الوصف المختصر للمواد الدراسية – إجراءات تنفيذ مهام لجنة الخطة الدراسية /قسم هندسة الحاسوب والاتصالات Course Brief Description – Procedures of the Course Plan Committee/ Department of Computer and Communications Engineering	QF09/0409-1.0

Department	Department of Computer and Communications Engineering	القسم

	عدد المواد الدراسية Number of Courses		تاريخ الاعتماد Approval Date		الخطة الدراسية رقم Course Plan No.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 230	3	**Introduction to Electrical Engineering Design**	**0901 200**

This course is divided into two parts. The first part covers the following topics: an overview of electrical engineering; engineering as a profession; introduction to the different areas of electrical engineering such as communications, computer design, control, networks, and signal processing; basic computer tools such as SPICE, MATLAB, and LabVIEW; Experiments to familiarize the students with the introductory lab equipments. The second part of this course introduces freshmen to the design process of an engineering project. This part of the course serves three purposes: (1) it introduces students to the design process of turning an idea into a final design, (2) it presents the different functions that people play in a project, and (3) it gives students a chance to consider what role in a project would be best suited to their interests and skills.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0103 102	3	**Electromagnetic I**	**0901 207**

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.
0103 102, Co-0101271	3	**Electric Circuits I**	**0901 210**

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 behavior 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.
0901 210	3	**Electric Circuits Lab**	**0901 211**

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.
0901 210	3	**Electronics I**	**0901 220**

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.
0102099	3	**Programming in C++ Language**	**0901 230**

A course on the basic principles of programming and their application to the solution of engineering problems using a high level programming language. This course introduces structured and object-oriented programming. C++ data types. Pointers and memory management. Object oriented programming in C++. File and stream I/O. Preprocessor macros. Templates and the Standard Template Library. Numerical computation in C++. Interfacing with hardware. Engineering applications.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 230	3	**Digital Logic Design**	**0901 232**

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, demultiplexers, 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.
0101 205	3	**Introduction to Linear Systems**	**0901 240**

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.
0101 104	3	**Signal and System Analysis**	**0901 260**

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. Computer applications.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 200	3	**Numerical Methods for Engineers**	**0901 305**

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.
0901 207	3	**Electromagnetic II**	**0901 307**

Transmission lines: time and space dependence of signals, line parameters, input impedance, use as circuit elements, reflection coefficient, standing-wave ratio, transient behavior. Impedance matching: transformers, stubs, analysis using the Smith Chart. Maxwell's and wave equations. Plane waves: propagation, reflection and refraction. Electromagnetic waves: TEM, TE, TM propagation. Waveguides: basic equations, parallel plate guide, rectangular guide. Introduction to antennas. Applications to communications and radar systems.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 210, Co-0901 260	3	**Electric Circuits II**	**0901 310**

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.
0901 220	3	**Electronics II**	**0901 320**

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, cascode, 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.
0901 211, 0901 320	3	**Electronics Lab**	**0901 321**

Diode circuits. DC and AC characteristics of BJT and FET amplifiers. Single- and multi-stage amplifiers and their Operational amplifiers and applications. Filters. Oscillators. Transistor as a switch. TTL logic frequency response. 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.
0901 230	3	**Object-Oriented Programming**	**0901 330**

This course teaches the fundamental ideas behind the object-oriented approach of programming; through the widely-used Java programming language. Object-oriented programming concepts such as: data Abstraction, Encapsulation, Inheritance and Polymorphism. Decomposition of large systems into reusable objects; Multi-class implementations: Composition, Nested calsses. The UML concept; Programming projects will be implemented in JAVA. A set of laboratory experiments will provide hands-on experience in related topics. Some application on web pages in java applets.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 330	3	**Data Structures and Algorithms**	**0901 331**

This course covers fundamental algorithms and data structures that are used in software applications today. Particular emphasis is given to algorithms for sorting, searching, and indexing. Linear Data structures: such as linked list, stack, and queue. Binary trees, heaps, B-Trees, and Graphs will also be covered along with their associated special algorithms for traverse including shortest path algorithms. The course also covers basic algorithmic analysis techniques and seeks to promote student programming skills.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 332	3	**Computer Organization and Architecture**	**0901 333**

This course introduces the principles of computer organization and the basic architecture concepts. Machine instruction sets and assembly language programming. Processor datapath and control unit design. Instruction pipelining. The memory system. Caches. Virtual Memory.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
Co-0901 333	3	**Digital Logic Design Lab**	**0901 335**

This laboratory consists of four parts. Part one involves the design of logic circuits using discrete components. The second part involves the design of logic circuits using VHDL and testing its operation on an FPGA board. The third part of this laboratory course involves experiments of computer architecture.

المتطلب السابق	الساعات المعتمدة	اسم المادة الدراسية	رقم المادة

Prerequisite	Credit Hours	Course Name	Course No.
0901 260	3	**Probability and Random Signal Analysis**	0901 360

Probabilistic models, conditional probability and Bayes' rule, distributions and density functions, operations on random variables, expectations and characteristic functions. Independence, 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.
0901 307	3	**Radio-wave propagation and Antennas**	0901 407

Antenna principles and types; Antenna parameters (gain, beamwidth, aperture, impedance, polarization); ideal and practical dipoles; Friis transmission formula and radar equation; Plane earth propagation; Knife-edge diffraction; Biological effects of radiation; Satellite communications; Urban propagation; Noise in communication systems.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 335	3	**Microprocessor Systems**	0901 430

Examines hardware and software model of microprocessors; Introduction to microprocessor interfacing. Bus functions, bus interconnections, synchronous and asynchronous bus. Signal flow and data transfer, decoding for I/O and memory, memory organization and structures. Interfacing examples; parallel interfacing, serial interfacing, the interrupt system; bus arbitration and DMA. Analog-to-digital and digital-to-analog structures and interfacing. bus standards; local area networks. Benchmarking and comparative study of recent microprocessors.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 333, 0901 430	3	**Microprocessor Systems Lab**	0901 431

Software and hardware experiments with a microprocessor-based system. Microprocessor organization and operation; hardware/software interaction; memory, serial and parallel I/O port interfacing; interrupt-handling.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 333, 0901 434	3	**Embedded Systems**	0901 432

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 programs.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 433	3	**Operating Systems**	**0901 434**

The evolution, architecture, and use of modern operating systems (OS). Multitasking, concurrency and synchronization, IPC, deadlock, resource allocation, scheduling, multithreaded programming, memory and storage managements, file systems, I/O techniques, buffering, protection and security, the client/server paradigm and communication.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 260	3	**Control Systems**	**0901 440**

Transfer functions. Block diagrams. Signal flow graphs. Servomotors control analysis. Control system stability analysis. 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.
0901 360	3	**Communication Systems**	**0901 450**

Equivalent low-pass models. Amplitude modulation and demodulation. Coherent and non-coherent detection. Angle modulation and demodulation. Noise representation and analysis: SNR analysis of AM and FM systems. Sampling, quantization and pulse code modulation. TDM and Pulse modulation techniques: PAM, PPM, PWM.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 450	3	**Communication Systems Lab**	**0901 451**

Tuned circuits and crystals. AM modulators. AM demodulators. Super-heterodyne radio receiver. FM modulators. FM demodulators. Simulation using Matlab/Simulink. Lab project.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 360	3	**Digital Signal Processing**	**0901 460**

Review of discrete time signals and systems. Z transform review. One-side Z transform Pole and zero placement. Solutions of LCCDE in frequency domain. Allpass systems and applications. Minimum phase systems. Structure of FIR systems. Design of FIR filters by windowing. Design of discrete time IIR filters from continuous time filters. Impulse invariance and bilinear transformation design methods. Autocorrelation function and the spectral density of discrete-time signals. Related MATLAB functions for the topics above.

المتطلب السابق	الساعات المعتمدة	اسم المادة الدراسية	رقم المادة

Prerequisite	Credit Hours	Course Name	Course No.
0901 460	3	**Digital Signal Processing Lab**	**0901 462**

The lab uses Matlab as the simulation package and experiments will be conducted on the available DSP boards. Familiarization experiments with the DSP kit. Experiments include FIR and IIR filter design, quantization effects, and spectral estimation. Real signals are sampled and processed including speech and images. Lab project.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 434	3	**Computer Networks**	**0901 470**

Overview of Computer networking, OSI model, communication and transmission systems; physical layer issues: data transmission, channel capacity, signals encoding. Data link layer issues: framing, error control, flow control, line configurations, bridging. Network layer issues: Packet switching. Introduction to queuing theory. Flow/congestion control and their algorithms. Routing algorithms and protocols, architecture of Internet, Internet Protocols. Introduction to LANs.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 470	3	**Computer Networks Lab**	**0901 472**

This laboratory course covers the technologies and protocols of the internet. The experiments cover the internet protocol (IP), address resolution protocol (ARP), internet control message protocol (ICMP), user datagram protocol (UDP) and transmission control protocol (TCP), the domain name system (DNS), routing protocols (RIP, OSPF, BGP), network address translation (NAT), dynamic host configuration (DHCP), network management protocols (SNMP), and IP multicast.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
Passing 120 credit hours	3	**Engineering Training**	**0901 490**

The student has to spend at least 8 weeks of electrical 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.
0901 320	3	**Principles and Applications of VLSI Design**	**0901 520**

Introduction to VLSI technology. Electrical properties of NMOS and CMOS transistors. NMOS subsystem design and layout. Subsystem design and layout using simple static, complex static, and dynamic domino CMOS logic circuits. Designs of NMOS and CMOS PLA, finite state machines and memory systems. System designs using BiCMOS technology, GaAs technology, gate arrays and Field-Programmable Gate Arrays.

المتطلب السابق	الساعات المعتمدة	اسم المادة الدراسية	رقم المادة

Prerequisite	Credit Hours	Course Name	Course No.
0901 431, 0901 434	3	**Real-Time Systems Design**	**0901 532**

Definition of real-time systems; examples. Characteristics of real-time systems. Analysis frameworks and tools. Elements of real-time system structure. Reliability and fault tolerance. Exceptions and exception handling. Concurrency and concurrent programming in real-time systems. Synchronisation and communication, resource control, and scheduling in real-time systems. Real-time systems design methodologies. Computer assisted design of real-time systems.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 571	3	**Distributed Systems and Middleware**	**0901 533**

The knowledge of distributed computing and middleware has become essential in today's network-centric computing environment. The topics covered in this course include fundamentals of distributed computing, software agents, naming services, distributed transactions, security management, distributed object-based systems, middleware-based application design and development, and case studies of middleware.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 571	**3**	**Web Server Design and Programming**	**0901 534**

This course concentrates on major technologies used in building Web servers. Alternate versions are to be given each year: the Windows-based IIS Server and the Linux-based Apache server. For IIS, ASP.NET along with C# are used for programming Web servers. For Apache, PHP is the language of choice. The course starts with a fast track on client programming, the HTTP protocol, SQL database servers, and XML programming. A weekly lab, two application projects, and a research project constitute the major requirements of the course.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 450	**3**	**Digital Communications**	**0901 551**

Quantization. Delta modulation. Noise analysis in PCM and DM systems. Base band digital systems: digital signaling over channels without and with inter-symbol interference and additive Gaussion noise. Error probability analysis. Passband digital systems: signal and system models of ASK, PSK, DPSK, FSK and QAM. Signal space representation and receiver model. Error probability analysis of digital modulation techniques for coherent and non-coherent detection. Power spectra of digital signals. Introduction to Information Theory. Introduction to Error control coding.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
Co-0901 551	3	**Digital Communications Lab**	**0901 552**

The Lab Use TIMS, which is a telecommunications modeling system. It models mathematical equations representing electrical signals, or block diagrams representing telecommunications systems. Experiments include Digital waveform generators. Waveform analysis. Pulse amplitude modulators and demodulators. Sample and hold circuits. Delta modulation. PCM. ASK, FSK, PSK, DPSK systems.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 551	3	**Information Theory**	**0901 553**

Introduction to information theory and communication systems. Source coding. Channel coding and data encryption. Measure of information: entropy, mutual information and average mutual information. Discrete source coding: fixed-length and variable codes, stationary sources, ergodic sources, Markovian sources, the source coding theorem. Data compression. Rate-distortion function. Channel coding: data transmission over discrete noisy channels, capacity of DMC's, discrete channels with memory, the channel coding theorem, block codes and tree codes. Continuous channels and sources: entropy and mutual information of continuous-amplitude discrete-time signals, discrete-time Gaussian sources and channels with and without memory, rate-distortion function of a Gaussian signal, continuous-time Gaussian sources and channels, transmission with a bandwidth constraint.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 551	3	**Error Control Coding**	**0901 554**

General Introduction. Algebraic concepts. Linear block codes. Cyclic codes, error trapping, decoding of cyclic codes. BCH codes, majority-logic decoding of cyclic codes, finite geometry codes, burst error correcting codes. Convolutional codes. Maximum likelihood decoding. sequential decoding and majority-logic decoding of convolutional codes. Burst error correcting convolutional codes. Automatic repeat request strategies. Trellis coded modulation . Turbo codes. Low density parity check codes.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 307, 0901 551	3	**Optical Fiber Communication Systems**	**0901 555**

Components, advantages and classifications of fiber communication systems. Dielectric slab wave-guide. Step index fiber. Graded index fiber. Attenuation and dispersion. Light sources. Optical modulation. Photodetectors. Optical detection. Noise in the optical receiver. Heterodyne detection. Bit error rate analysis of direct detection and heterodyne detection systems. Lab experiments, project

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 551	3	**Satellite Communication Systems**	**0901 558**

Overview of satellite communication. Earth station technology. Earth-orbiting and geostationary satellites. Channel characterization and link budget calculations. Transponders and transponder model. Channelization. Frequency plans. Propagation and interference considerations. Satellite access techniques. Introduction to satellite networks.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 307	3	**Wireless Communications**	**0901 559**

Overview of wireless communications including first, second and third generations of systems and standards. Cellular systems principles, Trunking, Grade of Service and Traffic Capacity, power control, handovers. Characterization of wireless channels: large scale and small scale propagation mechanisms: path loss, multipath and fading. Digital modulation techniques for wireless channels. Power efficiency, diversity. Performance in multipath fading channels.

Multiple access: fixed (FDMA, TDMA, CDMA) and random (ALOHA, CSMA) access methods.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 460	3	**Digital Image Processing**	0901 566

Introduction to image processing system. Image Enhancements in spatial domain. Image Enhancements in frequency domain. Image Restoration. Color Image processing. Image representations: block transforms and subband/wavelet representations. Object Recognition concept. Applications in Image interpritation. Image Segmentation algorithms. Introduction to video and motion detection. Related MATLAB functions and some practical experiments. Project including image acquisition and some applications.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 472	3	**Wireless Networks**	0901 570

Principles of wireless mobile networks. Cellular wireless networks. Multiple access protocols. Channel allocation algorithms. Data communications in wireless networks. Mobility and location management algorithms. Transport layer in wireless networks. Security; data management. Wireless Internet access protocols. Ad hoc and sensor networks, routing algorithms and protocols.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 470	3	**Higher Layer Network Protocols**	0901 571

Communication services, protocols and software. Internet Protocols and IP addressing. Transport protocols: TCP, UDP, Quality of Service, connection management, flow and congestion control. Session, presentation and application protocols, such as DNS, Security, SNMP, HTTP. Performance issues. Fundamental concepts of computer network design.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 470	3	**Computer Network Design**	0901 572

Computer network design goals. Hierarchical design. LAN models and design, VLANs. Internet technologies; Internetworking principles and design. WAN design. Mobile wireless networks. Medium Access Control protocols. Quality of Service control. Traffic flow measurement and management.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 472	3	**Cryptography and Network Security**	0901 573

Security policies. Security mechanisms. Physical security. Security awareness. User authentication. Application security mechanisms. Encryption. External and internal firewalls. Security of operating systems and software. Security of e-commerce applications. Design of security system and components. Devices for security analysis; sniffers, attack detectors. Information warfare. Ethical issues in computer security.

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

0901 472	3	**Optical Networks**	0901 574

Introduction to optical networking. Optical Switching components and systems. Wavelength Division Multiplexing. WDM networks. Optical ring networks Vs optical mesh networks. Optical network control architecture. Routing and wavelength assignment algorithms. Protection and restoration mechanisms in optical networks. Optical networks case studies.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 472	3	**Computer Network Management**	0901 575

Foundations of network and system management. Management architectures. Information model, organizational model, communication model, Functional model; SNMP network management; OSI network management, CMIP; Internet management.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 470	3	**Multimedia and Networking**	0901 576

This course covers topics in multimedia such as system requirements, performance requirements, representation and compression. Multimedia networking is emphasized by discussing multicasting, streaming, multimedia networking protocols and quality of service-based traffic management protocols. Other topics covered include synchronization, VoIP, and Internet 2. Multimedia networking applications are designed and implemented as student projects.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 330, 0901 360	3	**Artificial Intelligence**	0901 580

The roots and scope of Artificial Intelligence. Knowledge and knowledge representation. Search, informed search, adversarial search. Deduction and reasoning. Uncertainty in Artificial Intelligence. Introduction to Natural Language Processing. Elements of planning. Basics of Machine Learning.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901 431	3	**Robotics**	0901 582

Evolution of robotics, mobile and manipulator robots, coordinate systems, kinematic models of manipulators, position, velocity and force control, sensors and actuators, robotic vision, workspace modeling, task and path planning, industrial robots, manufacturing and autonomous systems, robot programming.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
Passing 120 credit hours	3	**Graduation Project I**	0901 591

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

المتطلب السابق	الساعات المعتمدة	اسم المادة الدراسية	رقم المادة

Prerequisite	Credit Hours	Course Name	Course No.
0901 591	3	**Graduation Project II**	**0901 592**
Lectures and tutorials on product design and development methodology, and the role of the professional engineer in this regard. Completion of work started in 0901 591. Deliverables include written documentation and presentations in class.			

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
4th year	3	**Special Topics in Computer and Communications**	**0901 599**
Content has to be approved by the Electrical Engineering Department Council.			

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0103102, Co-0101 271	3	**Electrical and Electronics Circuits**	**0901212**
Ohm's and Kirchhoff's Laws. Series and parallel connections, Voltage and current division. Nodal and mesh analysis. Superposition. Thevinin's and Norton's theorems. Inductance and capacitance. Source free RL and RC circuits. Response of RL and RC and RLC circuits to unit step function. Characteristics of a sinusoid. The phasor concept. Phasor relationships for R, L, and C elements. Impedance and admittance. Effective values of current and voltage. Instantaneous, average and apparent power and power factor. Three-phase Y- and Delta- connections. Introduction to semiconductors. The PN junction. Applications of PN junctions (rectifiers). Transistors: operation, model, V-I characteristics. Operational amplifiers and gates. Safety considerations. Protective earthing.			

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901212	3	**Electrical and Electronics Circuits Lab**	**0901213**
Electric measuring equipment. DC circuits. Basic Laws and network theorems, impedance concept and phase shift in RL and RC circuits. 3-phase Y- and Delta- connected loads. Measurement of power and power factor. Transistor amplifiers. Op-amps			

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0103102	3	**Principle of Electrical Engineering**	**0901214**
This course is intended to develop knowledge of both the safety and functional requirements of an installation covering; Electrical Principles, wiring Systems, wiring Regulations , Electrical Technology Electrical Practice , Health and Safety at Work , Industrial Studies ,Telephone networks (land lines) including switching systems ,mobile phone networks ,cable television networks including receiving stations and cable distribution networks .internet backbone, including high-speed data cables, routers and servers as well as the protocols and other basic software required for the system to function.			

المتطلب السابق	الساعات المعتمدة	اسم المادة الدراسية	رقم المادة

Prerequisite	Credit Hours	Course Name	Course No.
0901214	3	**Electrical and Networking Infrastructure**	0901301

This course covers the basic principles of data communications and see where those applications have a daily impact. Learn about communications between terminals and computers, local area networks and packet networks, modems and interfaces, fiber optic and satellite systems plus much more.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901212	3	**Digital Logic and PLC**	0901332

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, demultiplexers, 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. Memory devices and systems including RAM, ROM, FIFO, LIFO and dynamic RAM.

reading and understanding basic ladder logic, PLC hardware components, developing fundamental PLC wiring diagrams, basics of PLC programming, timers, counters, program control instructions, data manipulation instructions, math instructions, sequencer and shift register instructions, PLC installation, editing and troubleshooting.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901212	3	**Electrical Machines**	0901342

Magnetic circuits; single-phase and three-phase transformers: Principles, analysis, performance characteristics and testing; electromechanical energy conversion; principles and classification of DC generators; DC motors: analysis, performance characteristics, starting, testing and speed control; synchronous motors: analysis, performance characteristics, applications, starting, and testing; three-phase induction motors: analysis, performance characteristics, testing, starting and speed control; single-phase induction motors; special types of motors: stepper motors, universal motors, reluctance motors, burshless DC motors.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901342	3	**Electrical Machines Lab**	0901343

Transformer magnetic circuits. Testing of single and 3-phase transformers. DC generators. Speed control of DC motors. Testing and operational characteristics of alternators. Testing and operational characteristics of synchronous motors. Testing and operational characteristics of induction motors.

الوصف المختصر للمواد الدراسية – إجراءات تنفيذ مهام لجنة الخطة الدراسية /قسم هندسة الحاسوب والاتصالات Course Brief Description – Procedures of the Course Plan Committee/ Department of Computer and Communications Engineering	QF09/0409-1.0

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0901212	3	**Power Electronics**	**0901425**

Basic elements of PE systems. Applications of PE. Classification of PE controllers. Power semiconductor devices (PSD). Classification of PSD. V-I characteristics of the major PSD. Switching characteristics of PSD. Basic drive circuits of PSD. Line commutated converters. Single-phase H.W. rectifiers. Single-phase F.W. rectifiers configuration. 3-phase H.W and F.W rectifiers. Single-phase and 3ph semiconverters. Inversion mode of operation. Performance characteristics of line commutated rectifiers. Introduction to AC switching controllers. Introduction to DC-to-DC converters. Introduction to DC-to-AC converters.