed; functional design of mobile radio systems, diversity schemes-space; frequency and polarization diversity; mobile radio system functional design; signal error analysis versus performance criteria; multiple access schemes; classification of the concepts of sensitive topics; new concepts data transmission via cellular; spectrum and technology of WLL

EEE G612 Coding Theory & Practice   [3 2 5]

Codes for data-compression: instantaneous codes; Kraft inequality; Mcmillan theorem; Huffman codes; codes for error detection and correction; binary symmetric channel; channel capacity, Shannon's fundamental theorem; linear codes; Macwilliam's identity; Reed-muller codes; cyclic codes; BCH codes; codes for secrecy and security; private-key cryptosystems; affine codes; twisted codes; one-time-pads; public-key cryptosystems based on large primes and discrete logarithms.

EEE G622 Advanced Digital Communication   [3 2 5]

Introduction to Digital communication, review of probability and statistic processes; review of source coding and characterization of signals; optimum receivers for additive white gaussian noise channel; carrier & symbol synchronization; channel capacity & coding; block & convolutional codes; communication through band-limited linear filter channels; adaptive equalization multicarrier systems; digital communication through fading multipath channel; future trends in digital communication

EEE G613 Advanced Digital Signal Processing   [5]

Review of stochastic processes, models and model classification, the identification problem, some field of applications, classical methods of identification of impulse response and transfer function models, model learning techniques, linear least square estimator, minimum variance algorithm, stochastic

approximation method and maximum likelihood method, simultaneous state and parameter estimation of extended Kalman-filter, non-linear identification, quasi linearization, numerical identification methods.

BITS G540 Research Practice [4]

This course is designed to train the students towards acquiring competence in research methodologies. The course will be conducted in terms of actual participation in Research and Development Work. Each student will be assigned to a faculty member to work on specified projects. The student will be required to present some seminars in his research area in a structured manner.

BITS G553 Real Time Systems [5]

Real-time software, Real-time operating systems scheduling, virtual memory issues, and file systems, real-time databases, fault tolerance, and exception handling techniques, reliability evaluation, data structures, and algorithms for real-time/embedded systems, programming languages, compilers, and run time environment for real-time/embedded systems, real-time system design, real-time communication and security, real-time constraints and multi-processing and distributed systems.

BITS G554 Data Compression [5]

Introduction: the need for data compression. Information theory and data compression; Entropy, Relative entropy, and mutual information. Fano's inequality. Types of information sources, and source extension. Asymptotic equipartition property and data compression. Entropy rates of stochastic processes. Kraft inequality, Prefix codes, Huffman codes, and Arithmetic coding. Quantization and Rate distortion theory. Lossy image compression techniques based on DCT, VQ, and Fractals. Introduction to wavelets: continuous and discrete wavelet transforms. Filter banks and wavelets. Frames and tight frames. Wavelet packets. Wavelet-based signal processing. Joint source and channel coding.

CS C461 Computer Networks [3 0 3]

Evolution of communication and computer networks, protocol layering, network reference models, multiple access protocols, local area networks, packet, and circuit switching, switching fabrics, network performance analysis and simulation techniques; addressing, routing, flow and congestion control, IP protocol; Broadband Integrated Services Digital Network (B-ISDN); Asynchronous Transfer Mode (ATM) reference models; network interoperability, traffic management and quality of service in integrated network protocol design and implementation strategies

CS G541 Pervasive Computing [4]

Select application architectures; hardware aspects; human-machine interfacing; device technology: hardware, operating system issues; software aspects, java; device connectivity issues and protocols; security issues; device management issues and mechanisms; the role of the web; wap devices and architectures; voice-enabling techniques; PDAs and their operating systems; web application architectures; architectural issues and choices; smart card-based authentication mechanisms; applications; issues and mechanisms in WAP-enabling; access architectures; wearable computing architectures.

CS G553 Reconfigurable Computing [5]

Overview of Programmable Logics. FPGA fabric architectures. Logic Elements and Switch Networks. Design and Synthesis of Combinational and Sequential Elements. Placement and Routing. Pipelining and other Design Methodologies. Fine-grained and Coarse-Grained FPGAs. Static and Dynamic

Reconfiguration. Partitioning. Hardware/Software Portioning and Partial Evaluation. Systolic Architectures.

EA C415 Introduction to MEMS [4]

Overview, history and industry perspective; working principles; mechanics and dynamics, thermofluid engineering; scaling law; microactuators, microsensors, and microelectromechanical systems; microsystem design, modeling, and simulation; materials; packaging; microfabrication: bulk, surface, LIGA, etc; micromanufacturing; microfluidics; micro-robotics; case studies.

EA C451 Internetworking Technologies [3 0 3]

Introduction to internetworking concepts; the internet architecture; goals and key issues related to internetworking technologies; design aspects; HTTP and other relevant protocols; agent technology and tools relevant to the internet; techniques of data compression; voice, video, and interactive video-on-demand over the internet; multimedia operating systems and their impact; multimedia networking; mobile computing; internet security; case studies.

EA C473 Multimedia Computing [3 0 3]

Introduction to multimedia; media & data streams; image, video & audio file formats; image & video processing, synthesis of the sound signal; image coding & compression, video & audio codecs, low rate video telephony; audio-visual integration, lip-reading, face animation; augmented reality; multimedia search services, content-based image & video indexing; access to multimedia, human-machine interfaces, spoken language interface; algorithm vs. architecture-based approaches, multimedia processors, performance quantification; case studies, vision 2010.

EEE C414 Telecommunication Switching Systems and Networks [3 0 3]

Introduction, electromechanical switching, pulse dialing, and DTMF dialing, stored program control, space division switching, speech digitization, and transmission, time-division switching, fundamentals of traffic engineering, telephone networks, signaling, data networks, layered architecture and protocols, LANs, packet switching networks, TCP/IP, ISDN, ATM networks

EEE C472 Satellite Communication [3 0 3]

Review of microwave communications and LOS systems; the various satellite orbits like GEO, MEO, LEO; the satellite link analysis and design; the communication transponder system like INSAT, INTELSAT, etc; the earth segment and earth station engineering; the transmission of analog and digital signals through satellite and various modulation techniques employed; the multiple access techniques like FDMA, TDMA, CDMA, DAMA, etc; the INSAT program; salient features of INSAT – systems and services offered; satellite services offered by INTELSAT, INMARSAT and future satellites like IRIDIUM, etc; future trends in satellite communications.

EEE G510 RF Microelectronics [5]

Introduction; application of RF electronics in modern systems; basic concepts in RF circuit design, active RF components: various RF diodes and transistors and their circuit models, matching and biasing networks, RF amplifier design: low power, low noise, and broadband amplifiers, RF oscillator design; negative resistance oscillator; dielectric resonator oscillators, phase noise. RF Mixers: Balanced mixers; low noise mixers; noise in RF circuits, microwave transmitters, and receivers.

EEE G512   Embedded System Design   [3 1 4]

Introduction to embedded systems; embedded architectures: Architectures and programming of microcontrollers and DSPs. Embedded applications and technologies; power issues in system design; introduction to software and hardware co-design.

EEE G613 Advanced Digital Signal Processing   [5]

Review of stochastic processes, models and model classification, the identification problem, some field of applications, classical methods of identification of impulse response and transfer function models, model learning techniques, linear least square estimator, minimum variance algorithm, stochastic approximation method and maximum likelihood method, simultaneous state and parameter estimation of extended Kalman-filter, non-linear identification, quasi linearization, numerical identification methods.

EEE G626 Hardware Software Co-Design   [4]

FPGA and ASIC based design, Low-Power Techniques in RT Embedded Systems On-chip networking. Hardware Software partitioning and scheduling, Co-simulation, synthesis and verifications, Architecture mapping, HW-SW Interfaces, and Re-configurable computing.

EEE G627 Network Embedded Applications   [4]

This course deals with the three main application areas of Network Embedded Systems – Wireless Sensor Networks, Automotive Networks, and Industrial Networks– Network Architecture, Deployment Issues, Network Protocol stack: Modular and Cross-Layer Design. Network Node: Architectures, Operating Systems, and Applications. Middleware Issues and Design. Security and Encryption

IS C462 Network Programming   [3 0 3]

Overview of computer networks; inter-process communication; network programming; socket interface; client-server computing model: design issues, concurrency in server and clients; external data representation; remote procedure calls; network file systems; distributed systems design

MEL G621 VLSI Design   [3 2 5]

Introduction to NMOS and CMOS circuits; NMOS and CMOS processing technology; CMOS circuits and logic design; circuit characterization and performance estimation; structured design and testing; symbolic layout systems; CMOS subsystem design; system case studies.