

## B.Sc. in Electrical Engineering-Telecommunication-Course Description

### LNG 181 English I for Engineering & Computing

LNG 181 builds on the reading and writing skills. This course provides practice in analyzing and responding to various rhetorical modes of writing with an emphasis on authentic texts. The course focuses on exposition and argumentation specialized for Engineers. **Pre-requisite None**

### LNG 182 English II for Engineering & Computing

This course builds the written and oral communication skills that enable Engineering students to communicate according to the conventions of the profession. It includes writing (letters, memos, proposals, emails, and reports), principles and practices in delivering informal and formal public speaking, and presenting solutions and results of research in a clear and effective way. **Pre-requisite LNG-181**

### GED 198 Islamic Culture

The course presents an elementary survey of Islam as a religion and an approach to life. Topics include: the Quran, its names characteristics and miracles, the scientific miracles in the Quran, an introduction to the prophetic heritage (the Sunnah), the history of Islam and the Islamic civilization, Islam's vision of the human being, the universe and life, and the pillars of Islamic faith. Students are invited to reflect on the relationships between Islam and other civilizations. **Pre-requisite None**

### GED 196 Communication Skills in Arabic 1

يطمح هذا المساق إلى تحقيق مجموعة من المهارات التعليمية الأساسية لبناء شخصية الطالب الجامعي بناءً ثقافياً يوافق حياته المهنية ، ويدفعه نحو آفاق ثقافية تساعده على بلوغ مرحلة متقدمة من مراحل استخدام اللغة العربية في المجال العلمي ، والبحث الأكاديمي.

ويشمل هذا المساق ثلاثة محاور أساسية تتطرق من حاجات الدارسين اللغوية :

- 1- قراءات في مجال الاتصال والتواصل الإنساني .
- 2- قراءات في الثقافة الأدبية : يتناول مجموعة من المقالات والدراسات المتقدمة التي تطرح إشكاليات وقضايا تتلاءم مع أهداف التنمية العلمية والفكرية والثقافية والاقتصادية التي تسعى الجامعة إلى تحقيقها على مستوى الفرد والمجتمع .
- 3- أنشطة البحث العلمي : وتتناول البحث الصفي ومجالاته المختلفة ، اختيار نقطة بحثية وإجراءات معالجتها بدءاً من صياغة

عنوان البحث ، و طرق جمع مادته و كيفية تدوينها و توثيقها ، و صوغ أفكاره وإخراجه في صورته النهائية

**Pre-requisite None**

### GED 199E UAE Society

This course is an introduction to the UAE society in its political, geographical, cultural, demographical and social aspects. Students are encouraged to reflect on the evolution of society in view of the fast changes brought by modernization and globalization. Topics include: the Emirates geography and history, aspects of life before and after the Emirates political union, economic and social development, the cultural life before and after the union. **Pre-requisite None**

### ENT 141 Fundamentals in Innovation and Entrepreneurship 1

This course is developed for the UAE based on decades of practices and experiences of teaching innovation and entrepreneurship at Stanford University that has fueled innovation and high growth in Silicon Valley. The goal of the course is to equip the next generation of leaders in the UAE with an innovative and entrepreneurial mindset and its related core skills. Most sessions include a mix of components: lecture, discussion, interactive activities in class,

and open Q & A if an appropriate expert or guest speaker is available. The session descriptions below contain a summary of the session, a list of materials to read and videos to watch before the session, and a set of study questions to contemplate beforehand and to be used in class discussion. You will focus on the principles of design thinking. ***Pre-requisite None***

### **ENT 142                      Fundamentals in Innovation and Entrepreneurship 2**

This course is developed for the UAE based on decades of practices and experiences of teaching innovation and entrepreneurship at Stanford University that has fueled innovation and high growth in Silicon Valley. The goal of the course is to equip the next generation of leaders in the UAE with an innovative and entrepreneurial mindset and its related core skills. Most sessions include a mix of components: lecture, discussion, interactive activities in class, and open Q & A if an appropriate expert or guest speaker is available. The session descriptions below contain a summary of the session, a list of materials to read and videos to watch before the session, and a set of study questions to contemplate beforehand and to be used in class discussion. ***Pre-requisite ENT-141***

### **GED 110E                      Modern Art Appreciation**

Modern Art Appreciation' is a broad-based (1) theoretical and (2) practical course. It focuses on (1) visual theory, the major modern art movements, such as The Origins, The Islamic Art, The Renaissance Art, The Modern (19th century) Artistic Movements. (2) In addition, students will identify various styles within Modern Art Movements, and apply this knowledge in studio and class assignments. ***Pre-requisite None***

### **GED 111                      Music Appreciation and Communication**

Stimulate music appreciation and communication. Identify factors that promote and inhibit music, music history, music practice and communication via music. Look at popular music and its impact on every-day life. Understand the value of music as part of mass communication and media. Learn the building blocks of music history, music practice and music appreciation. ***Pre-requisite None***

### **GED 112                      Using Positive Psychology at Work**

This advanced psychology course invites students to explore the emerging field of Positive Psychology with a focus on the workplace. Students will learn about the science of happiness by exploring theory and concepts relative to a state of well-being, such as the architecture of sustainable happiness, adaptation, broaden and build theory and flow. The second part of this class will focus on the application of theory in the workplace as well as in one's personal life. Students will be invited to engage in several positive psychology interventions (PPIs), such as generating positive emotions to improve creativity, relationships with coworkers, and work performance. How these techniques are currently being used within organizations to increase employee retention and job satisfaction will also be reviewed through the identification and evaluation of two corporate wellness programs. Students should be aware that there is a significant amount of reading involved. Failure to keep up with the readings will result in poor academic results. ***Pre-requisite LNG-172 or LNG-182***

### **GED 252E                      Critical Thinking**

This course aims to engage student's in critical thinking in a range of contexts. Student's will analyze and evaluate the language of argumentation by identifying premises and conclusions, deductive and inductive reasoning. Furthermore, students will evaluate arguments; validity, soundness and problems of interpretation as well as common fallacies of reasoning. Students will distinguish different types of thinking through evaluating independent and collaborative learning, and group dynamics. In addition, students will acquire strategies and methods to solve problems, equate probability and causality. Lastly, students will learn to analyze reading texts and respond by composing a critical analysis. ***Pre-requisite LNG-172 or LNG-182***

### **GED 205E                      Psychology in Every Day Life**

An introduction to concepts and principles of selected areas of psychology and their applications to daily living. The aim is to foster students' understanding of the self and its interactions with the environment. Topics include: research methodology in psychology, basic neuro-psychology, theories of learning, memory, motivation, development, and intelligence, as well as a focus on health, psychotherapy, and social psychology. ***Pre-requisite LNG-172 or LNG-182***

### **GED 272E                      Fundamentals of Public Speaking**

Being able to communicate well in public situations is something any university graduate is expected to be able to do with ease.

This course will introduce students to the fundamentals of public speaking. These include the steps of the speech-making process. The course will also focus on developing oral communication skills and presentation skills that students need to succeed in their major programs of study and to advance in their future careers. Students will be asked to give various speeches in a wide range of settings and for a variety of purposes to enhance their appreciation of and comfort with the art of public speaking. Fundamentals of Public Speaking' also focuses on developing skills for thinking critically, whether one is designing one's own presentation, listening to the presentations of others, or evaluating information and solutions in the process of accomplishing a group task. ***Pre-requisite LNG-172 or LNG-182***

### **GED 324E                      Ethical Reasoning for Today's World**

This course examines the theories, skills and applications of moral philosophy, including a description and a discussion of the three influential approaches to morality, namely: character ethics, consequence- based ethics, and principle-based ethics. Students will also engage in a good citizenship project where they will put into action their character strengths as per the Aristotelian theory and consider what their role is in the larger social context as a good, ethical citizen. ***Pre-requisite LNG 172 or LNG 182***

### **ENG 410                      Professional and Ethical Practice**

This course introduces the engineering profession, professional practice, engineering law and ethics. To fully assume responsibilities towards society the engineer should consider social implications and environmental impacts of technologies. Topics include: History of the profession of engineering, Principles of professional engineering practice, Professionalism and Codes of Ethics, Understanding Ethical Problems, Ethical Problem-Solving Techniques, Social implications and environmental impacts of technology, The Rights and Responsibilities of Engineers, Ethical Issues in Engineering Practice, Ethics in Computer and Internet Crime, Security and Privacy, Ethics related to Intellectual Property. ***Pre-requisite None***

### **GED 298E                      Special Topics in Western Culture**

Field Study – English Language and Canadian Culture: The course will allow students to enhance their English language skills and develop a firm understanding of Canadian culture and history. The field course will see students spending 4 weeks at the University of Ottawa located in Canada's Capital region where they will study intensive English, and also, through a series of lectures and seminars, learn about Canadian history and culture. Complementing the course will be an extensive schedule of cultural excursions aimed at exposing students to life in Canada. ***Pre-requisite GED-198E , LNG 172 or LNG 182,***

### **SHS 103                      Chemistry**

It is basic course of chemistry introducing students to chemical symbols, formulae and equations describing experiments. Topics include: Properties of Materials, Atomic Theory, Periodic Table, Chemical Formulae, Energy, Molecular and Ionic compounds, Measurement,

Chemical Equations, Equations for Ionic Reactions, Acids and Bases, Molarity and the composition of a solution, Study of rates of reactions. ***Pre-requisite None***

**SCI 220                      Engineering Mechanics**

This course covers Newton's laws, forces, equilibrium, moment and couples, structures in equilibrium, centroids and centers of mass, moments of inertia, motion in two and three dimensions, and rotation. ***Pre-Requisite: MTH-112***

**MTH 112                      Calculus I**

The course introduces the students to the fundamental concepts of calculus: limits, continuity, differentiation and integration; and trains them to apply these concepts to problems that arise in science and engineering. ***Pre-Requisite: Pass Math Placement Test or MTH-012***

**MTH 113                      Calculus II**

The course introduces techniques of integration, polar coordinates, and functions of several variables including partial differentiations and multiple integrals. In addition, students will develop the skills to apply these concepts to solve problems arising in science and engineering. ***Pre-Requisite: MTH-112***

**MTH 212                      Calculus III**

The course introduces the students to the fundamental concepts of calculus: limits, continuity, differentiation and integration; and trains them to apply these concepts to problems that arise in science and engineering. ***Pre-Requisite: MTH-113***

**SCI 210                      Modern Physics**

This course covers Electrostatic, Magnetostatics, waves, Doppler effect, reflection, refraction, geometrical optics, photons, wave nature of particles, and thermodynamics.

***Pre/Co Requisite MTH-113, SCI-220***

**SWS 110                      Programming I**

Problem solving; Basic elements of programming; Syntax and semantics of programming language including variables, data types, expressions, and assignment; program flow of control; conditions; iterations; Methods and parameter passing; Program debugging and testing; Object-oriented programming (OOP); Event-driven programming. ***Pre-Requisite: None***

**MTH 130                      Probability and Statistics**

The course serves as an introduction to probability models and statistical methods for students in engineering and the physical and natural sciences. Topics include: descriptive statistics, probability, conditional probability, discrete and continuous random variables and their probability distributions, correlation and simple linear regression. ***Pre-Requisite: MTH-112***

**MTH 220                      Ordinary Differential Equations**

The course introduces the main concepts in differential equations and exposes the students and trains them on solving ordinary differential equations by several quantitative methods: First order ODEs, Second and higher order linear ODEs, Series solutions at ordinary and regular singular points, Laplace transforms, Linear systems of differential equations with a short review of linear algebra. It also enables the students to relate the topics taught in the course to applications in engineering, science, and technology. ***Pre-Requisite: MTH-212***

### **SWS 316                      Programming II**

This course focuses on the object-oriented paradigm. Course topics include: Objects and Classes; Object-Oriented design; encapsulation and information hiding, inheritance and composition, polymorphism, class library, Simple Data Structures and their Applications (Array, String, and String Manipulation), GUI, Programming Practice using a modern high level language. ***Pre-Requisite: SWS-110***

### **ENG 221                      Electric Circuit**

This course provides students with fundamental understanding of electric circuits. Voltage and Current Sources, Resistors; Ohm's Law; Jule's Law: Energy and Power; Resistors in Series; Resistors in Parallel; Series-Parallel Resistive Circuits; Source Conversions, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Alternating Current, Capacitors and inductors; RC, RL, and RLC circuits, First order Analysis, Second Order Analysis, Phasor Circuit Analysis, Circuit Theorem with Phasor. ***Pre/Co Requisite SCI-210***

### **ENG 310                      Electronics I**

This course provides an introduction to electronic components in terms of implementation and application. Topics include: Semiconductor material; Semiconductor Diodes; Diode applications; LED and Laser Diodes; Zener Diodes; BJT Transistors; BJT Switching Applications; BJT Amplifiers, Power Amplifiers, JFET Transistors; MOSFET Transistors; Switching and logic CMOS applications of MOSFETs. ***Pre-Requisite: ENG-221***

### **ENG 101                      Digital Logic**

This course provides an introduction to digital systems with Verilog implementation. Topics include: Number systems and codes; Logic gates, truth table and universal gates, Combinational Circuit, Karnaugh Map, Flip-Flops and related devices, Decoders, Encoders, Adders, Multiplexers, Binary Adders, Signed Binary Adders, Counters and Registers. ***Pre-Requisite: None***

### **ENG 223                      Electric Circuit II**

This course provides the students the fundamental theory and mathematics for the analysis of Alternating Current (AC) electrical circuits, frequency response and transfer function of circuits. Topics include: Sinusoids and Phasors, Sinusoidal Steady-state Analysis, AC Power Analysis, Three-Phase Circuits, Magnetically Coupled Circuits, Frequency Response, Frequency selective circuits and two-port networks. ***Pre-Requisite: ENG-221***

### **BUS 310                      Project Management**

This course provides the student with tools ensuring the maximum of success in his future projects. Poorly or wrongly managing of engineering projects have been wrongly or poorly managed, delivering them behind schedule, and/or over budget, lead to failure and disappointment. The nine project management knowledge areas are tackled, namely project

1. Project Integration Management
2. Project Scope Management
3. Project Time Management
4. Project Cost Management
5. Project Quality Management
6. Project Human Resource Management
7. Project Communications Management
8. Project Risk Management

Project Procurement Management. ***Pre-Requisite: Completion of 60 Credit Hrs.***

**BUS 311                      Engineering Economy**

This course gives provides basic concepts of engineering economics by focussing on the theoretical and conceptual financial project analysis. Topics include: Engineering economic decisions, interest, cost of money, nominal and effective interest rates, changing interest rates, mortgages, describing project cash flows, internal rate of return criterion, comparing mutually exclusive alternatives, applications of economic evaluation techniques, design economics, depreciation, natural resource allowances, income taxes, developing project cash flows, capital budgeting decisions, personal investments, inflation and economic analysis, project risk and uncertainty, computer simulation. ***Pre-Requisite: MTH-130***

**ENG 210                      Computer Architecture**

This course provides an introduction to computer system architecture and organization. Topics include: Data representation, CPU and Memory; Design, Implementation and Enhancement, Analysis and Comparison of CPU architectures; I/O Operation; and Computer Peripherals. ***Pre-Requisite: ENG-101***

**ENG 314                      Electric Machines**

This course provides an introduction to Electrical Machines. Topics includes; Magnetic circuits, ideal and practical transformers, instrument and autotransformers. DC motors and generators, DC motors speed control, brushless DC motors. AC machines, induction motors characteristics, synchronous generators, fractional horsepower machines. AC machines frequency and speed control. Servomotors and stepper motors. ***Pre-Requisite: ENG-223***

**ENG 315                      Control Systems**

This course provides an introduction to Control Systems. Topics include Introduction to: Characteristics, time response, steady-state error. Open loop and closed loop concepts, transfer function, time domain, frequency domain, stability of linear feedback control systems, Root Locus method, Bode diagram. Design of feedback control systems: principles of design, design with the PD, PI, and PID controllers. Performance evaluation of feedback control systems. Software tools for simulation of control systems and analyze their performance are integrated throughout the course. ***Pre-Requisite: MTH-220***

**COM 411                      Digital Filter Design**

This course provides an introduction to digital signal processing and its applications. Topics include: Discrete time signals and systems, z-transform, Discrete Fourier Transform, Computation of the Discrete Fourier Transform, Structures for discrete time systems, Design of Nonrecursive Filters (FIR), Design of Recursive Filters (IIR), and Multirate signal processing. ***Pre-Requisite: MTH 220***

**NET 110                      Computer Networks Fundamentals**

Introduction to data communication systems; Local Area Networks and OSI layer model, with emphasis on data link and physical layers; Analog and digital communication systems; Multiplexing, bandwidth and throughput; Modulation techniques; Transmission lines; Switching and routing; Ethernet technologies; Internet Protocol. ***Pre-Requisite: ENG-101***

**ENG 301                      Electronics II**

This course covers Small-signal BJT Amplifiers; Small-signal FET Amplifiers; MOSFET Amplifier; Amplifier Frequency Response ; Ideal Operational Amplifier Circuits and Analysis; OpAmp applications, such as, adder, integrator, differentiator, active filters, and oscillators. ***Pre-Requisite: ENG-310***

## **ENG 222                      Engineering Electromagnetics**

This course is intended to develop both physics and engineering related understanding of electromagnetic forces and fields. It also explains propagation process through materials, devices as well as systems. It starts by reviewing Complex Numbers, Phasors, Vector Analysis, Differential operators. Topics include: Waves and Phasors; Transmission Lines; Electrostatics; Magnetostatics; Time-Varying Fields; Faraday's Law; Boundary Conditions for Electromagnetics, Electromagnetic Potentials; Plane-Wave Propagation. ***Pre-Requisite: MTH-212, SCI-210***

## **ENT 241                      Entrepreneurship I**

Introduction to entrepreneurship theory and practice. Business plan development and execution. Funding possibilities and investments. Definition of entrepreneurship; classical and modern management theories and identification of opportunities; strategic planning and execution. ***Pre-Requisite: ENT-142***

## **ENT 242                      Entrepreneurship II**

Business plan and pitch development and execution. Funding possibilities and investments. Definition of entrepreneurship; classical and modern management theories and identification of opportunities; strategic planning and execution. ***Pre-Requisite: ENT-241***

## **COM 310                      Coding and Information Theory**

This course introduces the theory and practice of coding and information theory for applications in the communication field. Topics include: Discrete Sources, Channels and Channel Capacity, Shannon's Coding Theorems, Run-Length-Limited Codes, Linear Block Codes, Cyclic Codes, Convolutional Codes, Trellis Coded Modulation, Bit Interleaved Coded Modulation, Turbo Codes, Low Density Parity Check Codes, and Coding for the Fading Channels. ***Pre-Requisite: MTH-130***

## **COM 311                      Signals and Systems**

This course covers, Continuous and discrete-Time Signals and System, Continuous and Discrete Linear Time-Invariant Systems, Fourier series, Fourier Transform and Applications, sampling and Laplace transform. ***Pre-Requisite: MTH-220***

## **COM 320                      Telecommunications**

This course provides an introduction to Communications systems. The following topics are covered: components, signals and channels, sampling, quantization, PAM, PCM and Delta modulations, quantization noise, time division multiplexing, performance criteria, bandpass transmission, digital modulations (ASK, FSK, PSK and quadrature shift keying). ***Pre/Co Requisite ENG-301, COM-310, COM-311***

## **COM 321                      Advanced Programming in Telecom**

This course focuses on implementing telecommunication protocols and network applications. It proposes Java as a implementation language. It includes the following topics: Client-server Architecture, Databases handling, Java and Web Applications (Servlets, JSP, JavaScript), interface connections (USB, serial Port, Bluetooth Port), Java to micro edition (J2ME) and mobile applications...), Introduction to the implementation of Network security (Cryptography and steganography). ***Pre- Requisite NET-120***

### **COM 322                      Applied Electromagnetics**

This advanced electromagnetics course is focusing on typical and modern applications. Without excessive recourse to mathematics, the course provides a solid grounding in antennas, fibers and propagation, covering satellite and terrestrial radio systems for both mobile and fixed contexts. Topics include: Plane-Wave Propagation, Reflection, Transmission, Antenna Principles, Antenna parameters, practical dipoles, antenna arrays, horn antennas, loop antennas, Helical antennas, Patch antennas, Terrestrial Fixed Links, tropospheric refraction, Multiple Knife-Edge diffraction, Satellite Fixed Links, tropospheric effects, ionospheric effects, satellite earth station antennas, Macro-, Micro- and Picocells, shadowing, propagation within buildings, wideband and ultra-wideband effects, Single-mode Fibers, Dispersion and compensation, Software for Applied Electromagnetics. ***Pre-Requisite ENG-222***

### **COM 412                      Digital Communications**

This course provides a balanced coverage of digital communication systems. Topics include: pulse code modulation, baseband transmission of digital signals, bandpass transmission of digital signals, synchronization, diversity, equalizers, multiple access, orthogonal frequency division multiplexing, spread spectrum systems. ***Pre/Co Requisite COM-320, COM-322***

### **COM 413                      Communication Systems**

This course provides a balanced coverage of both digital and analog communication systems with focus on design. It develops in the student the ability of using both mathematical and personal computer methods (MATLAB essentially) to analyze, design, simulate and evaluate modern communication systems. Topics include Modulation and multiplexing methods, Performance of communication systems, Wire and wireless communication systems, RFID systems. ***Pre/Co Requisite COM-320, COM-322***

### **COM 420                      Optical Communications**

This course covers optical propagation, step index fibers, graded index fibers, absorption and dispersion in optical fibers, optical fiber cables and connectors, Optical Sources and Amplifiers, Light Detectors, Couplers and Connectors. Optical Modulation, Multiplexing Techniques, and switching. System Design and Trends in optical systems. ***Pre/Co Requisite COM-320, COM-322***

### **ENG 320                      Internship**

Internship is a course designed to provide students with opportunities to gain work experience in a real world environment, to practice critical thinking, to solve real problems, and to develop design and innovation skills. By interacting with professionals on real problems and commercial devices, systems or software, the student learns how to tackle real world tasks, manage his/her duties, identify objectives, respect constraints, explore new ideas, investigate practical issues, design new elements (device, system, software) and make some decisions. ***Pre-Requisite: 90 Cr.H + CGPA 2.0***

### **ENG 400                      Graduation Project-1**

This project provides the students with the opportunity to use the learning they acquired to: apply critical thinking, further develop their design skills, and innovate. The students are expected to complete literature survey; develop a project plan; analyze requirements and acquire the necessary material and steps for their intended project. Graduation Projects in industrial environment with the co-supervision by an industrial expert are encouraged. ***Pre-Requisite: Completed 100 Cr***



## **ENG 401                      Graduation Project-2**

This project provides the students with opportunities to demonstrate the learning they acquired to: apply critical thinking, further develop their design skills, and innovate. The students are expected to implement, test and perform the analysis of the results of a project based on the design and schedule completed by the same student team during the graduation project 1. Graduation Projects in industrial environment with the co-supervision by an industrial expert are encouraged. ***Pre-Requisite: ENG-400***

## **NET 120                      LAN Switching and Routing**

This course handles the theory and implementation of routing, switching and their associated protocols and algorithms which are the main elements in internetworking technologies. Topics include: Review of class full IP addressing and sub netting, Bridges, Switches, and Routers, Variable Length Subnet Masking, Classless Inter domain Routing, Route aggregation; Mechanics of Routing Protocols, RIP v1 and RIP v2, IGRP and EIGRP; OSPF; IEEE LAN standards, Transparent Bridges; Principles of LAN Switches, Loop Resolution, VLANs Applications, Concepts, and Standards. ***Pre-Requisite: NET-110***

## **NET 424                      Broadband Communications**

This course provides a detailed analysis of broadband infrastructure, technologies and services. It addresses industry standards and global services. Topics include: Internet Services, Traffic Modeling, Internet Traffic Control, Billing, Pricing and Admission Policy, Mobile Network Performance, Bandwidth Allocation, Switching Systems, Traffic Flow Control Routing, Congestion and Admission Control, Multicast Protocols, Network Management, Quality of Service. ***Pre-Requisite: NET-110***

## **ELC 323                      Instrumentation and Measurements**

In this course, students will learn how to select and use appropriate electronic test instruments for various applications based on an understanding of the capabilities and limitations of modern electronic test instrumentation. They will also develop an understanding of the basic principles of operation of these instruments. Comprehension of the topics covered in lectures will be reinforced with a broad spectrum of laboratory experiments. Through attractive practical applications, student will learn fundamentals of the "LabView" instrumentation software. ***Pre-Requisite: ENG-223***

## **NET 222                      Wireless Networks**

This course focuses on modern wireless communication and networking technology, and its application to transmit voice, data and images. Topics include: Radio frequency spectrum, Licensed and unlicensed bands, bandwidth and information rate; Multiple Access methods and Spread Spectrum Techniques (FDMA, FDM, FDM/TDMA and CDMA); Wireless Personal Area Network (Bluetooth, piconet, scatternet, ...); IEEE 802.11 Wireless LAN; Planning and building Wireless LANs; Compose Request for Information and Request for Proposal regarding WLAN; Security in Wireless Networks; Wireless WANs; Cellular, Voice and Data Networks, Cellular Networks, AMPs, GSM, GPRS and CDMA based system, LMDS and MMDS; Wireless and Internet. ***Pre-Requisite: COM-412***

## **COM 427                      Satellite Communications**

This course provides an introduction to satellite communications. Topics include: orbital mechanics, satellite design and launch, configuration and installation of earth stations, implementation of communication links, and the set-up of the satellite network. ***Pre-Requisite: COM-322, COM-412***

**COM 421                      RFID Technology**

RFID (Radio Frequency Identification) is a technology combining wireless techniques and Electronic Product Code (EPS) aspects. It is rapid expanding and impacts business and society. This course handles technical underpinnings as well as specific segments of the market of RFID. The course is application and design oriented: RFID in the Automotive Industry, in Cattle Ranching, in Health Care, in Manufacturing, in Marine Terminal Operation, in the Military, in Payment Transactions, in Retailing, in Transportation, in Warehousing and Distribution Systems. It also includes non-technical topics, and use throughout the world: Australia, China, France, Germany, Japan, Singapore, South Korea, Spain, United Kingdom, and United States. **Pre-Requisite: COM-320, COM-321, COM-322**

**NET 323                      Voice/IP Convergence**

This course covers: Concepts of IP-based packet networks; Characteristics of the Internet and IP; The VoIP Model; Voice Coders; Performance Considerations and Traffic Engineering; trade-offs of packet size, packet loss, and packet latency; RTP, RTCP, RTSP, translators and mixers; signaling, Session Initiation Protocol (SIP), Session Description Protocol (SDP); VoIP Gateways and IP Call Processing Protocols; Internetworking SS7 and Internet Call Processing; Quality of Service (QoS). **Pre-Requisite: NET-110**