LEFKE AVRUPA ÜNİVERSİTESİ
EUROPEAN UNIVERSITY OF LEFKE

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAM INFORMATION

www.eul.edu.tr

PROGRAM INFORMATION

Program Name and Degree Awarded: Electrical & Electronics Engineering / Bachelor of Science (B.Sc.)

Duration of Studies: 4 years / 8 semesters

Total Credits / ECTS: 143 credits / 240 ECTs

Language of Instruction: English

Mission and Vision:

The mission of European University of Lefke's (EUL) Electrical & Electronics Engineering program is to educate competent, creative, and innovative engineers who possess both theoretical knowledge and practical skills, with a strong emphasis on problem-solving, analytical thinking, and adherence to ethical principles.

Our vision is to become one of the most prestigious engineering departments in our region by training engineers who can keep up with global developments, are aware of contemporary problems, produce creative solutions to these problems, and are able to work effectively in-group work and take part in national and international projects.

Program Objectives:

The objectives of the European University of Lefke (EUL) Electrical & Electronics Engineering program are to cultivate competent, innovative, and ethical engineers who possess strong theoretical knowledge and practical skills to address complex problems in the field.

Program Learning Outcomes:

(i) Engineering Knowledge: Knowledge of mathematics, science, basic engineering, computer computing and subjects specific to the relevant engineering discipline; Ability to use this information in solving complex engineering problems.

(ii) Problem Analysis: The ability to define, formulate and analyze complex engineering problems using basic science, mathematics and engineering knowledge and taking into account the UN Sustainable Development Goals* relevant to the problem under consideration.

(iii)Engineering Design: Ability to design creative solutions to complex engineering problems; The ability to design complex systems, processes, devices or products to meet current and future requirements, taking into account realistic constraints and conditions.

(iv)Use of Techniques and Tools: The ability to select and use appropriate techniques, resources and modern engineering and informatics tools, including estimation and modeling, for the analysis and solution of complex engineering problems, while being aware of their limitations.

(v) Research and Investigation: Ability to use research methods, including literature research, designing and conducting experiments, collecting data, analyzing and interpreting results, to investigate complex engineering problems

(vi)Part(s):

a. Global Impact of Engineering Practices: Information about the effects of engineering practices on society, health and safety, economy, sustainability and environment within the scope of the UN Sustainable Development Goals.
b. Awareness of the legal consequences of engineering solutions.

(vii) Ethical Behavior: Acting in accordance with engineering professional principles, knowledge about ethical responsibility; Awareness of acting impartially, without discrimination on any issue, and being inclusive of diversity

(viii) Individual and Team Work: Ability to work effectively individually and as a team member or leader in intradisciplinary and multidisciplinary teams (face-to-face, remote or hybrid).

(ix) Oral and Written Communication: The ability to communicate effectively verbally and in writing on technical issues, taking into account the various differences of the target audience (such as education, language, profession).

(x) Part(s):

a. Project Management: Knowledge of business practices such as project management and economic feasibility analysis.
b. Awareness about entrepreneurship and innovation.

(xi) Lifelong Learning: Lifelong learning skill that includes being able to learn independently and continuously, adapting to new and developing technologies, and thinking inquisitively about technological changes.

ELECTRICAL & ELECTRONICS ENGINEERING - Curriculum							
1st Year Fall				**1st Year Spring**			
	COURSE CODE AND NAME	**CREDIT**	**ECTS**		**COURSE CODE AND NAME**	**CREDIT**	**ECTS**
1	COM101 ENGLISH I	(3,0) 3	5	9	COM108 HISTORY	(2,0) 2	4
2	COM111 CHEMISTRY	(3,0) 3	4	10	COM110 ENGLISH II	(3,0) 3	5
3	COMP117 COMPUTING FOUNDATIONS	(3,1) 4	5	11	COM122 PHYSICS II	(3,0) 3	4
4	EEE119 INTRODUCTION TO PROFESSION	(2,0) 0	2	12	COMP124 COMPUTER PROGRAMMING	(3,2) 4	5
5	ENG111 CHEMISTRY LAB	(0,2) 1	2	13	ENG122 PHYSICS II LAB	(0,2) 1	2
6	ENG121 PHYSICS I LAB	(0,2) 1	2	14	MATH109 LINEAR ALGEBRA	(3,0) 3	4
7	ENG131 PHYSICS I	(3,0) 3	4	15	MATH110 CALCULUS II	(3,2) 4	6
8	MATH101 CALCULUS I	(3,2) 4	6				
		19	**30**			**20**	**30**
2nd Year Fall				**2nd Year Spring**			
	COURSE CODE AND NAME	**CREDIT**	**ECTS**		**COURSE CODE AND NAME**	**CREDIT**	**ECTS**
16	COM106 TURKISH	(2,0) 2	4	22	EE214 ELECTROMAGNETIC THEORY I	(3,0) 3	5
17	EE203 DIGITAL CIRCUITS I	(2,2) 3	6	23	EE216 CIRCUIT THEORY II	(3,2) 4	6
18	EEE215 CIRCUIT THEORY I	(3,2) 4	6	24	EE228 ELECTRONICS I	(3,2) 4	5
19	EE227 ELECTRICAL MATERIALS	(3,0) 3	4	25	EE252 TECHNICAL DRAWING	(3,0) 3	4
20	LEUXX1 FREE ELECTIVE I	(3,0) 3	5	26	MATH224 ENGINEERING MATHS	(3,0) 3	5
21	MATH201 ORDINARY DIFFERENTIAL EQUATIONS	(3,2) 4	5	27	MATH226 PROBABILITY & STATISTIC METHODS	(3,0) 3	5
		19	**30**			**20**	**30**
3rd Year Fall				**3rd Year Spring**			
	COURSE CODE AND NAME	**CREDIT**	**ECTS**		**COURSE CODE AND NAME**	**CREDIT**	**ECTS**
28	EE315 ELECTROMAGNETIC THEORY II	(3,0) 3	6	33	EE320 MICROPROCESSOR SYSTEMS	(3,2) 4	6
29	EE317 SIGNALS AND SYSTEMS	(3,1) 3	6	34	EE322 CONTROL SYSTEMS	(3,0) 3	6
30	EE337 ELECTRONICS II	(3,2) 4	7	35	EE342 COMMUNICATION SYSTEMS I	(2,2) 3	7
31	EE339 ELECTRONIC INSTRUMENTATION	(3,0) 3	5	36	EE348 ELECTROMECHANICAL ENERGY CONVERSION II	(3,0) 3	6
32	EE341 ELECTROMECHANICAL ENERGY CONVERSION I	(3,0) 3	6	37	LEUXX2 FREE ELECTIVE II	(3,0) 3	5
		16	**30**			**16**	**30**
4th Year Fall				**4th Year Spring**			
	COURSE CODE AND NAME	**CREDIT**	**ECTS**		**COURSE CODE AND NAME**	**CREDIT**	**ECTS**
38	BUSN461 STRATEGIC PLANNNING AND MANAGEMENT	(3,0) 3	5	45	EE452 GRADUATION PROJECT II	(0,9) 5	10
39	ECON413 ENGINEERING ECONOMICS	(3,0) 3	5	46	EEXX4 TECHNICAL ELECTIVE IV	(3,3) 3	5
40	EE310 SUMMER TRAINING	(0,0) 0	2	47	EEXX5 TECHNICAL ELECTIVE V	(3,0) 3	5
41	EE410 GRADUATION PROJECT I	(0,2) 1	3	48	EEXX6 TECHNICAL ELECTIVE VI	(3,0) 3	5
42	EEXX1 TECHNICAL ELECTIVE I	(3,0) 3	5	49	ENGG434 ENGINEERING ETHICS	(3,0) 3	5
43	EEXX2 TECHNICAL ELECTIVE II	(3,0) 3	5				
44	EEXX3 TECHNICAL ELECTIVE III	(3,0) 3	5				
		16	**30**			**17**	**30**

Laboratory and Equipment Capacity (if applicable):
Students have access to several up-to-date and well-resourced facilities, such as our Physics Laboratory, General Computer Laboratories, Electronics Laboratory, Control Laboratory, Communication Systems Laboratory, Digital Electronics and Microprocessor Laboratory, Computer-Aided Design Laboratory and Computer Networks Laboratory.

The Department of Electrical & Electronics 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 EEE 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:
Electrical & Electronics Engineering careers offer diverse opportunities across multiple sectors, including power and energy, telecommunications, aerospace, automotive, robotics, IoT and embedded systems, and electronics manufacturing. Key career paths include roles like Design Engineer, Controls Engineer, Test Engineer, Project Engineer, Hardware Engineer, Sales

Engineer, and Electrical Engineer. The demand for EEE graduates is high globally, supporting fields from consumer goods to defense and IT.

Contact Information:

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COURSE CATALOGUE DESCRIPTIONS:

1st Semester

COMP117 - 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.

EE119 - Introduction to Profession
A series of seminars are held in current topics and areas of specialization in Electrical and Electronics Engineering. The course introduces EUL Organisation, EUL policy Electrical and Electronics Engineering undergraduate program, EEE curriculum, definition of Engineering, definition of Electrical and Electronics 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 EEE. Specialisation areas speakers are invited from different departments of EUL including Electronics & Communication 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.

COM101 - 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.

COM111 – 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.

ENG111 – 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.

ENG131 - 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.
ENG121 - 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
COM108 – History (Non-Turkish speaking students)
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.

ORT108 – 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.

COM110 - 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.

COM122 - 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.

ENG122 - 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.

MATH109 - 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

COM106 - 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.

ORT106 - Türkçe (Turkish speaking students)

The course aims at providing the basic characteristics of written language and written communication and the differences between written language and spoken language. Expression: written and verbal expression; subjective expression; objective expression; paragraph; paragraph types (introduction, body, conclusion paragraphs). Defining texts and text types (informative texts, literary texts) conditions in texts (cohesion, consistency, intentionality, acceptability, contingency, informatively). Theoretic information about written expression, planned writing processes, and informative texts. Studying samples and writing applications, summarizing and preparing the plan, and correcting language and expression mistakes.

EE203 - 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).

EE215 - 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.

EE227 - 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

EE214 - 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.

EE216 - 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.

EE228 - 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.

EE252 - Technical Drawing

This course introduces students to simple principles in engineering drawing and general drawing and design communication, enable students to implement their professional skills in graphics, drafting and design, introduce the students the fundamentals of CAD and engineering applications.

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

EE315 - 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.

EE317 - 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.

EE337 - 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.

EE339 - Electronic Instrumentation

Function and characteristics of instrument, measurement errors, accuracy, DC and AC Ammeter, DC and AC voltmeter, Multimeter, Wheatstone and Kelvin bridge, Bridge-controlled circuit, Oscilloscope, Transducers and applications, Signal generators and analyzers.

EE341 - Electromechanical Energy Conversion I

Electromagnetic circuits Properties of magnetic materials, magnetic induction, Faraday's law, Energy losses. Single and three phase transformers Transformers, Auto –Transformers, Reactance and equivalent circuit, Efficiency and voltage regulation. DC machines DC generators, structure of DC machines, Armature reaction, Commutation, Speed control.

6th Semester

EE320 - 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.

EE322 - 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.

EE342 - Communication Systems I
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.

EE348 - Electromechanical Energy Conversion II
Rotating Single and tree phase asynchronous machines. Special electrical machines. Electromagnetic fields pulsating and rotating magnetic fields, EMF induced in a winding. Phasor diagrams, Induction machines equivalent circuit, steady-state analysis, speed control. Synchronous machines equivalent circuit, steady-state analysis, stability. Single and tree phase asynchronous machines. Special electrical machines.

7th Semester

EE410 - Graduation Project I
4th academic year (final year) students in the Department of Electrical and Electronic 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 Electrical and Electronic 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.

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.

EE310- Summer Training
Electrical and Electronic 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

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.

EE452 Graduation Project II
This course is the sequel to EE410. It consists in the implementation of a realistic, preferably interdisciplinary, engineering capstone project emphasizing engineering design principles on an Electrical and Electronics Engineering topic. The team must complete the detailed design and implementation of the preliminary design they started in the EE410 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.

TECHNICAL ELECTIVES

EE321 - 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.

EE327 - 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.

EE329 - 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.

EE409 – 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.

EE418 - 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.

EE419 – 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.

EE429 - 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.

EE431 - 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.

EE432 - 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.

EE433 - 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.

EE436 – Power System Analysis I
Analogue methods of power flow analysis dc and ac network analyzers. Digital methods of analysis Power Flow algorithms and flow charts, analysis using iterative techniques. Power system faults Causes and effects of faults. Review of per unit system and symmetrical components. Symmetrical three-phase faults. Asymmetrical faults, short circuit and open circuit conditions. Introduction to simultaneous faults. Power System Stability Power angle diagram, effect of voltage regulator, swing equation Transient.

EE437 - 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.