LIST OF COURSES FOR M.ENGG. PROGRAMME IN TELECOMMUNICATION ENGINEERING

Applicable to Batch 2016-17 and onwards

COMPULSORY COURSES		
Course Code	**Course Title**	**Credit Hours**
TC-501	Probability and Random Processes	3
TC-502	Information Theory	3
TC-503	Digital Communication Theory	3
TC-504	Advanced Communication Systems	3
TC-511	Communication Networks	3
ELECTIVE COURSES		
Course Code	**Course Title**	**Credit Hours**
TC-505	Telecommunications Network Operations	3
TC-512	Microwave Systems	3
TC-513	Principles of Radar	3
TC-514	Mobile Telephone System	3
TC-515	Advanced Digital Signal Processing	3
TC-516	Satellite Communication	3
TC-517	Communication Security	3
TC-518	Advanced Optical Communication Systems	3
TC-519	Antenna Theory	3
TC-600	Independent Study Project	6
TC-601	Dissertation	9

DETAILED CONTENTS OF COURSES FOR THE M. ENGG. PROGRAMME IN TELECOMMUNICATION ENGINEERING

TC-501   Probability and Random Process

Axioms of probability, Random variable; expected values, Gaussian and Poisson random variable distribution. Function of Random variables, sequences of random variables. Second order statistics. Properties of correlation function, time averages, stationary, Ergodicity. Frequency domain analysis. Time linear operations. Wiener filtering, Gaussian processes.

TC-502   Information Theory

Information measures, Coding Theorem, Data Compression, Entropy, source entropy and Noiseless coding Theorem. Sources coding, Huffman coding. Hamming Distance and code special codes for noise channels.

TC-503   Digital Communication Theory

Detection theory. Statistical decision theory. Bayesian decision, application of detection theory to communication systems. Signal formats binary and M-array Modulations, Coherence and non-coherent detection, probability of error performance. Signal Design and spectral analysis. Channel capacity. Optical communication.

TC-504   Advanced Communication Systems

Review of Fourier transform theory, RF sub-system design, RF channel characteristics, Modulation and demodulation, multiplexing, carrier and sub-carrier signal processing, analog and digital system design, Satellite related RF issues.

TC-505   Telecommunications Network Operations

Overview of Telecommunications Networks and Network Management Systems Introduction to Telecommunications Networks, Introduction to Telecommunications Network Management Systems, Telecommunications Management Network: TMN Functional, Physical and Logical Layered Architectures: What is TMN? Motivation for TMN, TMN Functional Architecture, TMN Physical Architecture, TMN Logical Layered Architecture, TMN Information Architecture and Generic Information Model: TMN Information Architecture, Generic TMN Information Models, Configuration Management: Network Planning and Engineering, Installation and Software Management, Provisioning, NE Resource Status and Control, Performance Management: Performance Monitoring, Performance Analysis, Performance Management Control, Fault Management: Alarm Surveillance, Fault Localisation, Test

Management, Fault Correction and Service Restoration, Trouble Administration, Accounting Management: Accounting Management Process, Usage Metering and Data Collection, AMA Data Processing, Charging and Billing, Security Management: Fraud Prevention, Fraud Detection, Fraud Containment and Recovery, Security Services, Security Mechanisms, Service Management and Service Activation: Service Configuration Management, Service Ordering, Service Provisioning, Service Performance Management.

TC-511   Communication Networks

Review of Markov chain, Queuing theory, open and closed network of queues, priority queuing. Application of stochastic modeling. Optimisation techniques to Communication Network design and Analysis. Data Link Control, Performance models of multi-access channels, Routing and flow control.

TC-512   Microwave Systems

Wave guides and transmission lines, General Microwave circuit theorem. Resonant Cavities, Microwave Junction and scattering matrices, Non-reciprocal devices. Fundamentals of Microwave Filter design.

TC-513   Principles of Radar

Signal propagation problems. Antennas and RF processing. Reflection from targets. Radar equation. Target detection, Swerling's models. Resolution and ambiguity function. Pulse compression, Processing of Pulse train.

TC-514   Mobile Telephone Systems

Need for mobile system, Basic cellular system, Performance criteria, Operation of cellular system, Analog and Digital cellular systems, Elements of cellular system design, Specifications of analog systems, Cell coverage for signal and traffic, Cell site and mobile antennas, co-channel interference reduction.

TC-515   Advanced Digital Signal Processing

Review of discrete signals and systems in temporal and spectral domains, data acquisition, discrete transforms (DFT, DCT and z-transforms), digital filters-IIR and FIR, spectral estimation, adaptive filters, multi-rate signal processing, Wavelets and joint time-frequency analysis, and real-time signal processing.

TC-516   Satellite Communications

Fundamentals of satellite communication systems: ground stations, sub-systems: link budgets modulation schemes multiple access types and beam switching. Direct Broadcast Systems (DBS). Geostationary and low earth orbit systems and services. Space and ground segment technology. Next generation broadband satellite systems. Fast packet switching on the sitcom link including Asynchronous Transfer Mode (ATM) protocols and IP applications. Satellite optical data links. Satellite position finding systems, NAVSTAR GPS and GLONASS, VSAT.

TC-517   Communication Security

An introduction to Encryption and Security Management: Analog Scrambling, Algorithms, Fundamentals in Key Management. Security Threats and Solutions. Voice Security in Military Applications. Secure GSM Systems: Architecture, Standard Security Features, Custom Security, Key Management and Tools. Electronic Protection Measures. Link and bulk Encryption. Secure e-mail. Management, Support and Training.

TC-518   Advanced Optical Communication Systems

Theory of ray optics, wave optics and electromagnetic optics, planar optical waveguides, wave propagation in cylindrical waveguides, electromagnetic mode theory for optical propagation, single-mode fibers, Transmission Characteristics of Optical Fibers, Losses in optical fibers, intermodal and intramodal dispersion, polarization, optical sources, optical detectors, optical couplers, optical modulators, optical amplifiers, optical-fiber cables and connectors, fiber-optic sensors, Direct Detection Optical Fiber Communication Systems, Coherent Optical Fiber Communication Systems, Free space optical communication.

TC-519   Antenna Theory

Antenna Fundamentals, Properties of individual antennas and arrays of antennas. Retarded potentials, dipoles of arbitrary length, radiation pattern, gain, directivity, radiation resistance. The loop antenna. Effects of the earth. Reciprocity, receiving antennas, effective length and area. Antenna Arrays: collinear, broadside, endfire. Array synthesis. Mutual coupling. Log-periodic and Yagi arrays. Radiation from apertures: the waveguide horn antenna, parabolic dish. Microstrip patch antennas.