الوصف المختصر للمواد الدراسية – إجراءات تنفيذ مهام لجنة الخطة الدراسية /كلية الهندسة والتكنولوجيا Course Brief Description – Procedures of the Course Plan Committee/ Faculty of Engineering and Technology	QF09/0409-2.0

Department	Electrical Engineering/Power and Control	القسم

	عدد المواد الدراسية Number of Courses	18/6/2016	تاريخ الاعتماد Approval Date	2016/24/13	الخطة الدراسية رقم Course Plan No.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0120131	3	**Electromagnetic**	0905214
Review of vector analysis: gradient, divergence and curl. Electrostatics: Coulomb's law, electric field, Gauss's law, energy and potential, conductors, semiconductors and dielectrics, capacitance, Poisson's and Laplace's equations. Steady electric currents. Magnetostatics: magnetic fields and forces, Ampere's and Biot-Savart laws, Faraday's law and applications, Maxwell's equations, electromagnetic potentials.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0120131	3	**Principles of Electrical Circuits**	0905111
DC and sinusoidal steady state (AC) analysis of circuits. Basic passive circuit elements (resistors, capacitors, inductors). Voltage and current sources. Kirchoff laws. Loop and nodal analysis. Circuit theorems: Superposition, Maximum power transfer, Thevenin, Norton. Sinusoidal signals, complex numbers, phasors and impedance concepts. Average and RMS quantities. Steady state time-domain behaviour of inductors and capacitors, and energy storage. Complex, average and apparent power. Resonant circuits. Introduction to the use of electrical measurement equipment, and circuit simulation using SPICE.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905111	1	**Electric Circuits Lab**	0905212
Resistors and resistive circuits. Potentiometers. Superposition principle. Thevenin's theorem and maximum power transfer. RLC current and voltage characteristics. Frequency response of RL, RC and RLC circuits. Series and parallel resonant circuits. Lab project.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905111	3	**Electronics I**	0905261
Physics of semiconductors. Diodes: operation, models and application circuits. Bipolar Junction Transistors - operation and characteristics. DC and AC circuit models. Basic single-stage BJT amplifier configurations. Field-Effect Transistors: Structure and physical operation, bias circuits, small-signal equivalent circuits and basic amplifiers. Basic concepts of digital logic circuits. The BJT inverter. The CMOS Inverter. Propagation delay of the CMOS inverter. CMOS gates and other digital circuits.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905261	3	**Electronics II**	0905362
Darlington pair amplifiers. Differential Amplifiers: BJT, MOS, BiCMOS, GaAs. Multistage Amplifiers: Frequency Response: s-Domain analysis, amplifier transfer function, frequency response of CS, CE, CB, cascade, CC and cascaded amplifiers. Feedback: general feedback structure and basic feedback topologies. Operational amplifier theory and applications: summation, subtraction,			

integration and differentiation. Filters. Oscillators. Output Stages and Power Amplifiers: Class A, B and AB output stages. IC and MOS power amplifiers. Bipolar and Advanced Technology Digital Circuits: TTL, ECL, BiCMOS Digital Circuits, GaAs Digital Circuits.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0120121	3	**Digital Logic Design**	0909242

Number Systems and digital waveforms. Basic gates and logic functions. Boolean algebra, Boolean expressions. Logic minimization techniques. VHDL basics. Design, simulation and synthesis tools for programmable logic devices. Combinational logic building blocks including decoders, encoders, multiplexers, de-multiplexers, magnitude comparators. VHDL for combinational circuits. Digital arithmetic, adders, subtractors. VHDL for arithmetic circuits. Basics of sequential circuits. Basic latches and flip-flops. Timing parameters and diagrams. Counters, shift registers. Basic PLDs, CPLDs and FPGAs architectures. VHDL for binary counters and shift registers. State machines. System design with state machines using VHDL.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909221	3	**Signals and Systems Analysis**	0909223

Continuous-time and discrete-time signals. Mathematical description of systems. Properties of systems. Convolution and impulse response of continuous and discrete time LTI systems. Fourier series of periodic continuous and discrete time signals. Decomposition and approximation of signals by orthogonal functions. The Fourier transform of continuous and discrete time signals. Frequency response of systems. Frequency selective filtering. An introduction to z-transform. First and second order systems. Sampling and reconstruction of continuous-time signals. LTI system analysis with Laplace transforms.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905261	1	**Electronics Lab**	0905265

Diode circuits. DC and AC characteristics of BJT and FET amplifiers. Single- and multi-stage amplifiers and their frequency response. Operational amplifiers and applications. Filters. Oscillators. Transistor as a switch. TTL logic specifications. Interfacing of logic gates. Comparators and Schmidtt triggers. Monostable and astable multivibrators. A/D and D/A converters. Sweep voltage generators. Sample and hold circuits. Lab project.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901242	1	**Digital Logic Design Lab**	0901243

This laboratory consists of a series of experiments dealing with the analyzing, designing, simulating, constructing and testing of logic gates, combinational and sequential logic circuits. VHDL will be used as a Hardware description language in addition to synthesis and implementation tools for FPGA devices.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0101104	3	**Numerical Analysis for Engineers**	0911361

Roots of nonlinear equations (fixed point, Newton, secant, bisection). Condition number of linear systems. Iterative methods for linear and non-linear systems (Gauss-Seidel, Gauss-Jacobi, SOR; fixed point, Newton). Interpolation and polynomial approximation. Eigenvalue methods. Spline interpolation, numerical differentiation and integration. Numerical methods for differential equations. Random number generators. Error analysis.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0101104	3	**Introduction to Linear Systems**	0909221
Review of complex numbers. The fundamental theorem of algebra. Review of vector and scalar products, projections. Introduction to vector spaces, linear independence, bases; function spaces. Solution of systems of linear equations, matrix algebra, determinants, eigenvalues and eigenvectors. Gram Schmidt, orthogonal projections. Linear transformations, kernel and image, their standard matrices. Applications (e.g. geometry, networks, differential equations).			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905111	3	**Advanced Electrical Circuits**	0905213
Forced and natural responses of RL, RC and RLC circuits using the differential equation approach. Transient circuit analysis using unilateral Laplace transforms. Two-port networks and parameters. Mutual inductance and the ideal transformer. Transfer functions. Frequency response of simple filters. Fundamentals of computer-aided circuit simulation. The measurement of sinusoidal and non-sinusoidal electrical quantities in analogue and digital circuits. Introduction to sensors and instrumentation amplifiers. The measurement of non-electrical quantities.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905261	3	**Power Electronics**	0905364
An introduction to switched-mode dc-dc converters. The first part of the course treats basic circuit operation, including steady-state converter modeling and analysis, switch realization, discontinuous conduction mode, and transformer-isolated converters. Next, converter control systems are covered, including ac modeling of converters using averaged methods, small-signal transfer functions, and classical feedback loop design. Finally, magnetics design for switched-mode applications is discussed, including: basic magnetics, the skin and proximity effects, inductor design, transformer design.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905449	1	**Power Electronics and Drive Systems Lab**	0905465
This laboratory introduces the student to measurement and simulation of important operating characteristics of power electronic circuits and power semiconductor devices. Emphasis is on devices, circuits, gating methods and power quality.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905213 0905214	3	**Electrical Machine I**	0905330
This course taught the theory of AC Synchronous Generators and Motors, which is then demonstrated with practical labs. Vector analysis of the synchronous machine and its effect on the grid system as well as the concept of infinite buss is covered in depth. Attention is given to the different types of construction methods of Synchronous machines and as well as the effect of these Construction methods on the Harmonic distortion. Power factor correction using synchronous machines in "Real World "situations are covered in depth.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909242	3	**Embedded Systems**	0905447
This course provides a practical understanding to the design of computing systems that are embedded in a larger system such as communication and control systems; design aspects of embedded systems;			

architectures, microcontrollers, memory hierarchy, I/O, timers and exceptions, interfacing, and data acquisition; Real time operating system features. Concurrent processes and priority. Synchronizing processes. Hardware and operating system constraints. Deadlines and real time scheduling. Inter-task communication, message passing and threads, Hardware for real time. Safety critical systems. Case studies. A series of case studies illustrating design and performance issues for real-time embedded systems leading to an introduction for the assignment to control a petrol engine. An introduction to the PIC microcontroller. The programmer's model, instruction set and addressing modes The structure of the PIC and its polling and interrupt input/output mechanisms. Compiling and downloading programmers.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905330	3	**Power Systems Analysis I**	0905324

This course is an introductory course in the field of power systems. Students study the electrical power transmission system, the power system operation and control, requirements for power transmission systems (supply, operation, economics), Production and Insulation of underground cable, and operation management, models of N-Port components (transmission line, cable, shunt, transformer). Also, students study the fault calculations, power flow studies, power system stability and protection. Finally, students learn the components, which make up a typical substation and how it feeds a distribution network that supplies customers with electricity.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901223	3	**Probability and Random Process**	0905324

Probabilistic models, conditional probability and Bayes' rule; vectors of random variables, distributions and density functions, operations on random variables, expectations and characteristic functions. Independence, Laws of Large Numbers, Central-Limit Theorem. Random process concepts. Random signal analysis concepts. Spectral characterization. Response of linear time-invariant systems to random inputs. Applications drawn from Computer and communications system.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905324	3	**Power systems Analysis II**	0905425

Modern Power System Operation, review of Power System Modeling, network Matrices, bus admittance and bus impedance atrices sparse data structures solution of linear system of equations, factorization, ordering, load flow solutions and control, formulation of load flow problem solution of nonlinear algebraic equations solution techniques (Gauss-Seidel, Newton Raphson,) computer studies control of power into a network. Computer calculation of fault currents review of sequence networks and unsymmetrical faults analysis using bus impedance matrix faults through impedances. Power system formulation of the stability problem equal Area Criterion of stability multi machine stability studies computer solution techniques.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905324	3	**High Voltage Engineering**	0905423

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.
The following topics will be covered; Generation of high voltage (AC and DC), impulse generating equipment, high voltage measuring systems, Quasi electrostatic field calculation and simulation models, standard high voltage laboratory test and measurement methods and analysis of results, electrical breakdown fundamentals; electrical breakdown in solids, non-destructive tests such as corona testing and partial discharge, insulation coordination as related to equipment ratings and test requirements, review of other industrial applications of high voltage engineering.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905330	3	**Electrical Machines II**	0905431

This course Includes advanced electrical machines technology and principles, construction and performance of salient and non – salient type synchronous generators, principle of operation and performance of synchronous motor, construction, principle of operation and performance of induction machines, starting and speed control of three-phase induction motors, construction, principle of operation and performance of single phase induction motors and special machines.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905431	1	**Electrical Machines Lab**	0905432

The course consists of five laboratory tasks: Synchronous machines, Short-circuit of synchronous machine, Transformers, Induction machine, and DC Machines

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905431 0905364	3	**Drive Systems**	0905449

Elements of drive systems, characterization of mechanical loads, requirements of electrical drive systems, dynamic equations and modelling of electrical machines, dc drives with various dc power sources, induction motor drives, ac controller, slip-energy recovery, constant air-gap flux, synchronous motor drives, permanent magnet motors, reluctance motors.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901223	3	**Control Systems**	0905342

Transfer functions. Block diagrams. Signal flow graphs. State-space description. Mathematical modeling of physical systems. Time-domain analysis. Root locus techniques. Frequency-domain analysis and design.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905342	3	**Automated Control System**	0905343

The subjects dealt in this class are the role of process control in process operation, the basic hardware and instrumentation for process control, the mathematical modeling of processes using unsteady-state mass and energy balances, various simple empirical models for designing controllers, the analysis of dynamical systems using Laplace transforms, the design and tuning methods for feedback controllers, stability analysis, performance analysis of feedback loops using Laplace and frequency domain techniques, and the basic control strategies.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.

0905343	1	**Control Systems Lab**	0905542
Introduction to feedback concepts (positive and negative). Transient and steady-state analysis using Laplace transforms. Bode plots and stability criteria. Lab work includes the use of mathematical analysis and simulation.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905342	2	**Instrumentation & Sensors**	0905316
This course explains the basic measurement techniques, instruments, and methods used in everyday practice. It covers in detail both analogue and digital instruments, measurements errors and uncertainty, instrument transformers, bridges, amplifiers, oscilloscopes, data acquisition, sensors, instrument controls and measurement systems.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905316	1	**Instrumentation & Sensors Lab**	0905416
This course will consist of a lab project designed to provide students with an opportunity to consolidate their theoretical knowledge of basic measurement techniques, instruments, and methods. It includes projects in both analogue and digital instruments, measurements errors and uncertainty, instrument transformers, bridges, amplifiers, oscilloscopes, data acquisition, sensors, instrument controls and measurement systems.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905343	3	**Digital Control Systems**	0905445
Introduction to real-time computer control systems; a review of discrete-time signals and systems, difference equations, z-transform; sampled data systems, sample and hold, discrete models; discrete equivalents of continuous-time systems; stability analysis; design specifications; design using root locus and frequency response methods; implementation issues including bumpless transfer, integral windup, sample rate selection, pre-filtering, quantization effects and computational delay; scheduling theory and priority assignment to control processes, timing of control loops, effects of missed deadlines; principles and characteristics of sensors and devices, embedded processors, processor/device interface.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
Passing 90 credit hours	0	**Engineering Training**	0905401
The student has to spend at least 8 weeks of power and control engineering training at recognized companies and establishments during the summer semester.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905324	1	**Power Systems Analysis Lab**	0905426
Practical Laboratory for understanding the components (e.g. transformers, rotating machines) of a power system through performing experiments and studies			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905324	3	**Electrical Power Distribution Systems**	0905427
To identify the typical power system faults that may occur within an industrial facility. In addition to			

calculate the maximum fault current that may exist in an industrial power system network and to specify the interrupting capacity of electrical equipment apparatus. Moreover, to apply an appropriate fault detection scheme to protect against power system faults. Finally, to size and specify current and voltage transformers for protective relaying applications.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905425	3	**Power Systems Protection**	0905528

This course seeks to provide an understanding of how interconnected power systems and their components are protected from abnormal events such as faults (short circuits), over-voltages, off-nominal frequency and unbalanced phase conditions.
The course begins with a brief review of power system operation, three-phase system calculations and the representation (modeling) of power system elements. The modeling of current transformers under steady-state and transient conditions is presented with emphasis on the impact on protective devices. A unit on system grounding and its impact on protective device operation are included. Course emphasis then shifts to protective devices and their principles of operation. Both electromechanical and numeric relay designs are covered. The final course segments cover specific applications such as pilot protection of transmission lines, generator protection and transformer protection.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905431	3	**Electrical Power Generation Stations**	0905525

Generation of electric power using fossil, nuclear and renewable, including solar, geothermal, wind, hydroelectric, biomass and ocean, energy sources. Power plant thermal cycle analysis. Cogeneration and combined cycles. Economics, operations, and design of electric power stations.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905431	3	**Renewable Energy Systems**	0905529

Students will learn about the state-of-the-art in renewable energy applications including biomass for heat, electric power and liquid fuels as well as geo-energy sources such as wind, solar, and hydro power. Students will do engineering calculations of power and energy availability of renewable energy sources and learn about requirements for integrating renewable energy sources into production, distribution and end-use systems.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909447	3	**Programmable Logic Controllers (PLC)**	0905549

Fundamental concepts of programmable logic controllers, principles of operation, and numbering systems as applied to electrical controls. Identify and describe digital logic circuits and explain numbering systems; explain the operation of programmable logic controllers; convert ladder diagrams into programs; incorporate timers and counters utilizing programmable logic controllers; and execute and evaluate programs.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905343	3	**Advanced Control Systems**	0905448

Direct Digital Control (DDC), REGATE Equation for large scale systems, technologies and implementation of industrial process control systems Design and manufacture of stepping motor drivers, servo motor amplifiers, integrated driver/controllers and standalone programmable machine

controllers for scientific and industrial applications, Integrated power solutions for power industry.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905425	3	**Power Systems Control**	0905541

Creation of the mathematical model of the PS, the effect of frequency on the operation of the PS, primary, secondary and tertiary regulation of frequency and active power, evaluation of regulation of frequency and active power, under-frequency load shedding in PS, effect of voltage on operation of the PS, sources and consumers of reactive power, equipment for regulation of voltages in the PS, primary, secondary and tertiary regulation of voltage and reactive power.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905427	3	**Underground Electrical Distribution Systems**	0905535

Underground Cable and Cable Accessories, Cable in Underground Structures, Transformers, Protective Equipment, Cable Installation in Conduit, Lightning Protection on Underground Systems, Overcurrent Protection on Underground Systems, National Electrical Safety Code Requirements, Planning and Design Criteria, Comprehensive Design Problem, Operation and Maintenance of Underground Systems.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	قم المادة Course No.
0905427	3	**Overhead Electrical Distribution Lines**	0905533

Standards and Regulations, Inspection and Maintenance, Conductors, Lightning Protection, Wood Poles, Live Line Working, Line Design Standards, Safety and ESQCR, Condition Assessment and Assessment Management of Overhead Lines, Insulators for Overhead Lines, Future Developments.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	قم المادة Course No.
Passing 120 credit	1	**Graduation Project I**	0905501

Lectures and tutorials on product design and development methodology, and the role of the professional engineer in this regard election of a project that will build design, and teamwork skills. Formation of teams. Documentation and presentation of first iteration of design project.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905501	2	**Graduation project II**	0905502

Lectures and tutorials on product design and development methodology, and the role of the professional engineer in this regard. Completion of work started in 0905591. Deliverables include written documentation and presentations in class.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
5th year level	3	**Special Topics In Electrical Engineering**	0905503

Content has to be approved by the Power and Control Engineering Department Council.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905342	3	**SCADA & DCS Systems**	0905548

The course includes mainly the SCADA application system software in details, which is concentrates mainly on the control Centre as well as the operators, a comparison between the SCADA system and

the DCS and discuss in deep all the differences between the two systems of control. Despite the aforementioned differences, most DCS and SCADA systems today come with same standard facilities like event, archiving, HMI, reporting, DB management and logging as well as control center remote control.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0120131	3	**Applied Physics**	0909211

Electric Field, Gauss's Law; Electric Potential; Capacitance and Dielectrics; Current and Resistance; Direct Current Circuits, Magnetic Field, Sources of the Magnetic Field, Faraday's Laws of Induction.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909211	3	**Applied Physics Lab.**	0909212

Field lines, Ohm's law, Wheatstone bridge, The Galvanometer Ammeter and Voltmeter, Kirchoff's rules, Voltage division with potentiometer, Electrical Power, measurement of a capacitance, RC circuits and Faraday's Laws.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905111	3	Principles of Electrical Power systems	0905525

This course is an introductory course in the field of power systems. Students study the electrical power transmission system, the power system operation and control, requirements for power transmission systems (supply, operation, economics), Production and Insulation of underground cable, and operation management, models of N-Port components (transmission line, cable, shunt, transformer). Also, students study the fault calculations, power flow studies, power system stability and protection. Finally, students learn the components, which make up a typical substation and how it feeds a distribution network that supplies customers with electricity.

Approved by	(التوقيع والخاتم الرسمي)	**اعتمدت من قبل مجلس القسم**