



Course Description

1. Course Name, No. of Credit Hours, Lectures-Contact Hours.

2. Course Description

3. Prerequisite(s)

Course Number	Course Name
---------------	-------------

4. Councurrent(s)

Course Number	Course Name
---------------	-------------

❖ Punctuations:

- (;) To separate within the course.
- (.) To separate within the same chapter.
- (:) To be followed by items that belong to a main title.
- (.) To end the short description.

0161101 Arabic 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 Remedial Arabic

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.

Exception: Non-Jordanian

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

0121181 English Communication Skills (1) {3} [3 – 3]

Course Description: Grammar: question tags, present/future modals of possibility, futures overview, future continuous, future perfect, articles, adjectives, adverbs, if structures, expressing obligation, expressing ability, linking words of contrast; Vocabulary: family and non-family relationships, family birth order in relation to career choices and interests, making





adjectives from nouns, work, 'after work' activities, old and new, films, film reviews, war, materials, risk, physical movements, free running, distances, dimensions; write an essay, notes, messages and a formal letter of application, use punctuation marks, capital letters and linking words properly, identify main ideas and details, guess the meaning of words from context, skim, scan for specific information and detail, make generalizations, see beyond the surface meaning, make inferences, identify opinion and attitude, make oral presentations, arguments and persuasive presentations, express agreement and disagreement, talk about future plans, make predictions, ask for someone's general opinion, ask for someone's specific opinion, present views and opinions, talk about materials, possession and inventions, pronounce words correctly, use proper intonation.

Prerequisite: 0171100 Remedial English

0152102 English Communication Skills (2){3} [3 – 3]

Grammar: making comparisons, passives, reported speech, relative clauses, gerunds, infinitives; vocabulary: moving and travelling, expressions with *go*, excess, food, cooking, verb phrases about money, prefixes, success, leadership, personality descriptions, phrasal verbs with three parts, crime, law, insurance, newspaper headlines, compound adjectives; write an essay, a formal letter and a letter of complaint, distinguish between formal and informal language, use punctuation marks, capital letters and linking words properly, identify main ideas and details, guess the meaning of words from context, skim, scan for specific information and detail, make generalizations, see beyond the surface meaning, make inferences, identify opinion and attitude, make oral presentations, arguments and persuasive presentations, narrate events, make oral complaints, present views and opinions, pronounce words correctly, use proper intonation.

Prerequisite: 0121181 (English 1) Communication Skills

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 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 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.

Prerequisite: None

0411100 Human Rights {3} [3 – 3]

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 organizations that are in the process of formation such imperative rules & customs; this course also address the content of human rights: 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 in general; in addition this subject will study the Jordanian constitution in way of examine its application for the international standards.

Exception: Law Students

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

Exception: Psychology students

0143301 Entrepreneurship {3} [3 – 3]

Introduction about leadership programme; work team; effective communication with others; time management; pressure management; positive thinking; practical applications; definition of leader; types of leadership; types of incentives; recognizing behavior patterns. definitions: planning, setting goals, importance of research and planning, achievement, seizing opportunities, types of risk, defining quality, effectiveness.

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 travelers 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.

Exception: Hotel & Tourism students

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, Importance of carbon, the early atmosphere; water and energy for life: water -an essential liquid, energy - renewable/non-renewable energy- resources and their conservation; nutrients and household chemicals: *nutrients (food aspects), household chemicals (in daily life)*; physical parameters and household appliances: perception of distance, mass, time, temperature and force, refrigerators, pumps and resistive heaters; safety and disposal of electrical/electronic items; industry and technology in daily life: *contributions of polymer industry* - natural and synthetic polymers, pharmaceuticals and cosmetics, generic and herbal drugs, drug abuse and





its consequences; agrochemicals and soil supplements (fertilizers), crop protectors (pesticides and herbicides) for improved agriculture productivity; relevance of organic farming, *contribution of electronic industry.*

Prerequisite: None

0161100 Remedial Arabic language {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 Remedial English language{3} [3 – 3]

Grammar: auxiliary verbs, present simple, present continuous, past simple, past continuous, future forms for personal plans, present perfect simple, present perfect continuous, past perfect simple; vocabulary: friendship, relationships, using a computer, quiz shows, T.V programs, newspapers, houses, adjectives describing places, compound nouns associated with appliances, spare time activities, the description of books and films, food, eating out , write a paragraph, distinguish between formal and informal letters, write informal emails, use punctuation marks, capital letters and linking words properly, identify main ideas and details, guess the meaning of words from context, skim, scan for specific information and detail, make generalizations, see beyond the surface meaning, make inferences, identify opinion and attitude, make oral presentations, arguments and persuasive presentations, express agreement and disagreement, make comparisons, narrate events, present views and opinions, make formal phone calls, recommend restaurants, pronounce words correctly, use proper intonation.

Prerequisite: None

0331200 Remedial Computer Skills {3} [3 – 3]

Introduction to basic computer hardware and software; copyrights; Windows operating system; Microsoft Office: Word, Excel, Power point, Access; Introduction to Internet.

Prerequisite: None

0111101 Mathematics (1) {3} [3 – 3]

Differentiation and Application; Complex Numbers; Analytical Geometry; Method of Integration; Infinite Series; Power Series; Vectors in Three Dimension; Equations of Line and Plane in 3 Dimension; Complex Power Series; Complex Integration.

Prerequisite: None





0111202 General Physics (1) {3} [3-3]

Physics and Measurement; Motion in One Dimension; Vectors; Motion in Two Dimensions; The Laws of Motion; Circular Motion and Other Application 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's Law; Electric Potential; Capacitance and Dielectrics; Current and Resistance; Direct Current Circuits; Magnetic Fields; Sources of the Magnetic Field; Faraday's Law; Inductance; Alternating Current Circuits; Electromagnetic Waves.

Prerequisite: 0111202 General Physics (1)

0111204 General Physics Lab. {1} [3-3]

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's Principle and Specific Gravity; Ohm's Law, Kirchhoffs Law; Wheatstone Bridge & Resistivity; The Oscilloscope, RC circuit.

Prerequisite: 0111202 General Physics (1)

Concurrent: 0111203 General Physics (2)

01121102 Mathematics (2) {3} [3-3]

Partial Derivatives; Optimization and Applications; Lagrange Multiplier; Double and Triple Integrals; Solutions of Higher Linear Ordinary Differential Equations ODE's; Series Solution of Linear ODE's; Partial Differential Equations; Wave and Heat Equations; Laplace Transform; Fourier series; Methods of Separation of Variables.

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 Remedial Computer Skills

0812101 Technical Writing {1} [1-1]

This course will teach students the established basics for effective written composition in the business world and introduce them to such types of communication as processes, description of mechanisms, proposals, reports, and presentations.

Prerequisite: 012181 Communication Skills (English 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 Communication Skills (English 1)

0832103 Engineering Mathematics I {3} [3 – 3]

Topics Include: Ordinary Differential Equations and Mathematical Modeling, First, Second and Higher Order Equations; Differential Equation Solving Using Infinite Series; Differential Equation Solving Using Laplace Transform; Applications in Electric Circuits.

Prerequisite: 0112102 Mathematics (2)

0832104 Engineering Mathematics II {3} [3 – 3]

Matrices: Vectors, Determinants, Solution of Linear Systems of Equations, Inverse of a Matrix; Eigenvalues: Eigenvectors, and Diagonalization; Complex Analysis: Complex Numbers and Functions, Analytic and Harmonic Complex Functions, Exponential, Trigonometric and Logarithmic, Complex Functions.

Prerequisite: 0832103 Engineering Mathematics I

0832107 Engineering Statistics {3} [3 – 3]

Randomness; Introduction to Probability Theory and Probability Distributions; Discrete and Continuous Probability Distributions; Univariate Analysis; Decision Theory (Bays' Theorem); Hypothesis Testing; Confidence Intervals and Tolerance.

Prerequisite: 0112102 Mathematics (2)

0833105 Numerical Analysis {3} [3 – 3]

Topics Include: General Numerical Methods; Equation Solving Via Iteration; Interpolation; Numerical Integration; and Numerical Differentiation; Numerical Methods In Linear Algebra; Numerical Methods For Differential Equations; Multi-Step Methods; Optimization And Unconstrained Optimization.

Prerequisite: 0832104 Engineering Mathematics II

0871101 Engineering Workshops {1} [1 – 2]

Workplace Safety and Use of Tools; Basic Skills of 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





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: 011202 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)

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.

Prerequisite: 0872301 Electric Circuits (2)

0872304 Electromagnetics {3} [3 – 3]

Student will learn basic Vector algebra and vector calculus. Coordinate systems and transformation. Coulomb's Law, electric field and potential. Electric flux density. Gauss Law and boundary value problems. Capacitor and energy density in electrostatic fields. Steady electric current. Biot-Savart Law and magnetostatic fields. Magnetic flux density. Ampere's Law. Maxwell's Equation. Magnetic vector potential. Inductance and energy density in magnetostatic fields. Ferromagnetic material and magnetic circuits. Time-varying fields and Maxwell's equations. The characteristics of the EM wave are described, including their 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)

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: 0872302 Electric Circuits (2), 0823203 Electronics (2)

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.

Concurrent: 0873308 Measurements and Instrumentation

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: 0832107 Engineering Statistics

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 Circuit; 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: 0823203 Electronics (2), 0823501 Signals and Systems

0874210 Power Electronics Lab. {1} [1 – 2]

Single-Phase Half-Wave Rectifiers: Controlled, and Uncontrolled; Single-Phase Full-Wave Rectifiers: Controlled, and Uncontrolled, and Semi-Controlled; Three-Phase Half-Wave Rectifiers: Controlled, and Uncontrolled; Three-Phase Full-Wave Rectifiers: Controlled, and Uncontrolled, and Semi-Controlled; Regulators; Invertors.

Prerequisite: 0874209 Power Electronics





0824306 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.

Prerequisite: 0873305 Electrical Machines

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;

Prerequisite: 0873305 Electrical Machines

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

0874314 Design of lighting and electrical installations {3} [3 – 3]

Residential and Commercial building wiring: blueprint reading, branch circuit and feeder installations, service entrance installations; Interpretation of plans, low-voltage installations; electrical safety; tools of the trade; load calculations; wiring devices; Industrial motor control fundamentals: Theory of magnetic controls, control components, pilot devices, control circuit diagrams and troubleshooting; Introduction to estimating concepts: computer aided electrical estimating, developing an estimate using an electrical blueprint; transformer connections: high-voltage installations, motor circuit theory and lighting designs.

Prerequisite: 0874310 Electric power systems (1)

0874316 Electrical power systems (2) {3} [3 – 3]

Review of Synchronous Generator (SG): Simplified models of SG for steady state and transient analysis; Basic Mathematical models for Power System Stability (PSS): Formal Definition of PSS, Classification of PSS, The Swing Equation, Transient Power-Angle Curve, The generalized swing equation with damping; Small signal (static) stability: Linearization of Swing Equation, Roots of Characteristic Equation, Undamped and damped Frequency of Oscillation, State Variable Form; Transient stability: Equal-Area Criterion and its applications to faults, Numerical Integration of the Swing Equation; Voltage Stability: Comparison of angle and voltage stability, Mathematical formulation of static voltage stability problem, Tools for voltage stability analysis, Reactive power flow and voltage collapse, Dynamic Vs. Steady-state Analysis of Voltage Stability; Power System Security:





Security function, System state classification, Security analysis, Contingency Analysis, Contingency Analysis using Sensitivity Factors, Line Loadability; Computer applications to all studied topics using Matlab.

Prerequisite: 0874310 Electric power systems (1)

0874317 Electrical Power Lab. {1} [1 – 2]

Transmission Line Parameters and Performance; Transformers: Voltage, Current; System Faults; Protection Systems; Power System Performance in Steady – State and PS Transient.

Concurrent: 0874310 Electrical power systems (2)

Prerequisite: 0874310 Electrical power systems (1)

0874901 Field Training {3} [3 – 6]

Practical experience to be gained through working for eight continuous weeks in an accredited establishment.

Prerequisite: Pass of 110 Cr. H

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.

Prerequisite: 0874312 Control Systems

0875315 Design of lighting and electrical installations Lab. {1} [1 – 2]

Identify structural equipment; training on domestic and industrial installations; fault detection; safety systems and electrical protection installations; phone system for the entrances of buildings combinations; fire protection systems; closed television-circuit; lighting design and evaluation of lighting devices combinations.

Prerequisite: 0874314 Design of lighting and electrical installations

0875318 Renewable energy systems {3} [3 – 3]

Conventional and renewable energy sources; Possible approaches for conversion of sunlight into electricity; Statistics on world installations of renewable energy systems and costs; Environmental considerations; Wind turbines (WTs) and Wind characteristics: Types of WTs, Power in the wind, Impact of tower height, Maximum rotor efficiency, Average power in the wind; WT generators: Review of induction generators, Fixed- and Variable-speed WTs, Types of Control systems, Typical wind generation configurations, Estimates of produced electrical energy, WT power curve, WT economics, Environmental impacts of WTs; Solar radiation: Properties of light, Solar Radiation in Space and the Earth's Surface, Solar angles, solar radiation measurements, calculation of average monthly insolation on a tilted surface, Peak Sun Hours; Physics and electrical characteristics of solar PV Cells: Basic





semiconductor physics, Equivalent circuit for a solar cell, The I–V curve under STC, Bypass diodes and blocking diodes, Types of PV cells; Grid-connected PV systems: Principal components, Configurations of inverters and PV arrays, Interfacing with the Utility, DC and AC rated power, STC efficiency of PV module or array, Estimating PV energy production, PV System sizing (Design), PV System economics; Computer applications to all studied topics using Matlab.

Prerequisite: 0874310 Electric power systems (1); 0874209 Power Electronics

0875902 Graduation Project (1) {1} [1 – 2]

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: Pass of 120 Cr. H

0875903 Graduation Project (2) {2} [2 – 4]

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: 0875902 Graduation Project (1)

0812401 Digital Logic Design {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: 0112102 Mathematics (2)

0812402 Digital Logic Design Lab. {1} [1 – 2]

Combinational Logic Circuits; Storage Elements; Hazards (Malfunctions); Circuit Characteristics: Loads, Delays, Etc.; Simple Combinational Networks: Adders, Multiplexes, Etc.; Simple Sequential Networks: Counters, Shift Registers; Synchronous and Asynchronous Sequential Machines; Processor and Controller; Project Using a Microprocessor as a Control.

Prerequisite: 0812401 Digital Logic Design





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 Design

0814407 Embedded Systems {3} [3 – 3]

Introduction to Embedded System: Understanding the Requirements, Constraints and Tools Associated with the Design and Implementation of Software Systems That Govern the Operation of Physical Hardware Since Such Systems Are Often Combinations of Electrical, Mechanical and Software Components; Specific Topics will Include: Microcontrollers and Embedded Development, Communication Protocols, Data Acquisition, Actuators, Sensors, Signal Processing, Basic Control Theory and Real-Time Embedded Operating Systems.

Prerequisite: 0813405 Microprocessors

0814415 Microprocessors and Embedded Systems Lab {1} [1-3]

Practical Sessions on the Different Topics Covered in the **Microprocessors and Embedded Systems** Course.

Concurrent: 0813405 Embedded Systems

Prerequisite: 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)

0822201 Electronics (1) {3} [3 – 3]

Introduction to Electronics; Semiconductors: Conduction in Metals, Intrinsic and Extrinsic Semiconductors, Electrical Properties of Semiconductors, Diffusion Process in Semiconductors; The PN Junction Diode: Forward, Reverse Biased Junction, V/I Static Characteristics, Temperature Effects, Diode's Models, Junction Capacitance, and Switching Times; Diode Types: Zener, LED, and Photodiode; Diode Applications: Rectification, Clipper, and Clamper Circuits, Voltage Multipliers; Bipolar Junction Transistors: CB and CE Characteristics, DC Biasing and Analysis; BJT Applications: BJT as a Switch, and





Amplifier; Field-Effect Transistor: V/I Characteristics of JFET and MOSFET, DC Biasing and Analysis, FET as a Switch and Amplifier.

Prerequisite: 0872301 Electric circuits (1)

0823203 Electronics (2) {3} [3 – 3]

Amplification; Biasing of Transistor (BJT and FET); Single-Stage Amplifier; Cascaded BJT and FET Amplifiers; Composite Transistor Stages; Operational Amplifiers and Applications; Differential Amplifier; Operational Amplifier Architectures; Gain with Active Load; DC Level Shifting; Output stage; Offset Voltages and Currents; Frequency Response of Amplifiers; The High-frequency Response of all Amplifier Configurations; The Low-Frequency Response of all Amplifier Configurations; The Frequency Response of Cascaded Stages; Feedback Amplifiers; Properties of Negative-Feedback Amplifiers; Properties of Feedback Amplifier Topologies; Analysis of Feedback Amplifiers.

Prerequisite: 0822201 Electronics (1)

0823206 Electronics Lab {1} {1-2}

Diode characteristics and applications. BJT characteristics and DC biasing. FET characteristics and DC biasing. BJT amplifiers. Operational amplifiers. Multistage amplifiers. Differential amplifiers. Frequency response. Feedback techniques.

Concurrent: 0823203 Electronics (2)

Prerequisite: 0822201 Electronics (1)

0823207 Digital Electronics {3} {3-3}

Applications of BJT as a Switch: RTL, DTL, TTL, ECL, MOS and CMOS Logic Gates; Timing Circuits: Bistable, Monostable, Astable Circuits and 555-timers; Wave-Shaping Circuits; Digital/Analog and Analog/Digital Converters; Sample and hold Circuits.

Prerequisite: 0823203 Electronics (2)

0823208 Digital Electronics Lab {1} {1-2}

Characteristics of Switching Devices; Characteristics of Logic Gates: RTL, TTL, and COMS; Analysis and Design of Multivibrators; Timing Circuits; Waveform Shaping Circuits; Applications of A/D and D/A Circuits; Interfacing of TTL & CMOS Gates.

Concurrent: 0823207 Digital Electronics

0823101 Probability and Random Processes {3} [3 – 3]

Introduction to Probability and Random Variables; Statistics of Random Variable; Random Process; Ergodicity and Stationary; Variance and Autocorrelation Function; Power Spectral Density; Filtering of Random Processes; Gaussian Process: Noise, Narrow Band Random Process.

Prerequisite: 0832107 Engineering Statistics





0823501 Signals and Systems {3} [3 – 3]

Classification and Representation of Signals and Systems: Continuous and Discrete Time Signal; Generalized Fourier Series: Amplitude and Phase Spectrum, Energy and Power Content of Signals; Fourier Transform and its Applications: Signal Sampling, Power Spectral Density and Transform, Transfer function; Laplace Transform and Autocorrelation; Discrete Time Systems: Convolution and Impulse Response, Discrete Time Fourier Transform, Z-Transform.

Prerequisite: 0832103 Engineering Mathematics I

0823502 Analog Communications {3} [3 – 3]

Review of: Fourier Transforms; Spectra, Filtres, 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

0823504 Digital Communications {3} [3 – 3]

Analog Pulse Modulation; PCM, DPCM, and Delta Modulation; TDM; Baseband Transmission; Nyquist Criteria; Matched Filter and Noise Performance; ISI; Line Coding and Partial Response Signaling; Equalization; Binary Bandpass Transmission: BASK, BFSK, BPSK and 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

0824506 Communications Lab. {1} [1 – 2]

Filters; Amplitude modulation (AM) and demodulation; Frequency modulation (FM) and demodulation; Sampling and Aliasing effect; Pulse code modulation (PCM); Error detection and correction, Digital modulation: Frequency shift keying (FSK), Phase shift keying (PSK), and Frequency shift keying (FSK).

Concurrent: 0824504 Digital Communications

0825210 Communication Electronics {3} [3 – 3]

Broadband and Narrow-Band Transformer like Coupling Networks; Nonlinear Controlled Sources; Sinusoidal Oscillators; Mixers; RF and IF Amplifiers; Amplitude Modulation Modulators and Detectors; FM Modulators and Detectors; Phase Locked-Loop.

Prerequisite: 0824504 Digital Communications

0825510 Communications systems and control in electric power systems {3} [3 – 3]

Structure of a modern electric power system (EPS); Restructuring of EPSs; Communications system for EPSs; Internet basics; Main features of Communications & control systems of both types of EPSs; Necessity of distributed processing; Power System State Estimation (SE): The concept of power system SE, The method of Weighted Least Squares (WLS),





Statistical properties of errors and estimates, Bad data detection and identification; Power System Control: Basic generator control loops, Load frequency control (LFC), Automatic generation control (AGC), Reactive power and voltage control; SCADA Systems for EPSs: Elements of a SCADA system, SCADA System Concept, Hardware and software for SCADA, CCC and ACCs, Determining Scan Interval, Functions of SCADA/EMS; Applications of GIS in EPSs; Computer applications to all studied topics using Matlab.

Prerequisite: 0874310 Electric power systems (1); 0823504 Digital Communications

0814105 Engineering Numerical Applications. {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

0824507 Digital Signal Processing {3} [3 – 3]

Discrete-Time Signals and Systems; Z-Transform; Frequency Analysis of Discrete-Time Signals and Systems; Fast Fourier Transform (FFT); DSP Systems; Design of Digital Filters: FIR, IIR Recursive and Non Recursive; Introduction to Image Processing; Computer Aided Design and Analysis homework using MATLAB software should be given to the students.

Prerequisite: 0823501 Signals and 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: 0823203 Electronics (2)

0875319 Distributed generation and smart grids {3} [3 – 3]

Traditional and new concepts of power systems; Possible benefits and drawbacks of Distributed Generation; DG definitions; Types of DG; Interface with the grid; Point of common coupling (PCC); Hosting capacity of DG; Impact of DG on power flow: Steady state voltage rise, Voltage profile for multi-bus radial feeder, Methods for steady state voltage regulation, Estimation of hosting capacity, Evaluation criteria, Power losses; DG impact on hosting grid under fault conditions: DG impact on balanced fault levels, DG impact on unbalanced fault levels, Behavior of DGs under fault conditions; Power Quality in presence of DG: Long duration voltage variation, Short duration voltage variation, Harmonics, Harmonic producers, Individual and total harmonic Distortion, Effect of harmonics on power system components; DG and Smart Grids: Definitions, Structure, Advantages, Smart grids worldwide, Microgrids, Smart grids and information technology; Computer applications to all studied topics using Matlab.

Prerequisite: 0875318 Renewable energy systems





0875320 Power Systems Protection {3} [3 – 3]

Protection objectives; Basic components of PSP; Current transformers; Voltage transformers; Protective relay; Circuit Breaker and trip circuit; Basic requirements of PSP; Primary and back-up protection; Various principles of power system protection; Types of relay based on relay operation mechanism; Overcurrent relays: Basic types of overcurrent relays, Time-current curves of time delay relays, Relay coordination, Protection of a Three-phase Feeder; Distance relays: Introduction to simple impedance distance relay and its R-X diagram, Impact of fault arc resistance, MHO distance relay, Three-stepped Distance Protection, Distance protection of a three-phase line; Differential Protection: Simple Differential Protection, Percentage Differential Relay, Power transformer protection; Rotating machinery protection: Stator faults, Phase fault protection, Ground fault protection, Rotor faults; Bus protection: Differential Protection of Buses, Selection of CT ratios in case of bus protection, External and internal fault, Actual behavior of a protective CT, Circuit model of saturated CT, Stability ratio of high impedance bus differential scheme, Protection of three-phase buses; Computer applications to all studied topics using Matlab.

Prerequisite: 0874310 Electric Power Systems (1)

0874321 Electrical Drives {3} [3 – 3]

Introduction to electric drive systems: elements of modern electrical drives, dynamics of motor-load system, load and motor torque-speed characteristics, steady state stability, thermal consideration; power electronic converters in electrical drives; DC Motors and Feedback Controller; AC Machines and Space Vectors; Drives for Synchronous Machines; Induction Machines; Reluctance Drives; modeling of electric drives systems; braking of electric motors (dc and induction motors); drives of stepper motors.

Prerequisite: 0873305 Electrical Machines

Concurrent: 0874209 Power Electronics

0825322 Selected Topics in Electrical Engineering {3} [3 – 3]

The objective of this course is to introduce advanced and new topics in one of the areas of electrical engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.

Prerequisite: 0874310 Electric Power Systems (1)

