Al-AHLIYYA AMMAN UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING
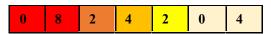
COURSE DESCRIPTIONS
OF
ELECTRONICS AND COMMUNICATIONS ENGINEERING PROGRAM

Number of Credit Hours: 160

Course Labeling Code:

Faculty	Code	Department Code	Year Level	Field Subject	Serial	Number

Example:

0	8	2	4	2	0	4

08 Faculty of Engineering Code
 2 Department Code
 4 Year Level
 2 Field Subject
04 Serial Number of the Course in the Field

Course Information:

Course Name {No. of Credit Hours} [Lectures – Contact Hours]

Example:

Power Electronics {3} [3-3]

{3}: 3 Credit Hours.

[3-3]: 3 Lectures, 3 Contact Hours Per Week.

0121181 English Communication Skills (1) {3} [3–3]
Grammar: question tags, modals, future forms, articles, adjectives, adverbs, if structures; vocabulary: relationships, work, activities, media, war, sport; writing skills: essay, notes, messages, application letters; basic and advanced reading skills; basic and advanced listening skills; verbal skills: oral presentations, arguments.
Prerequisite: 0171100 English Language (Remedial)

0161101 Arabic Language Communication Skills (1) {3} [3–3]
Language levels: phonological level, grammatical level, rhetorical level, orthographic level, comprehension and speaking; grammar exercises, nominal sentences, verbal sentences, kana and its sisters, Inna and its sisters, dual, masculine plural, feminine plural, indeclinable nouns, vocative, appositives; exercises in morphology, present participle and past participle; spelling and punctuation, dictionaries, listening and speaking.
Prerequisite: 0161100 Arabic Language (Remedial)

0161200 Military Sciences {3} [3–3]
The establishment and development of the Hashemite Kingdom of Jordan; the history of the Arab Legion; peacekeeping troops; preparing the nation for defense and liberation.
Prerequisite: None. Exception: Non-Jordanians

0161201 National Education {3} [3–3]
Concepts and terms; Geography of Jordan; contemporary political history of Jordan; Jordanian Society; Jordanian constitutional and democratic life; Jordanian national institutions; challenges facing Jordan; threats to civic life: fanaticism, extremism, terrorism, violence; corruption: definitions, types, causes, impact, and prevention.
Prerequisite: None

0152102 English Language Communication Skills (2) {3} [3–3]
Grammar: comparisons, passives, reported speech, relative clauses, gerunds, infinitives; vocabulary: explore, excess, food, money, success, crime; writing skills: essay, formal letters, letters of complaint; basic and advanced reading skills; basic and advanced listening skills; verbal skills: oral presentations, arguments, oral complaints.
Prerequisite: 0121181 English Language Communication Skills (1)

0161300 Islamic Culture {3} [3–3]
Definition of the culture, characteristics of the Islamic culture, Islamic culture and other cultures; the sources of Islamic culture: the holy Quran, Sunna, the Arabic language, history of Islam; fields of Islamic culture: faith, worship, morals; challenges facing the Islamic culture: orientalism, globalization, secularism; young people and the impacts of foreign cultures, women and Islam, Islam and terrorism.
Prerequisite: None

0162102 Arabic Language Communication Skills (2) {3} [3–3]
Definition of the Arabic language and its levels; understanding and comprehending extracts; practicing syntax and morphology: the style of command and demands; unconditional morphology relevant to interrogative cases; " kad " , [k&d] and its sisters; adjectival, exaggerated expressions; adverbs of time and place , the forms of "al-haser"[al-haser]; dictation exercises; the conditions of writing "al-hamza" (the glottal stop); numbers; composition, essay writing, listening and spoken extracts .
Prerequisite: 0161101 Arabic Language Communication Skills (1)

0162301 History of Jordan and Palestine {3} [3–3]
The geography of Jordan and Palestine, Jordan and Palestine in ancient times, general historical look, Jordan and Palestine in the Mamluki period, Jordan and Palestine during the First World War (1914-1918), Emirate of East Jordan (Transjordan), constitutional and legislative life in Jordan, Palestine under the British Mandate, and Jordanian-Palestinian relations, Jerusalem: historical status.
Prerequisite: None

0411100 Human Rights {3} [3–3]
This course deals with identifying the basic concepts of human rights in an analytical way, and then realistic clarify of the international & regional means dealing with human rights such as treaties, recommendations and international means that are in the process of formation, such imperative rules & customs, this course also address realistically the content of human rights and the rights of the first generation such as right of living. The second-generation rights such as the right to work and third-generation rights such as the right of environment. This course deals with the international ways to protect human rights, whether legal means "reports, complaints of States and individuals, commissions of inquiry," or other means such as the use of economic pressure or political use of force - the theory of intervention for the benefit of humanity.
Prerequisite: None

0132200 Psychology and Life {3} [3–3]
Human behavior, fields of psychology, main approaches to human behavior. Introduce skills based on the understanding of human behavior, teaching students these skills related to the challenges facing students in their everyday life such as: problem-solving, self-confidence, coping with stress, mental health, establishing healthy relationships with others, motivation, and linking all these terms to real life through discussion and application.
Prerequisite: None

014 3301 Entrepreneurship {3} [3–3]
Economic science definition: its objectives and the economic problem; the relation between the economic science and other sciences; economic analysis methods; production possibilities curve; national income accounts; consumption; investment; saving; unemployment; inflation; money and banking; financial and monetary policy and its role in dealing with the imbalanced economy through these policies; economic development in terms of importance and objectives and economic planning to achieve such objectives; demand and supply theory and consumer equilibrium; cost and production theory; Producer equilibrium in different markets.
Prerequisite: None

0162302 Media and Public Relations {3} [3–3]
The nexus between media and society in terms of the social, political, economic and cultural power of the media, the role of the media in giving people the opportunity to express their opinions and promote international relations; communication and public relations, communication and its types, levels, forms, properties, fields, activities, physical and nonphysical (symbolic) environment, and obstacles to the communicative process; public relations: its beginnings, development, principles, bases, importance, functions, planning, activities.
Prerequisite: None

0561500 Tourism and Archaeology {3} [3–3]
Tourism definition; Classification of Tourism; The difference between tourist and other traveler's concepts, Travel types, The definition of Archaeology and archaeological sites: Archaeological surveys and excavations; Documentation; Jordan through the ages; Components of tourism in Jordan; Elements of tourist attractions in Jordan: Archeological sites, Natural sites, Natural reserves, Forests; Tourist movement and types in Jordan; Economical impact of tourism in Jordan.
Prerequisite: None

0161303 Sport and Health {3} [3–3]
Defining health and fitness: physical education, health education; the cognitive, emotional, skill-oriented, and social goals of physical education; the history of physical education: ancient, medieval, and modern ages, the Olympics, athletics in Jordan: nutrition and exercising; athletic injuries: bone, joint, muscle, skin injuries;: special exercises for figure deformation; diseases related to lack of exercise: diabetes, obesity, being underweight, back pain, cancer; hooliganism: causes and recommended solutions for hooliganism.
Prerequisite: None

0162305 Environmental and Public Safety {3} [3–3]
The concept of the environment, its laws and relation to other sciences, primary and secondary components, cycle of elements in the natural environment, environmental problems, pollution of the environment, the problem of the depletion of environmental resources, principles of public health and diseases: the concept of public health, pathogens, viruses, bacteria, parasites, fungi, insects. The environment and pathology: organic, genetic, reproductive and psychological pathology. Nutrition and public health: types of food, malnutrition diseases, undesirable eating habits. The environment and public health from an Islamic perspective: Quranic verses and sayings of the Prophet.
Prerequisite: None

0162306 Science and Life {3} [3–3]
Origin and evolution of life: origin of universe, solar system formation and the origin of the earth, prebiotic chemistry, water for life sustenance contributions of polymer industry-natural and synthetic polymers, pharmaceuticals and cosmetics, generic and herbal drugs, drug abuse and its consequences.
Prerequisite: None

0111101 Mathematics (1) {3} [3-3]
Review of basic algebra, functions, limits, continuity, derivatives of algebraic, trigonometric, exponential and logarithmic functions. Curve sketching, related rates problems, maximum-minimum problems, indefinite integral, definite integral and applications with emphasis on engineering and pharmacy models.
Prerequisite: None

0111202 General Physics (1) {3} [3-3]
Physics and Measurement; Motion in One Dimensions; Vectors; Motion in tow Dimensions; The Laws of Motion; Circular Motion; Applications of Newton's Laws; Energy of a System; Conservation of Energy; Linear Momentum and Collisions; Rotation of a Rigid Object about a Fixed Axis; Angular Momentum; Static Equilibrium and Elasticity; Universal Gravitation; Fluid Mechanics; Oscillatory Motion; Wave Motion; Sound waves; Superposition and Standing Waves; Temperature; The First Law of Thermodynamics; The Kinetic Theory of Gases; Heat Engines, Entropy, and the Second Law of Thermodynamics.
Prerequisite: None

0111203 General Physics (2) {3} [3-3]
Electric Fields; Gauss Law; Electric Potential; Capacitance and Dielectrics; Current and Resistance; Direct Current circuits; Magnetic Fields; Source of the Magnetic Field; Faraday's Law; Inductance; Alternating- Current Circuits; Electromagnetic Waves.
Prerequisite: 0111202 General Physics (1)

0111204 General Physics Lab. {1} [1-2]
Experimental Error and Data Analysis; Measurements; Vectors; Kinematics; Newton's Second Law; Friction; Centripetal Force; work and Energy; Hooke's Law; Simple Pendulum; Specific Heat of Metals; Determination of the coefficient of viscosity by Stoke's law; Archimedes Principle and Specific Gravity; Ohm's Law; Kirchhoff's Law; Wheatstone Bridge & Resistivity; The Oscilloscope, RC circuit.
Co-requisite: 0111202 General Physics (1)

0112102 Mathematics (2) {3}[3-3]
Applications of the Definite Integral; Techniques of Integration; Hyperbolic Functions; Inverse Trigonometric Functions; L'hopital's Rule and Indeterminate Forms; Improper Integrals; Taylor's Formula; Sequences and Infinite Series and Applications with Emphasis on engineering models.
Prerequisite: 0111101 Mathematics (1)

0811201 Computer Skills (Engineering) {3} [3–3]
The basic concepts of programming using C++ language: C++ programming; controls structures; functions; arrays; pointers; an introduction to classes and objects.
Prerequisite: 0331200 Computer Skills (Remedial)

0812101 Technical Writing {1} [1–1]
Identify and write technical and scientific reports in English; focus on the technical side on every part of the report; practical applications on selected topics.
Prerequisite: 0121181 English Language Communication Skills (1)

0812102 Engineering Ethics {1} [1–1]
Engineering ethics; applied ethics and moral principles that apply to the practice of engineering; obligations on the shoulders of engineer towards society and towards its clients and his profession; ethics code engineering practice.
Prerequisite: 0121181 English Language Communication Skills (1)

0832103 Engineering Mathematics (1) {3} [3–3]
Different methods of solving ordinary differential equations applicable to the first, second and higher-order DEs, linear and nonlinear DEs, homogeneous and nonhomogeneous DEs. As an engineering application, modeling of some engineering, physical, and social problems will be given.
Prerequisite: 0112102* Mathematics (2) (to be passed)

0832104 Engineering Mathematics (2) {3} [3–3]
Linear Algebra: matrices, vectors, determinants, solution of linear systems of equations, inverse of a matrix; matrix eigenvalues problems: eigenvalues, eigenvectors, and diagonalization; complex analysis: complex numbers and functions, analytic and harmonic complex functions, exponential, trigonometric and logarithmic complex functions.
Prerequisite: 0112102 Mathematics (2)

0832107 Engineering Statistics {3} [3–3]
Applications of statistics in engineering; topics include: presentation and treatment of data; introduction to probability theory and probability distribution (discrete and continuous); counting techniques; sampling theory; statistical estimation; testing hypothesis; correlation; regression analysis.
Prerequisite: 0111101 Mathematics (1)

0833105 Numerical Analysis {3} [3–3]

General numerical methods: equation solving via iteration, interpolation; numerical integration, and numerical differentiation; numerical methods in linear algebra, Gauss elimination, least squares method, numerical methods for differential equations.
Prerequisite: 0112102 Mathematics (2)

0871101 Engineering Workshops {1} [1–2]

Workplace safety and use of tools; basic skills of measuring and machining; basic skills of welding; household electric circuit installation; basics of carpentry and its tools.
Prerequisite: None

0871102 Engineering Drawing {2} [2–4]

Use of instruments; lettering; graphic geometry; orthographic; isometric drawing and sketching; sectional views; computer aided design; applications in civil, mechanical, architectural and electrical engineering.
Prerequisite: None

0822201 Electronics (1) {3} [3–3]

Semiconductor materials and diodes: the pn junction, diode types, Zener diode; diode basic circuit analysis, diode applications; transistor amplifiers (BJT, MOSFET and JFET): physics, I-V characteristics, dc biasing and small signal analysis.
Prerequisite: 0111203 General Physics (2)

0822202 Electronics (1) Lab. {1} [1–2]

Diode characteristics; clipping and clamping circuits; half-wave and full-wave rectification; Zener diode and voltage regulation; BJT characteristics and biasing circuits; FET characteristics and biasing circuits; transistor amplifiers.
Co-requisite: 0822201 Electronics (1)

0823203 Electronics (2) {3} [3–3]

Multistage amplifiers; frequency response of single stage and multistage transistor amplifiers; differential amplifiers; operational amplifiers: analysis, design, frequency response, and applications; oscillators; passive and active filters.
Prerequisite: 0822201 Electronics (1)

0823204 Electronics (2) Lab. {1} [1–2]

Transistor amplifiers; frequency response of single and multi-stage transistor amplifiers; transfer characteristics of cascade amplifier; differential amplifier; operational amplifiers and applications; oscillators; passive and active filters.
Co-requisite: 0822203 Electronics (2)

0823207 Digital Electronics {3} [3–3]

Digital electronic signals and switches: digital signal, clock waveform, serial and parallel representation, applications of relay, diode and BJT as a switch; digital logic families: RTL, DTL, TTL, ECL, MOS and CMOS logic family, interfacing between families; timing circuits: bistable, monostable, astable circuits and 555-timers; interfacing to the analog world: DAC and ADC circuits, sample and hold circuits; memory concepts: RAM, ROM, magnetic and optical storage.
Prerequisite: 0823203 Electronics (2)

0823208 Digital Electronics Lab.   {1} [1–2]
Characteristics of switching devices, characteristics of logic gates: RTL, TTL, and COMS, interfacing of TTL & CMOS gates; analysis and design of multivibrators circuit; application of 555 timer; DAC and ADC circuits.
Co-requisite: 0823207 Digital Electronics

0823501 Signals and Systems   {3} [3–3]
Classification of signals, basic concepts of sampling, basic continuous-time and discrete-time signals; signal processing using MATLAB; classification of systems, properties of continuous-time LTI systems, convolution integral, proprieties of discrete-time LTI systems, convolution sum, difference equations; Laplace transform, transfer function; Fourier series; Fourier transform, frequency response of continuous-time LTI systems, power spectral density.
Prerequisite: 0112102 Mathematics (2)

0823101 Probability and Random Processes {3} [3–3]
Introduction to probability and random variables; statistics of random variable; random process; ergodicity and stationery; variance and autocorrelation function; power spectral density; filtering of random processes; Gaussian process: noise, narrow band random process.
Prerequisite: 0112102 Mathematics (2)

0823502 Analog Communications   {3} [3–3]
Review of Fourier transforms; spectra, filters, and Hilbert transform; analog modulation techniques: AM, FM and PM; band-pass noise representation: noise performance of analog modulation; FDM; super-heterodyne receiver.
Prerequisite: 0823501 Signals and Systems (to be passed)

0823503 Analog Communications Lab.   {1} [1–2]
Filters; AM and FM modulation and demodulation; amplitude modulators; single-sideband transmission; super-heterodyne Receiver.
Co-requisite: 0823502 Analog Communications

0824504 Digital Communications   {3} [3–3]
Sampling and analog to digital conversion: PAM, PCM, DPCM, delta modulation, TDM; principle of digital data transmission: baseband transmission, Nyquist criteria, matched filter and noise performance, ISI, line coding and partial response signaling, equalization, binary band-pass transmission: BASK, BFSK, BPSK, DPSK, geometric representation of signals: orthogonal signals, correlation receivers and signal constellations, M-ary band-pass digital transmission: ASK, PSK, FSK, QAM, noise performance and bandwidth efficiency, synchronization.
Prerequisite: 0823502 Analog Communications

0824505 Digital Communications Lab. {1} [1–2]
Sample and hold circuit; multiplexing; sampling process and aliasing effect; generation and detection of PCM; clock recovery; digital baseband signaling (line codes and data formats): unipolar RZ, bipolar RZ, unipolar NRZ, and bipolar NRZ; digital pass-band modulation techniques: ASK, PSK, FSK, and QPSK.
Co-requisite: 0824504 Digital Communications

0824507 Digital Signal Processing {3} [3–3]
Sampling and aliasing; review of discrete time signals and systems; z-transform and its application to the analysis of LTI systems; DSP using MATLAB; discrete-time Fourier transform (DTFT); frequency response of LTI systems; discrete Fourier transform (DFT); structures for FIR and IIR filters; introduction to design of digital filters; applications of DSP: speech processing and image processing.
Prerequisite: 0823501 Signal and Systems (to be passed)

0825210 Communication Electronics {3} [3–3]
Transmitter and receiver performance; noise performance in communications electronics; Noise Figure; sensitivity; nonlinear behavior/performance of nonlinear devices: harmonics; blocking and de sensitization; intermodulation products; intermodulation distortion; one dB compression point (P1dB); third order intercept point (IP3); communication circuits at RF; PIN diodes; variable capacitance diodes; oscillators; mixers; RF power amplifiers; RF low noise amplifiers and IF amplifiers; Phase Locked-Loop.
Prerequisite: 0824504 Digital Communications

0825211 Optical Communication Electronics {3} [3–3]
Advantages and applications of optical communication; theory of dielectric optical waveguides; properties of multimode and single mode optical fibers: wave Propagation, attenuation, and dispersion; optical sources: theory of lasers, semiconductor laser diodes, light emitting diodes, and drive circuits; optical detectors: theory, photodiodes types and receiver circuits, sources of noise; system design; numerical simulations.
Prerequisite: 0823203 Electronics (2)

0825508 Mobile Communication Systems {3} [3–3]
Cellular system design concepts: channel planning, traffic theory, handoff, capacity; radio propagation: free space path loss model, two-ray model, practical path losses models, diversity and fading; modulation techniques; equalization; multiple access techniques: FDMA, TDMA, CDMA, OFDMA; GSM system.
Prerequisite: 0824504 Digital Communications

0825509 Communications and Computer Networks {3} [3–3]
Circuit and packet switching; network layers; protocols: OSI, TCP/IP; access methods: telephony line modems – voice band, DSL, ISDN; wireless; fiber optic; network transmission equipment: modems, multiplexers, add/drop; local area networks: topologies, multiple access schemes, frame structure, capacity; Ethernet; wide area and metropolitan area networks; internet: protocols, addressing; routing, VoIP; asynchronous transfer mode: protocol layers; cell structure; physical layer, switching; synchronous systems: SONET, SDH; frame relay.
Prerequisite: 0823501 Signals and Systems

0824901 Field Training {3}
Practical experience to be gained through working for eight continuous weeks in an accredited establishment.
Prerequisite: Successfully completing 110 CR

0825902 Graduation Project (1) {1} [1–1]
Each student (or a team of students) may choose from a list of research projects, and is/are supervised by a faculty member in the department; Project (1), which represents the first phase of the graduation project requires gathering the practical and theoretical resources needed for the completion of graduation project (2).
Prerequisite: Successfully completing 120 CR

0825903 Graduation Project (2) {2} [2–2]
The student implements and finalizes the work described in project (1); after full implementation of the project's goals, the student must present a comprehensive report on the entire graduation project to an examining committee.
Prerequisite: 0825902 Graduation Project (1)

0812401 Digital Logic Circuits {3} [3–3]
Digital Numbering System and Information Representation: Arithmetic Operations, Decimal and Alphanumeric Codes, Binary Logic; Boolean Algebra: Identities, Functions and Manipulation, Standard Forms, Simplification, Logic Gates, Switch-Level and Logic CMOS Implementation, Integrated Circuits; Combinational Logic Design: Circuits (Gate Level), Design Hierarchy and Procedures, Computer-Aided Design, Combinational Two-Level and Multi-Level Implementations, Arithmetic (Add, Subtract, Multiply) and Other Popular Modules (Multiplexers, Encoders, Decoders); Programmable Logic Design: ROMs, PLAs, PALs, FPGAs, Language-Directed Combinational Design (VHDL); Sequential Logic Design: Latches, Flip-Flops, State Machine Design and Minimization (Mealy and Moore Models); Design Problems.
Prerequisite: None

0812402 Digital Logic Circuits Lab {1} [1–2]
Digital Logic Circuits laboratory provides students with the ability of identifying the digital logic gates and combinational logic circuits such as adders and decoders. Students are also conducting experiment with memory elements (flip-flops) and sequential logic circuits.
Co-requisite 0812401 Digital Logic Circuits

0813405 Microprocessors {3} [3–3]
Introduction to the Microprocessor and Microcomputer; The Microprocessor and its Architecture; Addressing Modes; Instruction Set; Programming the Microprocessor using Assembly Languages; 8086 and 8088 Hardware Specifications: Memory Interface, Basic I/O Interface, Interrupts, Keyboard and Printer Interface, PPI 82C55, ADC, DAC and DMA Interface.
Prerequisite: 0812401 Digital Logic Circuits

0814407 Embedded Systems {3} [3–3]
Introduction to Embedded Systems; Introducing PIC 16 Series: Architecture Overview of PIC16F84A, The 16F84A Memory, Power Up and Reset; Building Assembly Programs: Introduction to Assemblers, 16 Series Instruction Set; Parallel Ports; PIC 16F87XA: Architecture Overview, Special Memory Operations; The physical interface; Interrupts, Counters and Timers: Working with Interrupts, Counters and Timers, Watchdog Timer, Sleep Mode, Capture Mode, Compare Mode, PWM Module; Serial Communication; Data Acquisition.
Prerequisite: 0813405 Microprocessors

0813415 Microprocessors and Embedded Systems Lab. {1} [1–3]
Practical Sessions on the Different Topics Covered in the Microprocessors and Embedded Systems Course.
Co-requisite: 0814407 Embedded Systems and 0813405 Microprocessors

0814104 Discrete Mathematics {3} [3–3]
Introduction to Discrete Mathematics: Logic, Relations, Functions, Basic Set Theory, Countability and Counting Arguments, Proof Techniques, Mathematical Induction, Graph Theory, Combinatorics, Discrete Probability, Recursion, Recurrence Relations, and Number Theory; The Fundamental Mathematical Tools Used in Computer Engineering as: Sets, Relations, and Functions; Propositional Logic: Predicate Logic, and Inductive Proofs, Summations, Recurrences, and Elementary Asymptotic; Counting and Discrete Probability; Undirected and Directed Graphs; Introductory Linear Algebra with Applications in Computer Engineering.
Prerequisite: 0832104 Engineering Mathematics (2)

0833108 Numerical Analysis Lab. {1} [1–2]
The use of tools and ready-made programs to improve student performance and ability to use the program like MATLAB in the field of solving mathematical and numerical functions, applications in engineering sciences and system design.
Prerequisite: 0833105 Numerical Analysis

0872301 Electric Circuits (1) {3} [3 – 3]
Basic Components and Electric Circuits: Units and Scales, Current, Voltage, Power, Voltage and Current Sources, Ohm's Law; Voltage and Current Laws: Kirchhoff's Voltage, Kirchhoff's Current Laws; Nodal and Mesh Analysis; Techniques of Circuit Analysis: Linearity and Superposition, Source Transformations, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer; Energy Storage Elements: Capacitor, Inductor; Basic RL and RC Circuits: The Source Free RL Circuit, The Source Free RC Circuit, The Unit-Step Function; The RLC Circuit: The Source Free Parallel Circuit, The Over Damped Parallel RLC Circuit, Complete Response Analysis; Introduction to AC Circuits.
Prerequisite: 0111202 General Physics (1)

0872302 Electric Circuits (2) {3} [3–3]
Sinusoidal Steady State Analysis: Characteristics of Sinusoids, Forced Response to Sinusoidal Functions, The Phasor, Phasor Relationships for R, L, and C, Impedance, Admittance; AC Circuit Power Analysis: Instantaneous Power, Average Power, Effective Values of Current and Voltage, Apparent Power and Power Factor, Complex Power; Three-Phase Circuits; Magnetically Coupled Circuits; Complex Frequency and Laplace Transform; Circuit Analysis in The s-Domain; Frequency Response; Two-Port Networks.
Prerequisite: 0872301 Electric Circuits (1) (to be passed)

0872303 Electric Circuits Lab. {1} [1–2]
DC Circuits: Kirchhoff's Voltage and Current Laws, Network theorems, Maximum Power Transfer; Transient Circuits: RL, RC, RLC; Resonant Circuits; Magnetically Coupled Circuits; Two-Port Networks.
Co-requisite: 0872301 Electric Circuits (1)

0872304 Electromagnetics {3} [3–3]
Basic vector algebra and vector calculus; Coordinate systems and transformation; Electric field: Coulomb's law, electrostatic field, electric potential, electric flux density, Gauss's law and boundary value problems, capacitor and energy density in electrostatic fields; Maxwell's equation; Magnetic field: steady electric current, Biot-Savart law and magneto-static fields, magnetic flux density, Ampere's law, magnetic vector potential, magnetic forces, inductance and energy density in magneto-static fields, ferromagnetic material and magnetic circuits; Time-varying fields and Maxwell's equations; Electromagnetic waves: characteristics, speed, power and polarization.
Prerequisite: 0111203 General Physics (2)

0873305 Electrical Machines {3} [3–3]
Principles of Electromagnetic circuit; Single-phase transformers: ideal, practical transformer, equivalent circuit, auto-transformer; Three-Phase Transformer: Types, Connection; AC Machinery Fundamentals: Principle of work, rotating magnetic field; Three phase induction motors: Principle of work, properties an performance, starting, speed control; Synchronous Machines: Construction, Internal Generated Voltage, Equivalent Circuit; Operation Modes: Alone, Parallel; Synchronous Motors: Steady state operation, starting.
Prerequisite: 0872302 Electric Circuits (2)

0874306 Electrical Machines Lab. {1} [1–2]
DC Machines: Motors, Generators; Transformers: Single phase, Three-phase Transformers; Three-phase Synchronous Machines: Motors, Generators; Three-phase Induction Motors: Squirrel Cage Rotor, Wound Rotor (Slip ring); Single-phase Motors.
Co-requisite: 0873305 Electrical Machines

0873308 Instrumentation & Measurements {3} [3–3]
Introduction to Measurements and Errors: Units, Standards, and Calibration; Measurement Bridges; Electronics meters: DC, and AC; Indicating Instruments and Digital Multi meters; Oscilloscope and its Applications; Signal Generation; Analog and Digital Data Acquisition Systems; Transducers; Spectrum Analyzer and its Application; Frequency Counters.
Prerequisite: 0822201 Electronics (1)

0873309 Instrumentation & Measurements Lab. {1} [1–2]
Characteristics of Moving Coil Meters; Galvanometer Applications; Applications of Bridges Including: Resistance, Capacitance, and Inductance; Thermal, Light, and Displacement Transducers; Frequency Discriminators; Calibration of Measurement Devices; Oscilloscope Measurements.
Co-requisite: 0873308 Instrumentation and Measurements

0874106 Engineering Economy and Management {3} [3–3]
Engineering Project Development; Decision Making; Basic Concepts of Capital Investment: Formulas and Applications, Rates of Return, Economic Feasibility of Projects (Net Future Value, Net Present Value, and Equivalent Uniform Cash Flow); Comparison of Mutually Exclusive Proposals; Benefit-Cost Ratio Method; Depreciation; Corporate Taxation; Resource Allocation. Prerequisite:
Prerequisite: 0111101 Mathematics

0874209 Power Electronics {3} [3–3]
General introduction; Power semiconductor Switches: Features, Characteristics and Classification of Diodes, Transistor, Thyristor and others; Quality Assessment and Parameters of AC & DC Waveform; Single-Phase and Three-Phase Rectifier Circuits; Uncontrolled, Fully-Controlled, and Semi-Controlled Converters; AC/AC Converters (AC Voltage Regulators); DC/DC Converters (DC Choppers); DC/AC Converters (Inverters); Applications of Power Electronics.
Prerequisite: 0822201 Electronics (1)
Co-requisite: 0823501 Signals and Systems

0874310 Electrical Power Systems (1) {3} [3–3]
Structure of modern power systems, Basic concepts; Per unit system; Power transmission lines; Characteristics and Performance of power Transmission Lines; Load flow studies; Formulation of ZBUS Matrix; Symmetrical Fault Analysis; Symmetrical components; Unsymmetrical Fault Analysis; Symmetrical components.
Prerequisite: 0873305 Electrical Machines

0874311 Power & Power Electronics Lab.   {1} [1–2]
This course teach how to work with high voltage power elements and power electronics components.
Co-requisite: 0874310 Power Systems and 0874209 Power Electronics

0874312 Control Systems {3} [3–3]
Concept of Control Systems; Open-loop and Closed-loop Systems; Mathematical Modeling of Physical Systems; Transfer Function and System Modeling Diagrams; Response Characteristics of Control Systems; Specifications of System Performance; Stability Analysis of Linear Control Systems; Routh's Stability Criterion; Time-domain Analysis of Control Systems; Design of Controllers and Compensators.
Prerequisite: 0823501 Signals and Systems

0875313 Control Systems Lab. {1} [1–2]
Open-Loop and Closed-Loop Systems; Servomechanism Principles; Transient Response; Closed-Loop Position and Velocity Control Systems; The Effect of Gain, PI, PD, and PID Controls on System Performance; Control Systems for First and second order differential equations; Frequency Response Measurements; Analogue Computer Simulation of Control Systems.
Co-requisite: 0874312 Control Systems

0825212 Selected Topics in Electronics {3} [3–3]
The objective of this course is to introduce advanced and new topics in one of the areas of electronics engineering; the topics can be changed from one year to another depending on the instructor's area of specialty.
Prerequisite: None

0825511 Antennas and Wave Propagation {3} [3–3]
Properties of electromagnetic waves: Maxwell's equations, plane wave properties: field relationships, wave impedance, pointing vector, phase velocity, lossy media, polarization: polarization states, mathematical representation of polarization, random polarization; antenna fundamentals and principles: radiation, near-field and far-field regions, far-field radiation from wires, antenna parameters: radiation patterns, directivity, radiation resistance and efficiency, power gain, bandwidth, reciprocity, receiving antenna aperture, beamwidth and directivity, the Friis formula, polarization matching, practical dipoles: dipole structure, current distribution, radiation pattern, input impedance, antenna arrays: linear and planner arrays, the uniform linear arrays, parasitic elements (Uda-Yagi antennas), reflector antennas, monopole antennas, corner reflectors, parabolic reflector antennas, horn antennas, loop antennas, helical antennas, patch antennas; propagation of radio waves: ground waves, sky waves, troposphere propagation; microwave links.
Prerequisite: 0872304 Electromagnetics

0825512 Microwave Engineering {3} [3–3]
Introduction; review of Maxwell's equations; general concepts of Transmission Lines (TLs) for microwave frequencies: insertion and return loss; TEM, TE, and TM wave solutions; Stripline and Microstrip Lines; dispersion and group velocity; waveguides and resonant cavities; microwave network analysis; Lumped element and distributed element matching circuits and stubs; Scattering Parameters; microwave passive devices; microwave filters; detectors and transistor amplifiers;
Prerequisite: 0872304 Electromagnetics

0825513 Information Theory and Coding {3} [3–3]
Information theory; entropy; source coding theorem; lossless data compression; information capacity theorem; error control coding; block codes and decoding; cyclic codes; and convolutional codes.
Prerequisite: 0824504 Digital Communications

0825514 Radar Engineering {3} [3–3]
Radar principles; radar range equation; moving target indicator (MTI); continuous wave (CW); tracking radar systems; pulsed Doppler radar; detection, ranging, and extracting Doppler information; major radar transmitters and receivers' components; detection in the presence of noise and clutter.
Prerequisite: 0824504 Digital Communications

0825515 Selected Topics in Communications {3} [3–3]
The objective of this course is to introduce advanced and new topics in one (or more) of the areas of communications engineering. The topics can be changed from one year to another depending on the instructor's area of specialty and expertise.
Prerequisite: None

0161100 Arabic Language (Remedial) {3} [3–3]
The concept of language and its levels, comprehension and speaking; grammar exercises; nominal sentences, verbal sentences, kana and its sisters, inna and its sisters, masculine plural, feminine plural, singular, dual, numbers, appositives; punctuation marks, exercises in morphology (present and past participles); spelling issues (hamza/glottal stop writing): conjunctive hamza (hamzat wasl) and hamza qat', alef following group waw, alif layyinah ('flexible alif') and nunation (tanwin).
Prerequisite: None

0171100 English Language (Remedial) {3} [3–3]
Grammar: auxiliary verbs, the English tenses; vocabulary: relationships, media, places, appliances, activities; Writing Skills: paragraph writing, distinguishing between formal and informal letters; basic reading skills; basic listening skills; verbal skills: oral presentations, arguments, formal phone calls, restaurants recommendation.
Prerequisite: None

0331200 Computer Skills (Remedial) {3} [3 - 3]
IT Essentials: introduction to personal computer, computer assembly, an overview of preventive maintenance; operating system (WINDOWS 10): settings, managing folders and files, search; basics skills in Microsoft Word 2016; basic skills in Microsoft PowerPoint 2016; basics skills in Microsoft Excel 2016.
Prerequisite: None