

الوصف المختصر للمواد الدراسية - إجراءات إعداد الخطة الدراسية وتحديثها/ قسم الهندسة الكهربائية/الإتصالات والحاسوب	QF09/0409-3.0
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القسم	Electrical Engineering/Communications and Computer
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الخطة الدراسية رقم	تاريخ الاعتماد	عدد المواد الدراسية
Course Plan No.	Approval Date	Number of Courses

رقم المادة	اسم المادة الدراسية	الساعات المعتمدة	المتطلب السابق
Course No.	Course Name	Credit Hours	Prerequisite
0905111	Principles of Electrical Circuits	3	0120131

Basic passive circuit elements (resistors, capacitors, inductors). Voltage and current sources. DC and sinusoidal steady state (AC) analysis. 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..

رقم المادة	اسم المادة الدراسية	الساعات المعتمدة	المتطلب السابق
Course No.	Course Name	Credit Hours	Prerequisite
0909141	Discrete Structures	3	0120121

This course covers the mathematical topics most directly related to computer science and engineering. Topics included: logic, relations, functions, basic set theory, count ability and counting arguments, proof techniques, mathematical induction, graph theory, combinatorics, discrete probability, recursion, recurrence relations, and number theory. Emphasis will be on context for the application of the mathematics within computer engineering.

رقم المادة	اسم المادة الدراسية	الساعات المعتمدة	المتطلب السابق
Course No.	Course Name	Credit Hours	Prerequisite
0909101	Computer Applications Engineering	3	0420001

This course provides the necessary information for students to understand vectors, matrices , data types, and Matlab basic units of operations, use simpler programming techniques like decision making structures (if and switch statements)and repetition structures (for and while), understanding functions, function calls and scripting, building user defined functions and applications.

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

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.

رقم المادة	اسم المادة الدراسية	الساعات المعتمدة	المتطلب السابق
Course No.	Course Name	Credit Hours	Prerequisite
0909221	Introduction to Linear Systems	3	0101104

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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 linear systems of, 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.
0909221	3	Signal and System 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.
0101104	3	Numerical Methods 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.
0905213	3	Electromagnetics	0909322

Vectors; coulomb's law, electric flux density; Gauss law and divergence theorem, potential, boundary conditions: Poisson and Laplace equations, Biota-Savant law, Ampere law, the magnetic properties of materials, inductance, magnetic circuits, Faraday's law, displacement current. 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.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905362	3	Digital Electronics	0909317

Investigate dynamic operation of the BJT switch. Study of DTL, TTL circuits, and characteristics of the standard TTL circuit. Also, study of emitter-coupled logic (ECL) circuits, design and performance evaluation of CMOS logic circuits. Explore types of the CMOS logic circuits: pass transistor, dynamic logic. Gain insight into latches, flip-flop, architecture of memories (SRAM, DRAM, ROM), logic gate based multi-vibrator circuits, BiCMOS and GaAs logic circuits. Interface of various logic gates. Learn about sampling circuit, D/A and A/D conversion techniques.

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المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909353	3	Database Systems	0909549
This course aims to introduce the concepts and methodology of database systems. Database models. Database design and programming. It defines the underlying data structures needed for database processing and management, as well as the problems entailed in file-based information systems design and that motivates the use of a database system. Designing of Database Management Systems (DBMS) will be discussed.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909101	3	Object-Oriented Programming	0909353
This course teaches the fundamental ideas behind the object-oriented approach of programming, Object-Oriented Programming concepts: data Abstraction, Encapsulation, Inheritance and Polymorphism. Decomposition of large systems into reusable objects, Multi-class implementations: Composition, Nested Classes and Inheritance.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909353	3	Object-Oriented Programming Lab.	0909356
In this course, programming projects will be implemented in JAVA programming language, The UML concepts and diagrams, a set of laboratory experiments will provide hands-on experience in related topics.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909242	3	Computer Architecture and Special Processors	0909246
This course introduces the principles of computer organization and the basic architecture concepts. Machine instruction sets and assembly language programming. Processor data path and control unit design. Instruction pipelining. The memory system. Caches. Virtual Memory. In addition, the course discusses GPU architecture, high performance computing on GPUs, parallel algorithms and applications of GPU computing. Problem sets will cover performance optimization and specific GPU applications in numerical mathematics, medical imaging, finance, and other fields.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909242	3	Computer Organization Lab.	0909244
Simulator used in the design, synthesis and analysis data-paths, Pipeline, caching, switching circuits, and arithmetic and logic circuits. Behavioral and structural modeling of hardware designs in the IEEE standard hardware description language VHDL. Synthesis and implementation of hardware designs using Programmable Logic Devices			
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.
0909223 0909141	3	Probability and Random Signal Analysis	0909324

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.
0909426 0909362	3	Communications Electronics	0909464

Tuned and resonant circuits, Impedance matching and transformations. Filters. RF and IF tuned amplifiers. Power amplifiers. AGC circuits. Design of Low Noise Amplifiers. Case studies Oscillators types and circuits. Loop gain analysis. Negative resistance analysis. Voltage controlled Oscillators (VCO). Phase locked loops and applications. FM detection. Frequency synthesis. Mixers: Active mixers, Switching type mixers and 4-diode double balanced mixer. Mixers applications in Modulation and Demodulation. RF Projects on the design, construct, match, and test an RF oscillator and amplifiers.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909242	3	Microprocessor Systems	0909445

Examines hardware and software model of microprocessors; Introduction to microprocessor

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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.
0909246	3	Embedded Systems	0909447

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.
0909447	3	Embedded Systems Lab.	0909548

In this lab PIC microcontrollers will be studied. Input/output ports, Timers 0 and 1, LCD, keypad, ADC and serial modules are presented and configured. Arduino Kits is introduced and interfaced with motor drivers. Finally, Rassyberry Pi kits are introduced with the concept of real time OS.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909246	3	Operating Systems	0909349

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.
0909223	3	Control Systems	0905342

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.
0909324	3	Analog Communication	0909326

Equivalent low-pass models. Amplitude modulation and demodulation. Coherent and non-coherent detection. Angle modulation and demodulation. Noise representation and analysis: SNR analysis of

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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.
0909326	3	Analog Communication Lab	0909427

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.
0909223	3	Digital Signal Processing	0909325

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 Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909349	3	Computer Networks	0909462

Overview of Computer networking, OSI model, communication and transmission systems; physical layer issues: data transmission, channel capacity, signal 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.
0905261	1	Electronics Lab.	0905265

Study diode characteristics and applications such as rectification and regulation. Study of BJT characteristics, DC biasing, amplification, and switching. Learn FET characteristics, DC biasing, and amplification. Investigate operational amplifiers and their applications. Explore general electronic circuits such as 555 timers, comparators, Schmitt triggers, analog-to-digital converters, and digital-to-analog converters.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
Passing 90 credit hours	3	Engineering Training	0909401

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.
0909326	3	Digital Communications	0909428

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 Gaussian noise. Error probability analysis. Passband digital systems: signal and system models of ASK, PSK,

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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.
0909428 0909462	3	Communications and Networks Systems	0909429

Addressing the fundamental technologies and theories associated with designing complex communications systems and networks. Providing models and analytical methods for evaluating the performance of the communications systems and networks. Including both the physical layer (digital transmission and modulation) and networking topics, the quality of service concepts belonging to the different layers of the protocol stack are interrelated to form a comprehensive picture.

المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0905213	3	Electrical Machines	0909314

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.
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.
0909322	3	Optical Fiber Communication Systems	0909534

Components, advantages and classifications of fiber communication systems. Dielectric slab waveguide. 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.
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.

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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.
0909325	3	Digital Image Processing	0909535
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 sub band/wavelet representations. Object Recognition concept. Applications in Image interpretation. 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.
0909462	3	Cryptography and Network Security	0909565
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.
0909324	3	Machine Learning	0909556
This course provides the necessary information for students to distinguish between machine learning and non-machine learning problems, categorizes machine learning problem into supervised, non-supervised or other, determining which machine learning algorithm fits a problem(regression, classifications and clustering), and simulate different types of machine learning algorithms.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
Passing 120 credit hours	3	Graduation Project I	0909501
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, teamwork and en trepreneurial skills. Formation of teams. Documentation and presentation of the first iteration of design project.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909501	3	Graduation Project II	0909502
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.			
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Prerequisite	Credit Hours	Course Name	Course No.
5 th year	3	Special Topics in Computer and Communications	0909503
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.
0909428	3	Wireless Communications	0909529
Identify the challenges posed by using wireless channels for communication, such as channel noise and different kinds of fading. Knowledge of the wireless communications channel models, such as empirical path-loss models, large –scale and small-scale fading models, in addition to wideband channel models. Basic understanding of techniques used to mitigate multipath fading effect, such as channel coding, diversity, and equalization.			
0905111	3	Electrical 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	Communications Networks and Electrical Wiring	0909321
Electrical illumination systems, interior light systems design for buildings, Principles of Lighting Systems Design, Types of Lighting Systems, Low voltage wiring, Security systems, Fire alarm systems, Smoke and Fire Detector, Telephone networks and switching, Computer network basics, Local area networks.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909321	3	Communications Networks and Electrical Wiring Lab.	0909323
Residential house wiring using switches , fuses indicator, lamp and energy meter. Types of wiring: staircase wiring , fluorescent lamp wiring , corridor wiring, sockets. Electrical cables and wires. Types of circuit breakers: miniature MCB, molded case MCCB. Measurement of electrical quantities : voltage ,current, power, power factor in RLC circuit . Study of earthing and measurement of earthing resistance .Study of troubleshooting of electrical equipment. Fire alarm and fire fighting system . Telephony system : telephone wires, socket outlet, communication box, intercom .			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909242	3	Digital Logic Design Lab	0909243
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.			
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Prerequisite	Credit Hours	Course Name	Course No.
0909462	3	Computer Networks Lab	0909463
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.
0909428	3	Digital Communications Lab	0909531
Learn and observe complex signal and their spectra. Study and implement AM and FM using digital signal processing techniques. Explore time and frequency synchronization algorithms, especially the digital phase locked loop (PLL). Investigate digital modulation and demodulation schemes and related algorithm such as pulse shaping, up and down conversion, phase ambiguity, differential encoding and decoding.			
المتطلب السابق Prerequisite	الساعات المعتمدة Credit Hours	اسم المادة الدراسية Course Name	رقم المادة Course No.
0909445	3	Microprocessor Systems Lab	0909446
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.			
Approved by	(التوقيع والخاتم الرسمي)		اعتمدت من قبل مجلس القسم