PROGRAM INFORMATION

Program Name and Degree Awarded

The Electronics and Communication Engineering Department

Duration of Studies

4 years - 8 semesters

Total Credits / ECTS

144 / 240

Language of Instruction

English

Mission and Vision

Vision:

The Department of Electronics and Communication Engineering strives to become one of the prestigious engineering departments in the area. The aim is to graduate engineers produce who are able to keep up with the latest developments, are aware of the problems of the era, are able to come up with creative solutions to these problems as a part of a team, or alone, and who are able to take part in national and international projects.

Mission:

The experienced faculty and strong infrastructure in the Electronic and Communication Engineering Department aim for high-quality engineering education, so as to have graduates who are able to critically think, write and speak, have understanding and respect for social and ethical issues, who have a wide perspective and integrity; and who have ability produce solutions to various engineering and research topics.

Program Objectives

The proposed qualifications profile enables our students to embark upon a career within the ECE discipline. The competence profile has followed from the Electrical and Electronics Engineering Department (EEE), which has previously been accredited by MÜDEK (Association for Evaluation and Accreditation of Engineering programs) and also holds the EUR-ACE label, with emphasis on the topics in the Electronics and Communication sector. Besides this, the ECE Department has been accredited by ASIIN since 2017, as well as being awarded the EUR-ACE label. Our program has invariably been improved as a consequence of addressing all feedback received during the aforementioned accreditation processes. The program aims to include course topics highly relevant to the needs of industry, the ECE community and ongoing research. The program outputs were developed and decided upon via departmental meetings, which were attended by all lecturers, in

conjunction with the opinions and expectations of external stakeholders. The ECE programs offered by other institutions were also taken into account whilst determining these program outputs. If necessary, the program outputs are reviewed and updated periodically (within four years), taking into account academic student meetings, graduate student correspondence, sector/consultant surveys, alumni surveys, and the opinions of all stakeholders mentioned above. The review of the educational objectives also occurs in similar time periods. An intended qualifications profile has been established in accordance with the vision and mission of our department; this is summarized in the educational objectives and defined by eleven program outcomes.

Program Learning Outcomes

The program outcomes for the ECE department are listed below. Students graduating from the program should have:

PO1: Adequate knowledge in mathematics, science and engineering subjects pertaining to the Electronics and Communication Engineering discipline; ability to use theoretical and applied knowledge to solve complex engineering problems.

PO2: Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modelling methods for this purpose.

PO3: Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.

PO4: Ability to devise, select, and use modern techniques and tools needed for analysing and solving complex problems encountered in Electronics and Communication Engineering practice; ability to employ information technologies effectively.

PO5: Ability to design and conduct experiments, gather data, analyse and interpret results for investigating complex engineering problems or Electronics and Communication Engineering specific research questions.

PO6: Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.

PO7: Ability to communicate effectively, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions.

PO8: Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.

PO9: Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice.

PO10: Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development.

PO11: Knowledge about the global and social effects of Electronics and Communication Engineering applications on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions.

Curriculum

ELECTRONICS & COMMUNICATION ENGINEERING							
1st SEMESTER				**2nd SEMESTER**			
Course Code	**Course Name**	**CREDIT**	**ECTS**	**Course Code**	**Course Name**	**CREDIT**	**ECTS**
COMN191	ACADEMIC ENGLISH I	(3,0)3	3	UHTC01	HISTORY	(2,0)2	2
COMN111	CHEMISTRY	(3,0)3	4	COMN192	ACADEMIC ENGLISH II	(3,0)3	3
ENGG131	PHYSICS I	(3,0)3	4	COMN122	PHYSICS II	(3,0)3	5
ENGG117	COMPUTING FOUNDATIONS	(3,2)4	6	COMP124	COMPUTER PROGRAMMING	(3,2)4	6
ECEN119	INTRODUCTION TO PROFESSION	(2,0)0	2	ENGG122	PHYSICS II LAB	(0,2)1	2
ENGG111	CHEMISTRY LAB	(0,2)1	2	MATH104	LINEAR ALGEBRA	(3,0)3	5
ENGG121	PHYSICS I LAB	(0,2)1	2	MATH110	CALCULUS II	(3,2)4	7
MATH101	CALCULUS I	(3,2)4	7				
TOTAL		**19**	**30**	**TOTAL**		**20**	**30**
3rd SEMESTER				**4th SEMESTER**			
ECEN205	DIGITAL CIRCUITS I	(2,2)3	7	ECEN214	ELECTROMAG THEORY I	(3,0)3	6
ECEN215	CIRCUIT THEORY I	(3,2)4	8	ECEN216	CIRCUIT THEORY II	(3,2)4	7
ECEN227	ELECTRICAL MATERIALS	(3,0)3	6	ECEN228	ELECTRONICS I	(3,2)4	7
MATH201	ORDINARY DIFFERENTIAL EQUATIONS	(3,2)4	5	MATH224	ENGINEERING MATHS	(3,0)3	5
UFRC01	UNIVERSITY ELECTIVE I	(3,0)3	4	MATH226	PROBABILITY & STATISTIC METHODS	(3,0)3	5
TOTAL		**17**	**30**	**TOTAL**		**17**	**30**
5th SEMESTER				**6th SEMESTER**			
ECEN333	COMPUTER ARCHITECTURE AND ORGANIZATION	(3,2)4	6	ECEN308	MICROPROCESSOR SYSTEMS	(3,2)4	7
ECEN337	ELECTRONICS II	(3,2)4	7	ECEN342	COMMUNICATION ENGINEERING	(2,2)3	5
ECEN315	ELECTROMAGNETIC THEORY II	(3,0)3	6	ECEL02	TECHNICAL ELECTIVE II	(3,0)3	5
ECEN317	SIGNALS AND SYSTEMS	(3,1)3	6	ECEL03	TECHNICAL ELECTIVE III	(3,0)3	5
ECEL01	TECHNICAL ELECTIVE I	(3,0)3	5	ECEN322	CONTROL SYSTEMS	(3,0)3	6
				UHTC02	TURKISH	(2,0)2	2
TOTAL		**17**	**30**	**TOTAL**		**18**	**30**
7th SEMESTER				**8th SEMESTER**			
ECEN310	SUMMER TRAINING	(0,1)0	1	ECEN402	DIGITAL COMMUNICATION	(3,0)3	5
ECEN408	DIGITAL SIGNAL PROCESSING	(3,1)3	5	ECEN420	GRADUATION PROJECT II	(5,0)5	6
ECEN410	GRADUATION PROJECT I	(0,2)1	4	ECEL07	TECHNICAL ELECTIVE VII	(3,0)3	5
ECEL04	TECHNICAL ELECTIVE IV	(3,0)3	5	ECEL08	TECHNICAL ELECTIVE VIII	(3,0)3	5
ECEL05	TECHNICAL ELECTIVE V	(3,0)3	5	ENGG434	ENGINEERING ETHICS	(3,0)3	5
ECEL06	TECHNICAL ELECTIVE VI	(3,0)3	5	UFRC02	UNIVERSITY ELECTIVE II	(3,0)3	4
ENGG413	ENGINEERING ECONOMICS	(3,0)3	5				
TOTAL		**16**	**30**	**TOTAL**		**20**	**30**

Laboratory and Equipment Capacity (if applicable)

The Department of Electronics and Communication Engineering uses the laboratories listed in the Table below. Depending on the nature of the work done in the laboratory, the instruction during a lab session is performed by the Course Instructor and/or the appointed Teaching Assistants. High-quality equipment and apparatus are used in our laboratories. The equipment that is made available in the laboratory is experiment-oriented, i.e. only equipment that is prescribed to be used in certain experiments are made available for students.

Table - The Faculty of Engineering Laboratories used by the ECE Department

Laboratory Name	Student Capacity	Area (m2)
Electrical, Electronics and Digital Laboratory	**40**	**100**
Electric Machinery and Power Laboratory	**20**	**100**
Microwave and Antennas Laboratory	**20**	**70**
Communications Laboratory	**24**	**80**
Microprocessors Laboratory	**24**	**70**
Control Systems Laboratory	**20**	**70**
Computer Laboratory	**30**	**42**
Research Laboratory	**20**	**60**
Chemistry Laboratory	**30**	**100**
Physics Laboratory	**30**	**75**
3D Design Laboratory	**15**	**80**
Macintosh Laboratory	**30**	**70**

Career Opportunities

Graduates of the Electronics and Communication Engineering Department have a wide range of career opportunities in both the public and private sectors.

In the telecommunications sector, they can contribute to mobile networks, satellite communication, and internet services, playing key roles in building and maintaining global connectivity. In electronics design and manufacturing, opportunities exist in semiconductor

industries, consumer electronics, and embedded systems that power modern devices in automotive, aerospace, and healthcare. The IT and software field also offers roles in networking, IoT development, and cybersecurity, where engineers integrate hardware and software to create reliable digital systems. Beyond industry, there are rewarding paths in research and development, working on advanced technologies such as artificial intelligence, robotics, automation, and next-generation wireless systems. Graduates are also valued in the public sector, serving in defense, space agencies, and energy organizations that require expertise in complex communication systems. For those interested in education, academia provides opportunities for teaching, research, and postgraduate studies. Finally, many graduates choose the entrepreneurship route, launching start-ups in electronics, communication, and smart technologies, shaping the innovations of tomorrow.

Contact Information

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COURSE CATALOGUE DESCRIPTIONS

1st Semester

ENGG117 - Computing Foundations

Introduction to general problem-solving concepts, algorithms and applications. Computer terminology, units, number systems. Steps in problem-solving. Problem solution, pseudocode, algorithms, flowcharts, data types, control structures. History of computers and programming. A simple C program layout, syntax and rules. C language basics, native types, identifiers, declarations, variables, expressions, assignments. Basic console input and output functions. Operators, unary, binary, mathematical, relational, equality and logical, precedence and associativity rules, type conversions and casting. Statements, flow of control. Sequential structure. Selective structure, if-else statement. Repetitive structure, while loop, do-while loop. Tracing a C code.

ECEN119 - Introduction to Profession

A series of seminars are held in current topics and areas of specialization in Electronics and Communication Engineering. The course introduces EUL Organisation, EUL policy Electronics and Communication Engineering undergraduate program, ECE curriculum, definition of Engineering, definition of Electronics and Communication Engineering, basic concepts of charge, voltage, current, power, Ohm's law, current and voltage relation with cable cross sectional areas and the insulation, legal responsibilities and code of ethics for ECE. Specialisation areas speakers are invited from different departments of EUL including Electrical & Electronics Engineering, Computer Engineering and Software Engineering Department or other International Universities, Industry and Consulting firms, to deliver seminars in all aspects of engineering that are not normally covered in lectures.

COMN191 – Academic English I

This course is intended for academically oriented students and it aims to bridge the gap between general and academic English. The course aims at developing the skills required for academic study, including note-taking, essay writing, as well as teaching strategies for undertaking research and dealing with unfamiliar academic vocabulary. The course also aims at teaching the features of guided writing, reading strategies such as predicting, skimming, and scanning. At the end of this course the students are expected to be able to; develop strategies, to improve the ability to comprehend complex academic texts, to develop strategies to produce more coherent writing and, make clear, appropriate, relevant notes from academic texts, and to adopt various approaches to deal with new or unknown vocabulary by practising effective use of dictionaries, and through making effective vocabulary records.

MATH101 - Calculus I

Fundamentals of calculus and its applications for engineers. The conceptual and visual representation of limits, continuity, differentiability, and tangent line approximations for functions

at a point. Applying the power rule, product rule, quotient rule and chain rule to functions explicitly and implicitly for finding derivatives. Applying the fundamental theorem of calculus to evaluate definite integrals. Performing accurately improper integrals, definite and indefinite integration, integration by parts, substitution, and inverse trigonometric substitution.

COMN111 – Chemistry

This course is based on understanding the theory of general chemistry designed for engineering majors. Matter and measurements. Atomic and molecular structure of matter, atomic theory, electronic structure and periodic properties of elements. Chemical compounds, ionic and molecular compounds, chemical bonding, Lewis structures and VSEPR model. Chemical reactions, classification, mole and mass relationships, the limiting reagent, percent yield, energy, rates and equilibrium. The interaction between the particles in liquid and solid phase, kinetic theory of gases and gas laws. Solutions, concentration units, solubility, acids and bases.

ENGG111 – Chemistry Lab

This course has been specially designed as an intensive introduction to the techniques of experimental chemistry. Molarity, Solution preparation, Calculation of density, distillation, Separation methods, precipitation reaction, acid-base titration, thermochemistry.

ENGG131 - Physics I

Introduction to properties of physical quantities. Properties of one dimensional motion, and classification of uniform and non-uniform one dimensional motion. Difference between vector quantities and scalar quantities. Summation, subtraction, and multiplication of vectors. Properties of two dimensional motion. Laws of Newton and principle of inertia. Application of second law of Newton to different mechanical systems, including circular motion. Work and energy, law of conservation of energy, and conservation of mechanical energy. Third law of Newton, and momentum. Difference between elastic and inelastic collision.

ENGG121 - Physics I Lab

This course is directed to ENG131-Physics I. The aim of this course is providing a medium for students to see the experimental applications of kinematics and dynamics of one dimensional, two dimensional, circular and rotational motion. The course supports students to validate the underlying theory through experiment and observation.

2nd Semester

UHTC01 – History

The course provides a detailed exposure on the history of the construction of the Turkish Republic under the light of Kemal Atatürk's principles this course is designed for Turkish speaking students. COM108 is designed for non-Turkish speaking foreign students. The aim of the course is to introduce a brief history of Turkish Republic and Cyprus. Social, economic and political aspects and effects of Western Civilization on Turkey and Cyprus. Relations with Middle East.

ORTK01 – Tarih (Only Turkish-speaking students)

In this course collapsing of the Ottoman Empire, defending of the Turkish Nation its own independency with the leadership of Atatürk, the establishment period of the young and dynamic Turkish Republic and developing of the republic rapidly will be taken into hand. In addition, the striking revolutions realized in a short period and the importance of these revolutions will be taught.

COMN192 – Academic English II

This course is the continuation of the ENGL121 English I course. Similar issues are focused on as in the former course with higher tone of language. This course integrates all four language skills and teaches students how to integrate skills and content in real-world academic contexts. High-interest and intellectually-simulating authentic materials are used to familiarize students with academic content. The course also aims at developing the ability to participate in exchanges of information and opinions in the context of the specific field, and to write instructions, descriptions and explanations about topics in the related field. Extra importance is put on teaching students' terminology related to the specific field.

COMN122 - Physics II

Introduction to properties of physical quantities. Properties of one dimensional motion, and classification of uniform and non-uniform one dimensional motion. Difference between vector quantities and scalar quantities. Summation, subtraction, and multiplication of vectors. Properties of two dimensional motion. Laws of Newton and principle of inertia. Application of second law of Newton to different mechanical systems, including circular motion. Work and energy, law of conservation of energy, and conservation of mechanical energy. Third law of Newton, and momentum. Difference between elastic and inelastic collision.

ENGG122 - Physics II Lab

This course is directed with COM122-Physics II. The aim of course is providing a medium for students to see the experimental applications of thermodynamics, electricity and magnetism. The course supports students to validate the underlying theory through experiment and observation.

COMP124 - Computer Programming

Structured programming using C language. Selective statements; if/else, switch/case, nested forms, conditional operator. Iterative statements; for, while, do-while, nested forms, break/continue. Functions, formal parameters, actual arguments, call-by-value methodology. Function prototypes, scope rules and storage classes. Arrays, declarations, initialization list, define directive, arrays as function arguments, call-by-reference methodology. Character arrays, strings, null character, string manipulations. Pointers, pointer variable declarations, array/pointer relationship, pointer arithmetic, array-subscript and pointer-offset notations, pointers as function arguments. Structures, structures as function arguments, array of structures, pointer to a structure. Header files, standard library functions, console input/output, file input/output, character/string handling, memory allocations.

MATH104 - Linear Algebra

Systems of linear equations. Elementary row operations, echelon forms, Gaussian elimination. Matrices, power of matrices, determinants, inverses, diagonal matrices. Cofactor expansion via row reduction. Cramer's rule and evaluating determinants. Vector spaces, linear independence, basis, dimension inner product spaces, Euclidean spaces. Linear transformation systems. Eigenvalues and eigenvectors; and eigenvalue/eigenvector applications.

MATH110 - Calculus II

Techniques of integration, integration by parts, trigonometric substitution, integration of rational functions, integration of trigonometric integrals. Application of integrals, areas between curves, volume, volumes by slicing, volumes by cylindrical shells, arc length, area of a surface of revolution, moments and centre of mass. Parametric equations, curves defined by parametric equations, calculus with parametric equations, derivation, area and arc length calculations. Polar coordinates, plotting with polar coordinates, derivation and integration with polar coordinates. Sequences, series, integral tests and estimates of sum.

3rd Semester

ECEN205 - Digital Circuits

Number systems. Logic gates. Boolean algebra and truth tables. Karnaugh maps. Combinational logic analysis and design, including decoders and encoders, multiplexers, adder and subtractor circuits. Asynchronous and synchronous sequential circuits: flip-flops, parallel registers and shift registers, ripple counters, synchronous binary counters, ring and Johnson counters. Sequential logic analysis. Memory and programmable logic: read access memory (RAM), read only memory (ROM), programmable ROM (PROM), programmable logic array (PLA) and programmable array logic (PAL).

ECEN215 - Circuit Theory I

The course has been designed to introduce fundamental principles of circuit theory commonly used in engineering research and science applications. Techniques and principles of electrical circuit analysis including basic concepts such as circuit variables, circuit elements, voltage, current, resistance, impedance, Ohm's and Kirchoff's law; basic electric circuit analysis techniques, resistive circuits, transient and steady-state responses of RLC circuits; circuits with DC and sinusoidal sources, steady-state power and three-phase balanced systems. Techniques of circuit analysis. Topology in circuit analysis. State variables and state equations. Response of first-order RL, RC circuits. Natural and step responses of second-order RLC circuits.

ECEN227 - Electrical Materials

Basic lattice types. Hydrogen atom. Electron configuration. Wave-particle duality. Uncertainty principle. Schrodinger's wave equation. Fermi-Dirac Distribution. Band-gap theory. Semiconductors: holes, thermal equilibrium, intrinsic carrier concentration, donors and acceptors. Drift current and carrier diffusion. PN junction and diodes. Bipolar junction transistors, field effect

transistors and simple transistor circuit analysis. Secondary effects in transistors. Dynamic models for diodes and transistors. Schottky barrier diode.

MATH 201- Ordinary Differential Equations

Definition and classification of differential equations. Solution of first order linear differential equations, initial value problems, homogeneous differential equations, non-homogeneous differential equations, Bernoulli equations, higher order differential equations, Cauchy Euler equations, Laplace transforms and properties of Laplace Transforms.

4th Semester

ECEN214 - Electromagnetic Theory I

Review of vector calculus. Orthogonal coordinate systems, transformation of coordinate systems, Del operator, gradient, divergence and curle of a vector field. Electrostatics in vacuum, Coulomb's and Gauss's laws. Conductors in the presence of electrostatic fields, Dielectrics and Capacitance. Electrostatic forces by the virtual work principle, Steady currents, Ohm's and Joule's laws and Ampere's force law.

ECEN216 - Circuit Theory II

The course builds up on the Circuit Theory I. The basic objective of this course is to introduce students to the fundamental theory and mathematics for the analysis of Alternating Current (AC) electrical circuits, complex numbers, frequency response and transfer function of circuits. Sinusoidal sources and phasors. Circuit analysis in the s-domain (Nodal analysis, mesh analysis, superposition, Thevenin/Norton equivalent). AC steady-state analysis. AC steady-state power analysis. Three-phase circuits. The Laplace transforms. Circuit analysis in the s-domain. Magnetically coupled circuits, frequency response. Mutual inductance and transformers. Two-port circuits.

ECEN228 - Electronics I

This course introduces the characteristics and applications of semiconductor devices and circuits. Emphasis is placed on analysis, selection, biasing, and applications. Upon completion, students should be able to construct, analyse, verify, and troubleshoot analog circuits using appropriate techniques and test equipment. The course includes basic concepts such as; semiconductor material, semiconductor diode circuits and applications, zener diodes, rectifiers, filters. BJT, MOSFET and JFET amplifier design including biasing, small signal analysis and frequency response. Design of multistage amplifiers. Differential and operational amplifier design. Output stages.

MATH224 - Engineering Maths

The concept of numerical error, solution of nonlinear equations with root finding. Solution of linear systems of equations and their convergence. Direct and iterative methods for the solution of linear algebraic equations. Polynomial interpolation and extrapolation. Curve fitting for least squares line and polynomial fitting with data linearization method. Numerical differentiation for

Lagrange and Newton polynomials, numerical integration with quadrature formulas and their error analysis. Numerical solution of ordinary differential equations.

MATH226 - Probability and Statistical Methods

Descriptive statistics for example the meaning of mean, mode and median, cumulative frequency plots and quartiles, percentiles. Histograms and bar charts similarities and application areas. Review of sets, events, and probability. Probability distribution/density functions, for discrete and continuous variables. Joint distributions, marginal distributions, conditional distributions and statistical independence. Moments of random variables, such as mean, variance covariance and correlation. Functions of random variables and their expectations. Discrete random variables and discrete probability distributions; continuous random variables and continuous probability distributions.

5th Semester

ECEN333 - Computer Architecture & Organization

This course will review fundamental structures in modern processors and computer architecture. Topics will include technology trends, computer organization, instruction set design, memory system design and importance of buses within the computer organization. This course also covers introduction to symbolic assembly language programming for MIPS architectures.

ECEN337 - Electronics II

Review of DC biasing procedures for transistor circuits. BJT and FET small-signal models: re and pi models and transconductance amplifiers. Multistage BJT and FET amplifiers. Frequency response of transistor amplifiers. Differential amplifiers. CMRR. Operational amplifiers. Applications of op-amps as integrators, differentiators and adders. Power amplifiers: push-pull amplifiers, Class A, B and AB amplifiers. Tuned amplifiers.

ECEN315 - Electromagnetic Theory II

Course includes in depth theoretical knowledge about Time-varying fields; Maxwell's equations; wave equations; time-harmonic fields; complex phasors; scalar and vector potential functions; plane waves in vacuum; plane waves in dielectrics and conductors; polarisation of plane waves, Poynting's theorem; reflection and refraction of plane waves at dielectric interfaces; Snell's laws; Fresnel formulas; critical angle; total internal reflection; total transmission; Brewster's angle; standing waves; transmission line theory; TEM waves; transmission line parameters; lossy and lossless lines; matching of transmission lines to their loads.

ECEN317 - Signals and Systems

Introduces the fundamentals of signal and system analysis. Topics include discrete-time and continuous-time signal analysis, analysis of linear, time-invariant systems, convolution sum/integral representation, difference equations, Fourier series and transforms and representations of both continuous-time and discrete-time signals. The student is introduced to important Fourier properties and their application, e.g. time/frequency shifting,

differentiation/integration, scaling/multiplication, convolution and Parseval's theorem. Applications drawn broadly from engineering and physics, including audio and communications.

6th Semester

UHTC02 - Turkish (Non-Turkish speaking students)

This foundation course covers the basics of Turkish, introducing modern, practical grammar rules for Turkish. Vocabulary is one of the most important aspects of language. New words and example sentences are given at the beginning of each lesson. Grammar points are given in clear language. After each grammar point there are plenty of examples. Words and phrases used frequently in everyday language are introduced through sections entitled 'Text'. Practice is vital in language learning. Therefore, at the end of each lesson there are practice exercises with answers.

ECEN308 - Microprocessor Systems

This course will introduce the fundamentals of microprocessor, microcontroller, hardware interfacing and system design techniques. Upon completion of this course you will become competent in assembly language programming, C programming and hardware interfacing with microcontrollers. This course also covers the theory and application of interrupts, concept of stacks, timers/counters, D/A conversion, parallel and serial ports. This course is supported with lab sessions where hands-on experience will be gained with the selected microprocessor.

ECEN342 - Communication Engineering

Principles and theory of various modulation techniques such as Amplitude modulation, Angle modulation, their differences in terms of bandwidth, power efficiency. Double Side Band Suppressed Carrier Modulation. Single side band modulation and AM modulation. The Modulation and demodulation circuits for AM systems are discussed. Various types of filters are reviewed and their applications in communications theory is discussed. Envelope detection, Average detector, Peak detector and Synchronous detector are viewed. Frequency modulation and Phase modulation: similarities and differences. Spectra of modulated signals. Power Spectral Density. Frequency division multiplexing. Bessel functions. Spectra of FM signal. Frequency deviation. Reactance modulation for FM. FM discriminator. Radio transmitters. This course also has a co-requisite laboratory work, where students apply theoretical knowledge obtained to practical work.

ECEN322 - Control Systems

Open loop and closed loop control. Transfer functions, block diagram, signal flow graphs, state-space equations. Sensitivity, disturbance rejection, steady-state error, system type and final value theorem. PI, PD and PID controller design. Analysis of first-order and second-order system performances. Routh-Hurwitz criterion and relative stability. The root-locus method and control system characterisation. Frequency-domain system analysis techniques: Bode diagrams, Nyquist diagrams and Nyquist stability criterion. Gain margin and phase margin.

7th Semester

ECEN408 - Digital Signal Processing

Digital signal processing (DSP) elements. Sampling theorem and reconstruction. Analysis of discrete-time signals and systems. Convolution and correlation. Recursive and non-recursive systems. System characterization using linear difference equations. Impulse response of linear, time-invariant (LTI), discrete-time systems. Z-transform and its properties. Design of FIR and IIR digital filters and their structures. Signal analysis using the discrete Fourier transforms. Discrete-time systems analysis and design using MATLAB.

ECEN410 - Graduation Project I

4th academic year (final year) students in Electronics and Communication Engineering are required to prepare and present a graduation project (Graduation Project - Part I & II) under the supervision of a faculty member listed above. Each student has to prepare a separate (or, as part of a team with two members) project. The purpose of the project is to develop an understanding of independent research by studying a particular Electronic and Communication Engineering topic. It is an extended exercise in the professional application of the skills and experience gained in the undergraduate program.

ENGG413 - Engineering Economics

Engineering economy principles. Cash-flow diagrams. Time effect on money. Formulas for reflecting time effect on money. How to value money that was spent before and how to value if it will be spent in the future while comparing different alternatives at present. Interest rate, simple interest rate, compound interest rate and compounding periods. How different compounding periods affecting the total amount of interest earned from the deposit. Why different alternatives need to be compared on economical basis. What is feasibility? Comparing different alternatives, examples. Minimum rate of return, attractive rate of return. Replacement and economic life concepts and problems about replacement concept by following different evaluation techniques.

ECEN310- Summer Training

The Electronics and Communication Engineering students are encouraged to take part in industrial work/organizations relating to their fields of study. This required as part of the fulfilment of the degree program. Students are required to complete a total 30 working days of Summer Training session after finishing their second or third year of studies.

8th Semester

ECEN402 - Digital Communication

Course starts with a review of probability and introduction to stochastic processes so as to understand channel behaviour. Digital modulation and demodulation methods explained with respect to analogue modulation methods. Differences between analogue and digital techniques and the importance of detectors. Base band signals and dimensionality theorem. Gramm Schmidt orthogonalisation procedure. Pulse code modulation, Nyquist sampling theorem, explanation of

aliasing. Pulse amplitude modulation, Pulse position modulation and minimum eucladian distance between signals. Multiplexing methods. Digital Passband Transmission topics which include Additive White Gaussian Noise, Coherent and non-coherent digital modulation themes such as BPSK, DBPSK, BFSK, BASK, etc. Optical Communications.

ECEN420 - Graduation Project II

This course is the sequel to ECE410. It consists in the implementation of a realistic, preferably interdisciplinary, engineering capstone project emphasizing engineering design principles on an Electronics and Communication Engineering topic. The team must complete the detailed design and implementation of the preliminary design they started in the ECE410 course. It is an extended exercise in the professional application of the skills and experience gained in the undergraduate program. Students are expected to make a presentation and submit a detailed final report which documents the design, implementation and testing.

ENGG434 - Engineering Ethics

Ethics and professionalism, moral reasoning, moral frameworks, ethical theories, commitment of safety, risks, workplace responsibilities, honesty, equal opportunity: non-discrimination, confidentiality and conflicts of interest, environmental ethics, green engineering, sustainable development, dilemma resolution, professional rights, whistleblowing. Code of ethics: The Institute of Electrical and Electronics Engineers, American Institute of Chemical Engineers, American Society of Civil Engineers, Software Engineering. Basic ethics training. Engineering professional training, job responsibilities and professionalism, labor law and ethics. Case studies on the topics of engineering professional ethics, labor safety, environmental protection. Computers and ethics, data protection, computer failures. Global issues.

TECHNICAL ELECTIVES

BUSN461 – Strategic Planning and Management

Strategic Planning, setting goals, basic concepts of strategic management, developing a strategic plan, vision, mission, objectives, strategies and action plans, project management, types of project management, risk management, the six step process of risk management, risk management steps and tools, entrepreneurship, innovation, invention, the practice of innovation, entrepreneurial management, change management and leadership, roles and responsibilities for change, leadership style, strategic leadership, strategic leadership failure, global and social effects of engineering practices.

ECEN321 - Satellite Communications

Satellite Orbits and launching procedures, look angles, Space Stations and Ground Terminals, Spacecraft, power, communications, TT&C, antenna systems, Link budgets, C/N calculation, Analog modulation techniques, S/N calculation, Frequency Allocation, Link Calculation and Signal Propagation, Digital Modulation, Error Correction Codes, Multiple Access, Receiver Synchronization, Baseband Processing and the basics of Satellite Networking. Case studies: DBS-TV, GPS, LEO and VSAT networks.

EEEN327 - Introduction to Mobile Communication

Introduction to wireless communications, cellular wireless networks, 2G to 4G cellular networks, Wi-Fi and WLAN, Internet, wireless and mobile IP. Network Planning in gsm systems, architecture of the network, how to handle Handover management. Review of multiplexing techniques such as TDMA, FDMA, and introduction to CDMA. Traffic planning and understanding of the trade-offs involved with quality vs capacity. This course also includes a Term Project where students design a mobile network considering various project specifications. The project involves submission of a Report and an Oral Presentation. Wireless WANs and PANs such as Bluetooth, Wireless sensor networks, mobility management and radio resource management, traffic models and mobility model, multiple access techniques and an introduction to the simulation of wireless networks.

EEEN329 - Introduction to Telecommunication Networks

Physical Layer-the theoretical basis for data communication, guided transmission media, wireless transmission, Data Link Layer, data link layer design issues, MAC Sublayer, MAC Sublayer (Wireless), MAC Sublayer (Bridges), network layer design issues, Network Layer (Routing and Routers), Network Layer (Internetworking/IP), Transport Layer/Services/ Protocols. The Transport Service, elements of transport protocols, flow control and buffering, multiplexing, introduction to UDP, the TCP service model, the TCP protocol, performance issues, the application layer, the domain name system. Internetworking with IP (classes of IP addresses; IPV4 and IPV6), Cisco Packet Tracer Tutorial.

EEEN341- Electromechanical Energy Conversion

To provide knowledge of basic principles of electromechanical energy conversion. To provide an understanding of operation principles of single-phase and three-phase transformers, to provide the ability to analyze electromechanical energy conversion devices.

EEEN409 – High Voltage Engineering

The course serves as an introduction to high voltage engineering, including basics of electrical breakdown, high voltage generation, high voltage test systems, measurement and analysis techniques as applied to power system apparatus such as cables, insulators, transformers, and generators

EEEN418 - Microwave Theory and Design

Understanding the basics of microwave systems and circuits. Review of Electromagnetic Theory and Waves. Transmission Line Theory. Smith Chart description, use. Impedance Matching networks; Lumped Element Matching, Shunt Element Matching, Quarter Wave Transformers. Learning the basics of microwave network analysis and scattering matrix.

EEEN419 – Narrowband Wireless Communications

This course introduces the characteristics and applications of transmission fundamentals, communication networks, the cellular concept and system design fundamentals frequency reuse, interference and system capacity. Protocols and the TCP/IP protocol suite. Antennas and radio propagation and large-scale path loss. Small-scale fading and multipath propagation. Doppler shift, mobile multipath channel parameters such as coherence bandwidth and coherence time. Diversity techniques and diversity combining. Spread spectrum communication techniques. Multiple access techniques TDMA, FDMA, CDMA, SDMA. Satellite Communications, Wireless LAN technologies.

ECEN429 - Antennas and Propagation

Familiarizing students with the fundamental parameters of antennas and principles of radiation. Review of the theory of the electromagnetic radiation. Learning fundamental antenna parameters; major minor lobes, radiation patterns, directivity, radiated power. Different antenna types theory and measurements: dipole, Yagi-Uda, Log Periodic Antenna, Slot Antenna. Antenna Arrays. Design of printed circuit antennas; microstrip patch antenna.

EEEN431 - Principles of Digital Image Processing

This course introduces the principles of digital image processing applications and their implementations mainly in C++. Topic covers: Image sampling and quantization; interpolation techniques, nearest neighbour interpolation, bilinear interpolation; Histograms, understanding image histogram, contrast stretching, brightness and contrast, gamma, histogram equalization. Filtering in spatial domain, low pass filter, high pass filter, band pass filter, box filter, edge detection techniques. Colour theory, human colour vision, digital image colour systems: RGB, HSI, HSV, CMYK. Image morphology, thresholding, erosion, dilation, opening and closing operations, and/or/not operations. Information theory, Shannon'e entropy, Huffmann compression, compression techniques, lossy/lossless compression.

EEEN432 - Wideband Mobile Communications

Introduction to 3G systems. Radio channel models. Evolution from GSM to UMTS. User traffic modelling for future mobile systems. Introduction to WCDMA. WCDMA Physical Layer, WCDMA Radio Interface Protocols, WCDMA Radio Network Planning, WCDMA Packet Access, WCDMA Radio Resource Management, WCDMA Physical Layer Performance. The course involves a term Project where the students simulate a DS-SS system in MATLAB and compare it to regular BPSK under Additive White Gaussian Noise. The students are expected to submit their code and plots comparing for various SNR the two methods.

EEEN433 - Fibre Optic Communications

Fundamentals of fiber optics. Light propagation - Basic optical laws and types of fibers. Wave propagation and the propagation properties of optical fibers. Fiber optic system topology and the optical fiber’s advantages over other available technologies. Basic knowledge on new generation fibers (photonic crystal fibers) and applications of optical fibers in telecommunication.

EEEN436 – Power System Analysis I

The course will help students understand how power systems are modeled both at the distribution and transmission levels. The course covers the modeling of generators, transformers, and transmission lines. The focus of the course is on the long-distance transmission of electric power with an emphasis on admittance and impedance modeling of components and systems, power-flow studies and calculations, symmetrical and unsymmetrical fault calculations, economic operation of large-scale generation and transmission systems. A special emphasis is placed on applications of computer-based methods to power-system problems.

EEEN437 - Renewable Energy Systems and Utilization

A brief survey of the renewable energy technologies and an introduction to field testing of power performance using measurement instrumentation. History and development of energy. Classification and description of primary energy sources. Energy conversion processes and secondary energy. Energy production, storage, transportation and consumption. Energy infrastructures. Economic and political aspects of energy systems. Energy security and geopolitics.

COMP415 – Artificial Intelligence

Basic concepts of artificial intelligence; systems think/act rational, systems think/act human like, goal based, utility based, reflex agents. Environment types; static, discrete, accessible, episodic, and deterministic. Problem solving, problem, actions, goals, simple agent problem, multi agent problem. Uninformed search strategies; Breadth First Search, Depth First Search, Uniform Cost, Iterative Deepening. Informed search strategies; Greedy Search, A* search, hill climbing, annulated simmuling, admissible heuristic, complexity, completeness, optimal algorithms, game playing, min max algorithm, alpha beta pruning algorithm. Propositional Logic, truth table, entailment, inference, valid, tautologies. First Order Logic, modus ponens, resolutions, conjunctive form, disjunctive form, horn form. Forward chaining, backward chaining, resolution by refutation, generalized modus ponens.

COMP448 - Artificial Neural Networks

This course addresses the principles of neural nets. The subjects include neurons, activation functions, single-layer, multi-layer neural nets, supervised learning, unsupervised learning models, linear separability and perceptron learning, the emphasis is placed on back-propagation neural nets. Further selected topics include self-organization feature maps, Kohonen algorithm, and learning vector quantization technique.