



كلية التقنية الإلكترونية بني وليد

دليل قسم الحاسوب وتقنية المعلومات

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دليل قسم الحاسوب وتقنية المعلومات

Department of Computer Engineering and Information Technology

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College of Electronic Technology, Bani-Walid



Computer Engineering and Information Technology Department Guide

About the Department:

The Department of Computer Engineering and Information Technology is one of the specialized departments at College of Electronic Technology, Bani Walid. It is one of the oldest and time-honored departments in Libya. It has been opened since the establishment of the College in 1976. It is specialized in the theoretical, technical and applied aspects in the field of computing. This field is considered as a vital field, and also, considered as the backbone for all service, industrial, commercial and administrative institutions. Therefore, the need for efficient and excellent cadres in this domain, is constantly increasing.

Objectives of the department:

The Department aims to apply an academic program that provides highly-qualified graduates who are capable of pursuing graduate studies and become much more demanded in the labor market. It is interested in scientific studies and research, implementing applied projects and providing scientific consultations.

Majors in the department:

- **Computer Engineering:** This division is specialized in the design of computer circuits, microprocessors, embedded systems, micro-controllers and computer networks.
- **Information Technology:** This division is specialized in the practical aspects of computer networks, software engineering, web applications, data security and communication, image processing and multimedia.

Laboratories of the department:

The department has 9 computer labs which are equipped with modern equipment and devices that enable students to make experiments and practical applications during the study period. **The labs are:**

- **Microprocessor lab:** This lab contains a number of modern applied panels and training systems and development of the model 8086, Z80, 6800, and the systems of training logic programming. This lab is specialized in studying and conducting experiments of microprocessors and methods of assembly language and the methods of linking with the processor, and also linking the processor itself with digital and analog devices. This lab is also specialized in studying micro-controllers and the methods of programming it and studying the differences in linking between the micro-processor and controllers.
- **Digital Electronics Lab:** In this lab, practical experiments related to digital circuits are conducted through a complete study of logic gates and how to deal with them. Also, this lab is specialized in designing half adder, full adder, subtraction circuit and flip-flops and making tests of counters and recorders.
- **Networks and maintenance Lab:** This laboratory is specialized in the experiments of the computer networks, through which to identify the types of cables and tools for networks and identify the types of devices used on local networks and wireless network devices. Connecting a multi-devices local network and making preparation of these networks and managing it in terms of creating user accounts and granting different powers are implemented through this lab too.
- **Three labs for general software:** There are more than (60) computers used to carry out different software applications.
- **Two labs** for doing research and experiments and maintaining devices.

نبذة عن القسم:

قسم هندسة الحاسوب وتقنية المعلومات هو أحد الأقسام التخصصية بكلية التقنية الإلكترونية بني وليد، وهو من الأقسام العريقة في ليبيا حيث افتتح منذ تأسيس المعهد عام 1976م، ويختص بالجوانب النظرية والتقنية والتطبيقية معاً في مجال الحوسبة الذي يُعد من المجالات الحيوية والذي يمثل العمود الفقري لكافة المؤسسات الخدمية والصناعية والتجارية والإدارية، لذلك نجد الطلب في تزايد مستمر على الكفاءات والكوادر المتميزة في هذا المجال.

أهداف القسم:

يهدف القسم إلى تطبيق برنامج أكاديمي يُؤمن مخرجات ذات كفاءة عالية التأهيل قادرة على مواصلة الدراسات العليا والمنافسة في سوق العمل، ويهتم بالدراسات والأبحاث العلمية، وتنفيذ المشاريع التطبيقية، وتقديم الاستشارات العلمية.

الشعب التخصصية بالقسم:

- **شعبة هندسة الحاسوب:** تختص بتصاميم دوائر الحاسوب والمعالجات الدقيقة والنظم المضمنة والحاكمات الدقيقة وشبكات الحاسوب.
- **شعبة تقنية المعلومات:** وتختص هذه الشعبة بالجوانب التطبيقية في شبكات الحاسوب وهندسة البرمجيات وتطبيقات الويب وأمن وتراسل البيانات ومعالجة الصور والوسائط المتعددة.

معامل القسم:

- يوجد بالقسم 9 معامل حاسوب مجهزة بمعدات وأجهزة حديثة تمكن الطلاب من إجراء التجارب والتطبيق العملي أثناء فترة الدراسة وهي:
- **معمل المعالجات الدقيقة:** يحوي هذا المعمل عدد من اللوحات التطبيقية الحديثة وانظمة تدريب وتطوير من طراز 8086، Z80، 6800، وانظمة تدريب المنطق البرمجي، ويختص هذا المعمل بدراسة وإجراء التجارب الخاصة بالمعالجات الدقيقة وأساليب لغة التجميع وطرق الربط بالمعالج وربط المعالج بالأجهزة الرقمية والتناظرية ودراسة الحاكمات الدقيقة وطرق برمجتها ودراسة الفروق في الربط بين المعالج الدقيق والحاكمات
 - **معمل الالكترونيات الرقمية:** تجرى بهذا المعمل التجارب العملية المتعلقة بالدوائر الرقمية من خلال دراسة كاملة للبوابات المنطقية وكيفية التعامل معها وتصميم دوائر النصف الجامع ودائرة الجامع الكامل ودائرة الطرح والقلابات وتجارب العدادات والمسجلات.
 - **معمل الشبكات والصيانة:** يختص هذا المعمل بإجراء التجارب الخاصة بشبكات الحاسوب حيث يتم من خلاله التعرف على أنواع الكوابل والأدوات الخاصة بالشبكات والتعرف على أنواع الأجهزة المختلفة المستخدمة بالشبكات المحلية وأجهزة الشبكات اللاسلكية وتوصيل شبكة محلية متعددة الأجهزة وإجراء الإعداد الخاص بهذه الشبكات وإدارتها من حيث إنشاء حسابات مستخدمين ومنح الصلاحيات المختلفة.
 - **عدد ثلاث معامل برمجيات عامة:** يوجد بهذه المعامل أكثر من (60) جهاز حاسوب تستخدم لإجراء التطبيقات البرمجية المختلفة.
 - **معملان لإجراء البحوث وإعداد التجارب وصيانة الأجهزة.**

مقررات الفصول التمهيديّة

الفصل الدراسي الأول:

ت	الرمز	المقرر	الوحدات	الساعات	تدريبات نظرية
1	GS100	Mathematics I	4	3	2
2	GS102	Physics I	4	3	2
3	GS103	Physics I Lab	1	2	-
4	GS104	English I	3	2	2
5	GS106	Electrical Circuit I	4	3	2
6	GS107	Electrical Circuit I Lab	1	2	-
8		المجموع	17	15	

الفصل الدراسي الثاني:

ت	الرمز	المقرر	الوحدات	الساعات
1	GS150	Mathematics II	3	3
2	GS152	Physics II	3	3
3	GS153	Physics II Lab	1	2
4	GS154	English II	2	3
6	GS156	Electrical Circuit II	3	3
7	GS157	Electrical Circuit II Lab	1	2

3	3	Electronic Circuit I	GS158	8
2	1	Electronic Circuit I Lab	GS159	9
3	1	Engineering Drawing	GS160	10
24	18	المجموع		

الفصل الدراسي الثالث:

ت	الرمز	المقرر	الوحدات	الساعات
1	GS200	Mathematics III	3	3
2	GS202	English III	2	3
3	GS204	Digital Electronics	3	3
4	GS205	Digital Electronics Lab	1	2
5	GS206	Electronic Circuit II	3	3
6	GS207	Electronic Circuit II Lab	1	2
7	GS208	Computer Programming I	3	3
8	GS209	Computer Programming I Lab	1	2
9	GS210	Workshop Technology	1	3
		المجموع	18	24

الفصل الدراسي الرابع:

ت	الرمز	المقرر	الوحدات	الساعات
1	GS250	Mathematics IV	3	3
2	GS252	Statistics & Probabilities	3	3
3	GS254	Signals and Systems	3	3
4	GS256	Computer Programming II	3	3
5	GS257	Computer Programming II Lab	1	2
6	GS258	Int. to Control Systems	3	3
7	GS259	Int. to Control Systems Lab	1	2
8	GS260	Measurements	3	3
9	GS261	Measurements Lab	1	2
		المجموع	21	24

مجموع وحدات الفصول التمهيديّة: 74 وحدة دراسية.

مقررات الفصول التخصصية

((أولاً: المقررات العامة بالقسم))

الفصل الدراسي الخامس:

ت	الرمز	المقرر الدراسي	الوحدات	الساعات
1	GS300	Numerical Analysis	3	3
2	CM300	Communication Systems	3	3
3	CM301	Communication Systems Lab	3	2
4	CI304	Object Oriented Programming	3	3
5	CI305	Object Oriented Programming Lab	1	2
6	CI302	Computer Networks I	3	3
7	CI303	Computer Networks I Lab	1	2
8	CI300	Microprocessors	3	3
9	CI301	Microprocessor Lab	1	2
		المجموع	19	23

((ثانيا : مقررات شعبة الحاسوب))

الفصل الدراسي السادس :

ت	الرمز	المقرر الدراسي	الوحدات	الساعات
1	CM350	Digital Signal Processing (DSP)	3	3
2	CM351	DSP – Lab	1	2
3	CI350	Computer Networks II	3	3
4	CI351	Computer Networks II Lab	1	2
5	CI352	Operating Systems	3	3
6	CI353	Operating Systems Lab	1	2
7	CI354	Database Systems	3	3
8	CI355	Database Systems Lab	1	2
9	CE356	Computer Architecture	3	3
		المجموع	19	23

الفصل الدراسي السابع :

ت	الرمز	المقرر الدراسي	الوحدات	الساعات
1	GS400	Technical Report Writing	2	2
2	CI400	Data Structures & Algorithms	3	3
3	CI406	Image processing (Elective)	3	3
4	CI407	Image processing Lab	1	2
5	CE400	Computer Circuit Design	3	3

2	1	Computer Circuit Design Lab	CE401	6
3	3	Embedded Systems	CE402	7
2	1	Embedded Systems Lab.	CE403	8
3	2	Project Proposal	GP499	9
23	19	المجموع		

الفصل الدراسي الثامن:

ت	الرمز	المقرر الدراسي	الوحدات	الساعات
1	CE452	Introduction to VHDL	3	3
2	CE453	Introduction to VHDL Lab.	1	2
3	CE454	Data Acquisition	3	3
4	CE455	Data Acquisition Lab.	1	2
5	CI402	Artificial Intelligence	3	3
6	CE458	Fault Tolerant	3	3
7	CE456	Parallel processing	3	3
8	GP499	Project Implementation	2	3
		المجموع	19	22

مجموع وحدات التخرج بشعبة الحاسوب : 151 وحدة دراسية.

(ثالثا : مقررات شعبة تقنية المعلومات))

الفصل الدراسي السادس:

ت	الرمز	المقرر الدراسي	الوحدات	الساعات
1	CM350	Digital Signal Processing (DSP)	3	3
2	CM351	DSP – Lab	1	2
3	CI350	Computer Networks II	3	3
4	CI351	Computer Networks II Lab	1	2
5	CI352	Operating Systems	3	3
6	CI353	Operating Systems Lab	1	2
7	IT400	Web Programming I	3	3
8	IT401	Web Programming I lab	1	2
9	CI354	Database Systems	3	3
10	CI355	Database Systems Lab	1	2
		المجموع	20	25

الفصل الدراسي السابع:

ت	الرمز	المقرر الدراسي	الوحدات	الساعات
1	GS400	Technical Report Writing	2	2
2	CI400	Data Structures & Algorithms	3	3
3	CI406	Image processing (Elective)	3	3
4	CI407	Image processing Lab	1	2
5	IT458	Web programming II	3	3
6	IT459	Web programming II Lab	1	2

3	3	Visual Programming	IT402	7
2	1	Visual Programming Lab.	IT403	8
2	2	Network Administration I	IT404	9
3	2	Project Proposal	GP499	10
25	21	المجموع		

الفصل الدراسي الثامن:

ت	الرمز	المقرر الدراسي	الوحدات	الساعات
1	CI402	Artificial Intelligence	3	3
2	IT452	Multimedia Techniques	3	3
3	IT453	Multimedia Techniques Lab	1	2
4	IT454	Computer Security	3	3
5	IT456	Network Administration II	2	2
6	GP499	Project Implementation	2	3
		المجموع	14	16

مجموع وحدات التخرج بشعبة تقنية المعلومات: 151 وحدة دراسية.

المواد الاختيارية بقسم هندسة الحاسوب وتقنية المعلومات:

ت	الرمز	المقرر الدراسي	الوحدات	الساعات
1	IT450	Software Engineering	3	3
2	CI402	Artificial Intelligence	3	3
3	IT461	Android Programming Lab	1	2
4	IT460	Android Programming	3	3
5	CI406	Image processing	3	3
6	CI407	Image processing Lab	1	2
7	CE456	Parallel processing	3	3
8	CE450	Digital Systems Design	3	3
9	CE451	Digital Systems Design Lab.	1	2

المناهج الدراسية
((أولاً: مناهج الفصول التمهيديّة))

Semester: 1

GS100 Mathematics I

Calculus: Real numbers [intervals and inequalities], Functions, Limits, Continuity, Theorems on differentiation, Derivatives of elementary functions: algebraic, trigonometric exponential, logarithmic and hyperbolic, Derivatives of inverse functions: trigonometric and hyperbolic, Implicit differentiation, Parametric and Logarithmic differentiation, Maximum and minimum values of functions, *Analytical geometry:* Two and three dimensional coordinate systems: Cartesian, Polar, Cylindrical and Spherical, *Algebra:* Polynomials, remainder and factor theorem, Complex numbers, argued diagram, Cartesian and Polar forms, Operations with complex numbers, De Moivre's theorem and exponential forms.

GS102 Physics I

International system of units (SI); Fundamental SI units, derived units, derived units with special names. Vectors and Scalars; Vector addition (polygon, triangle and analysis methods). Rectilinear motion; average and instantaneous velocity and acceleration, freely falling bodies. Circular motion; centripetal force, projectile. Newton laws of motion. Work; work done by constant and variable force. Energy; potential and kinetic energy, elastic potential energy and conservation of energy. Geometrical Optics; nature of light, reflection and refraction, formation of images by reflection and refraction. Interference and diffraction. Sound; waves, Simple Harmonic Motion and its equations. Wave classification (Electromagnetic and mechanical). Wave equation. Wave speed (speed of a longitudinal and transverse waves). Vibrations of thread and air columns.

GS104 English I

Correct use of tenses; Use of Numbers & decimals: Introduction to measurement units; Use of descriptive nouns; Simple descriptions of shapes, figures and expressions of values; Describing angles and lines and some other geometrical shapes; Reading formulae; Introduction to fractions, equations, mathematical values and related expressions; Descriptions of basic spatial relationships of objects; Basic expressions of motion in various directions; Definition of sentence and its parts and kinds; Sentence and its different types; noun and its forms; changing the voice of English sentences.

GS106 Electrical Circuit I

Concept of current and voltage, Resistance, Conductance, ohm's law, power, Efficiency, Energy, Kirchhoff's laws, series and parallel connections, voltage and current sources, circuit analysis using branch-current, mesh and nodal methods, Bridge networks, Delta/Star conversion, Network theorems (superposition, Thevenin's, Norton's and maximum power transfer). Capacitors, capacitance, transients in capacitive circuits. Magnetic circuits, magnetic field, Flux density, permeability, Inductors, RC and RL dc circuits. Alternating current (AC) circuits, Instantaneous, peak, Mean and Effective values, series and parallel AC circuits, Phasor diagram, power in AC circuits, Series and parallel resonant circuits.

Semester: 2

GS150 Mathematics II

Calculus: Integration: Indefinite and Definite integrals, Area under a curve, Area between two curves, Integration Techniques: Integration by substitutions, Trigonometric techniques of integration, Integration by parts, Integration by partial fractions. *Partial differentiation:* Partial derivatives, Derivatives of functions of several variables, the chain, rule Euler's theorem for homogeneous functions, Total differentiation, and exact differentials. *Ordinary differential equations:* First order differential Equations: with Variables separable, Homogeneous functions, Exact differentials, Integrating factors, and Linear & reducible to linear first order equations. *Algebra:* Determinants, Properties of determinants, solutions of systems of simultaneous algebraic equation using determinants, Matrices, operations with matrices, sequences and series and convergence tests, Taylor and Maclurin's formula.

GS152 Physics II

Static electricity charge; Classification of charges, interaction of charges; Coulomb's law. Electric field; field intensity, field direction, field mapping. Gauss Law; concept of electric flux and area vector and applications (field of an infinite plane sheet of charge and field just outside a charged conductor). Electric potential and potential difference. Capacitors; types of a capacitors (parallel plate, circular and cylindrical capacitors), connection of a capacitors (in-parallel and in-series). Dielectric; concept and influence of the dielectric on the capacity, charging and discharging of a capacitor Magnetism: Magnetic induction, force experience by the charge, Lorentz force, lines of induction, magnetic flux. Biot- Savart law. Magnetic field produced; by a narrow circular coil and by an infinitely long straight conductor. Ampere's law. Hal effect.

GS154 English II

Properties of materials and their comparison by using modifiers, Color and surface attributes, Statements of general truths and facts, Giving direct and indirect

Instructions, Adjectives and degrees, Description of a process by using words of sequence, active and passive statements, Correct pronunciation of confusing words, Vocabulary development: Antonyms, Synonyms and Prefixes.

GS156 Electrical Circuit II

Mesh and nodal analysis in AC circuits, networks theorems in AC circuits, Transformers, Mutual inductance, Iron-core transformer, power and Equivalent circuit, Air-core transformer and its equivalent circuits. Poly-phase systems, 3-ph generator, phaser diagram, Y and Δ connected generator phase sequence, Two-port networks (Z and Y- parameters for T and Π networks), LC filters and RLC filters, Transient in simple RC and RL circuit, Transient in RLC circuits and their responses, Application of unit- step forcing function, Natural and forced responses.

GS158 Electronic Circuit I

The P-N junction, biasing of P-N junctions; Zener diodes, Tunnel diodes, photodiodes, Light Emitting Diodes, Laser Diodes, Diode circuits and applications:- Clipping circuits, comparators, rectifiers. Introduction to Bipolar Junction Transistors, Construction and biasing, Common Emitter, Common Base and Common Collector configurations, Small signal amplifiers, hybrid parameters, small signal equivalent circuit of BJT and its simplification, Large signal amplifiers, classification of amplifiers (A, B, AB, C), efficiency, AF power amplifiers, Push-pull amplifier. Construction of Field Effect Transistors (JFET & MOSFET), the basic amplifier, small signal equivalent circuit of FET.

GS160 Engineering Drawing

Drawing instruments, types of lines, letters and figures, geometrical construction, dimensioning, projections, principles of first angle and third angle projection applications, sectioning, section of views and hatching.

Semester : 3

GS200 Mathematics III

Ordinary differential equations: Linear dependence, Homogeneous and Non-Homogeneous linear differential equations with constant coefficients, Undetermined coefficients, Homogeneous and Non-Homogeneous Equidimensional equations, variation of parameters, Systems of linear differential equations. Laplace transforms: Definition and existence of Laplace transform, Translation theorem:(S-shifting, t- shifting), Unit step function, Differentiation and Integration of transforms, Transforms of derivatives and integrals, Convolution, Inverse transforms, Applications to linear differential equations with constant coefficients. Fourier analysis: Periodic functions, Trigonometric series, Fourier series of period 2π , Fourier series of any period, Half-Range expansions, Complex Fourier series, Fourier integrals, Fourier transforms

GS202 English III

Expressing contrast and similarity by using conjunctions, Making Statements of Cause and Reason, Expressing Probable and Hypothetical Results, Describing Procedure, Observations, Deduction and Conclusion for a carried out experiment, Comparative use of Adjectives, Use of prepositions and Adverbs, Making Active and Passive Statements, Vocabulary Development: Antonyms, Synonyms, Prefixes and Suffixes.

GS204 Digital Electronics

Binary systems, binary coded decimal (BCD), octal, hexadecimal, addition, subtraction, multiplication and division, conversions between other binary systems, Boolean algebra, karnaugh maps, logic gates, inhibit and enable operations, De Morgan's theorem, flip flops, shift registers; series-in-parallel-out (SIPO), serial-in-serial-out (SISO), parallel-in-serial-out (PISO), parallel-in-parallel-out (PIPO), counters; ring counter, ripple counter (asynchronous), up-down counter, divide by N counter, synchronous counters.

GS206 Electronic Circuit II

Frequency response of amplifiers, feedback in amplifier circuits, classification of amplifiers: voltage and current amplifiers, feedback concept; negative feedback amplifiers, analysis of feedback configurations, principles of oscillators, Wein bridge oscillators, crystal oscillators, sinusoidal oscillators, phase-shift oscillators, multivibrators (using transistor circuits). Operational amplifiers, differential amplifiers, transfer characteristics of differential amplifiers, frequency response of op amp's: Basic applications of op amps, summing amplifiers, differentiator and integrator circuits, oscillators, comparators.

GS208 Computer Programming I

Introduction to computers, hardware and software organization, files, problem solving, algorithms design and flowcharts, Introducing programming concepts and techniques, simple data types, expressions, identifiers, variables, literals, operators (arithmetic, relational, logical, bitwise), decision making and repetition statements, arrays (One and Two dimensional) , Introducing The basics of strings and functions. (Using C/C++ language syntax).

GS210 Workshop Technology

Identification of the various types of diodes and their applications – Testing the diode when connected and not connected in a circuit – Identification of various types of transistors and their applications – Testing of transistor when connected and not connected in a circuit – Using data sheet to find the equivalent components – Soldering and testing some simple electronic circuits – Transformers and their troubleshooting – Proper use of electrical and mechanical tools in the work shop – Methods of soldering and desoldering – Fabrication of printed circuit boards of some electronic circuits – Safety measure and rules in electrical workshop.

Semester: 4

GS250 Mathematics IV

Power Series solutions of linear differential equations: Solutions about ordinary points, Solutions about singular points, Bessel's equation, Legendre's equation. Vectors and the geometry of space: Vectors in plane, Vectors in space, Dot and cross products, lines and planes in space: Multiple integrals: Double integrals, Surface integrals, Triple integrals. Vector calculus: Vector functions, derivative of Vector functions , motion in space, Gradient and Directional derivatives, vector fields, Divergence and Curl, Line integrals, conservative vector fields, Green theorem, Divergence theorem, Stokes`

theorem, Applications of vector calculus, Partial differential equations: Separable Partial differential equations, Heat equation, wave equation, Laplac`'s equation. Special function: Gamma function, Beta function

GS252 Statistics & Probabilities

Rudimentary concepts of set theory; Fundamental principles of techniques of counting, factorial notations, permutations, ordered samples, binomial coefficients and theorem combinations; Sample space, axioms of probability, finite probability and infinite sample spaces; Conditional probability and its multiplication theorem, Random variables, distribution and function of a random variables, covariance and finite stochastic random process, independence, probability density function "pdf"; joint pdf, approximation to Binominal distribution, central limit theorem, Correlation and regression, Autocorrelation correlation function "ACF" , Cross ACF.

GS254 Signals & Systems

Introduction to signals and systems, classification of signals and systems, time-domain analysis of continuous time systems, step and impulse response of continuous systems, Fourier series representation of signals (Trigonometric and Exponential), Fourier Transform, properties of Fourier transform, Convolution, cross correlation and autocorrelation, Frequency transfer function. Discrete time signals and systems, sampling of signals, examples of discrete time signals, Time-domain analysis of discrete time systems, discrete time impulse response, convolution sum. Introduction to the Z transform.

GS256 Computer Programming II

Overview of structured programming, strings, functions including recursion, arrays and functions, sorting and searching techniques, references and pointers, structures, error-handling, file operations, overview of classes and objects.

GS258 Introduction to Control Systems

Introduction to control engineering and control engineering practice, mathematical models of physical systems, review of Laplace transforms, transfer function and block diagrams of control systems, state variable models, characteristics of closed loop systems, performance of control systems, stability of linear systems.

GS260 Measurements

Concepts and Principles, Measurements and error analysis, data and signal recording, mechanical pointers DC and AC current measurements, sensing and energy conversion elements, signal conditioning elements, magnifiers Transducer Fundamentals, Displacement transducer and motion sensor, strain gage, accelerometers, Gyros and attitude sensors, force transducer, Torque, flow meters, pressure, sound measuring microphones, vacuum sensors, optical detector, Humidity and moisture sensors, thermometers, liquid and level sensor.

((ثانياً : مناهج الفصول التخصصية))

Semester: 5

GS300 Numerical Analysis

Error analysis: rounding of numbers, classification and sources of errors, absolute and relative error, arithmetic operations with errors. Evaluation of functions: Taylor series and calculation of functions. Evaluation of a polynomial, the convergent series. Solution of non-linear algebraic equations. Iterative methods, Bisection method, Newton's method, Halley's method. Approximate solutions of systems of non-linear equations using Newton's method. Solving systems of linear algebraic equations: Gauss elimination method, Gauss-Jordan's method, Gauss-Siedel method. Interpolation and polynomial approximation: General interpolation formulae, Lagrange's interpolation, Newton's divided, forward and backward difference interpolation formulas. Curve fitting: The method of least squares. Introduction to numerical integration.

CM300 Communication Systems

The electromagnetic spectrum, Modulation, Classification of analog modulation, Amplitude modulation AM, DSB-SC, SSC and VSB, analysis of these types of AM modulation regarding to their generation and detection methods and the circuitry used. Frequency and phase modulation (FM and PM), methods of generation and detections and their analysis. Frequency division multiplexing (FDM), Sampling theorem, Ideal sampling, Natural sampling, Flat-top sampling, Nyquist rate, Quantization of signals, linear and non-linear quantization, Quantization noise, Digital modulation systems, PCM, and DPCM systems, S/N ratio in PCM, Bandwidth of PCM, Time-division multiplexing (TDM), Delta modulation and adaptive delta modulation.

CI300 Microprocessors

Basic hardware and software; architecture of the INTEL 8086 microprocessor, introduction to assembly language programming; addressing modes and instruction set for the 80x86 family, the turbo assembler, programming examples; arithmetic operations, conditional and unconditional jumps, loops, BCD arithmetic, subroutines and user subroutines, stack operations, table and file processing, input/output operations and interrupts.

CI304 Object Oriented Programming

Object oriented means, introducing the used language in the course (Java, C#, or C++), classes and objects, data hiding, encapsulation, constructors and destructors, member functions, access modifiers, overloading, inheritance, polymorphism, abstract classes, overview of library classes, UML overview.

CI302 Computer Networks I

Introduction to data communication, data and types of transmission, communication media types, data communication standards and standard organization, data transmission-simplex, half duplex, duplex, synchronous, asynchronous transmission, error detection methods. The OSI model, Layers of OSI, TCP/IP model, and classification of networks.

((شعبة الحاسوب))

Semester: 6

CM350 Digital Signal Processing

Review of discrete systems and signals, Z-transform and its properties, inverse Z-transform, realization of discrete time systems, direct, cascade, parallel and Ladder realizations, Fourier analysis for discrete time systems, discrete Fourier series, discrete Fourier transform (DFT), properties of DFT, linear and periodic convolution, Fast Fourier transform FFT, selected discrete orthogonal transform, discrete Walsh-Hadamard and Haar transforms, discrete cosine transform. Digital filter design, FIR filter design, IIR filter design.

CI350 Computer Networks II

Introduction to fundamental concepts in the design and implementation of computer communication networks, understanding TCP/IP internet layer, transport layer and their protocols, applications layered network architectures, network programming interfaces (e.g., sockets), packet delivery process, understanding Ethernet, local area networks and network routing, network security.

CI352 Operating Systems

Evolution of operating systems (OS), classification of OS and standards, general structure of OS, basic commands in Unix or Linux, programs, scripts, special symbols, input/output redirection, pipes, background processes, file systems, physical and logical structure of disks, access rights to files, processes, fork, exec, exit, and wait calls, states of processes and scheduling, memory management, mutual exclusion, deadlocks algorithms.

CI354 Databases

Introduction to databases, data models, relational model, schemas, keys, constraints, data integrity, relational algebra operations, SQL language, views, database design, ER/UML model, ER/EER mapping to relational model, functional dependencies, data anomalies and normalization.

CI356 Computer Architecture

History of computers, and review of some major logic circuits, Performance evaluation in modern computers, CPU components, Arithmetic algorithms and circuits (adder, multiplier, booth algorithm, divider...), Bus strategies, Instructions: formats, representations, interface with software, CISC, RISC. Design of control unit and data path of a sample computer. Micro programmed control unit, Memory system design (memory hierarchy, cache memory), I/O channels and processors, advanced topics (pipeline and parallel computers).

Semester: 7

GS400 Technical Report Writing

Definition of a technical report; Benefits of writing technical reports; Language of the technical report; Criteria of a technical report; Utility, Reliability, Persuasiveness, Readability. Conceiving, analyzing and determining the objectives of a report. Organizing the report, Mechanical and graphic display. Constituents of technical report; Preliminaries: Title page, Foreword, Abstract or Summary, Table of contents. Text: Introduction, Body, Conclusion, Recommendations. Reference matter: Appendix, Bibliography, References. Preparing of the first draft of a report. Main stages in the writing of a report; Collection of data, Selection of data or material, Logical ordering of material, Interpretation of data, Presentation of a report as a whole.

CI400 Data Structures and Algorithms

Static data structures, complexity analysis and big O notation, dynamic data structures, linked lists, stacks, queues, hashing, trees, binary search tree, graph theory, graph representation and searching, shortest paths, spanning trees.

CE400 Computer Circuit Design

Basics of digital design. Design of combinational functional blocks (e.g. decoders, multiplexers, adder, multipliers, etc.). Design of sequential functional blocks (e.g. registers, counters, etc.). State machine systems, Design steps of state machine systems. Design of Memory elements. Building simple and pipelined data-paths (ALU, register file and their interconnection paths). Sequencing and control -- hardwired control and micro-programmed control. Single-cycle computer, multi-cycle computer, a pipelined computer design.

CE402 Embedded Systems

Introduction to an embedded systems and microcontroller. Processor in the system, other hardware units, software embedded into a system, embedded system-on-chip. Microcontroller architecture (8051/8052). Devices and Device Drivers. Timer and counting devices, serial communication I/O buses, Device drivers, Parallel port devices drivers in a system, Serial port device drives in a system, Interrupt servicing (Handling) mechanism, memory selection for an embedded system, Software and Programming Concept: Embedded programming in assembly, Embedded programming in C.

Semester: 8

CE452 Introduction to VHDL

The origins of VHDL, VHDL basics, Benefits of VHDL, VHDL levels of abstraction, Abstraction and timing, The VHDL design flow, VHDL synthesis, Modeling hardware in VHDL, design entities, Entity declarations, Architectures Using libraries and packages, Concurrent signal assignments Signal assignments with delays, Component declarations, Objects in VHDL, Constants, variables and signals, VHDL types, Scalar types, Arrays Records, Synthesis of ints and enums, Custom types and subtypes, Tristate and resolved types, std_ ulogic and std _ logic, unsigned and signed, Attributes, Simulation and Synthesis :How a VHDL simulator works, Event driven simulation, Event processing, Simulation (delta) cycles, Delta cycle race conditions, Elaboration, Process synthesis, Synthesizable processes styles & templates, Combinational logic in a process, Synchronous (clocked) processes.

CE454 Data Acquisition

Data acquisition systems: solid state sensors, types of sensors, transducers. Signal acquisition and condition. dB review. Time domain and Frequency domain Signals and Systems -Cascaded filters and amplifiers. Block Diagrams. Signals and Systems Filters. Break frequency & Attenuation Slope, filter order, Lo pass, Hi pass, Band pass, Band stop Sampling, Antialias filters. D/A - R/2R ladder. A/D Successive Approximation Range, Resolution, and Code Width.

CE458 Fault Tolerant

Introduction fault error failure Typo of faults type of errors> Stack at 0 stack at 1 . D algorithm BIST. Transfer error processing errors memory errors .Code theory. Codes Hamming Berger arithmetic codes Redundancy types.

((شعبة تقنية المعلومات))

Semester: 6

CM350 Digital Signal Processing

Review of discrete systems and signals, Z-transform and its properties, inverse Z-transform, realization of discrete time systems, direct, cascade, parallel and Ladder realizations, Fourier analysis for discrete time systems, discrete Fourier series, discrete Fourier transform (DFT), properties of DFT, linear and periodic convolution, Fast Fourier transform FFT, selected discrete orthogonal transform, discrete Walsh-Hadamard and Haar transforms, discrete cosine transform. Digital filter design, FIR filter design, IIR filter design.

CI350 Computer Networks II

Introduction to fundamental concepts in the design and implementation of computer communication networks, understanding TCP/IP internet layer, transport layer and their protocols, applications layered network architectures, network programming interfaces (e.g., sockets), packet delivery process, understanding Ethernet, local area networks and network routing, network security.

CI352 Operating Systems

Evolution of operating systems (OS), classification of OS and standards, general structure of OS, basic commands in Unix or Linux, programs, scripts, special symbols, input/output redirection, pipes, background processes, file systems, physical and logical structure of disks, access rights to files, processes, fork, exec, exit, and wait calls, states

of processes and scheduling, memory management, mutual exclusion, deadlocks algorithms.

CI354 Databases

Introduction to databases, data models, relational model, schemas, keys, constraints, data integrity, relational algebra operations, SQL language, views, database design, ER/UML model, ER/EER mapping to relational model, functional dependencies, data anomalies and normalization.

IT400 Web Programming I

This course is an introduction to Web-based applications programming that covers the basics of client-side design techniques and technologies. The main topics are: introduction to the Internet and World Wide Web, Web domains and hosting, Web servers, the structure and design of a web page, understanding HTML, Cascading Style Sheets (CSS), CSS Box model, fixed and liquid pages, HTML Form Controls, the basics and features of JavaScript.

Semester: 7

IT458 Web Programming II

This course covers the basics of server-side programming techniques and technologies. The main topics are: Introducing the selected server-side script language (PHP), the basics of PHP, using MySQL with PHP, database driven web applications, cookies and sessions, overview on DOM, AJAX, JQuery, overview on Web Security concepts and techniques.

CI400 Data Structures and Algorithms

Static data structures, complexity analysis and big O notation, dynamic data structures, linked lists, stacks, queues, hashing, trees, binary search tree, graph theory, graph representation and searching, shortest paths, spanning trees.

IT402 Visual Programming

Course content includes: introducing the used language in the course (C#, Java, Visual C++, or VB.Net), Windows Application Programming, Forms, Toolbox, .. etc. Events, Database Connectivity, Dataset, Data Reader, Data Reports, Error Handling and Exceptions, Windows Application Deployment.

IT404 Network Administration I

Overview on computer network, Prepare windows server (OS), Administering Accounts and Resources, User and Computer Accounts, Managing Groups, Domain and Scopes, Active Directory domain Services, DHCP, File Services (sharing , NTFS,

Quota), Printer managing and Backup & Restore.(At Least use windows server 2008 R2)

Semester: 8

IT452 Multimedia Techniques

Multimedia data representations, basics of digital audio, graphics and image file format, color in image and video, basics of video, multimedia standard, image, video, audio compression, multimedia conferencing, multimedia security.

IT456 Computer Network Administration II

Overview on Active directory, Implementation of Domain Controller , Create Read Only Domain Controller server (RODC), Create Additional Domain server , Create Chilled Domain Server, Create New tree Server, Install HTTP Server Role & Internet Information Services (IIS).(At Least use windows server 2008 R2)

IT454 Computer Security

This course covers computer and information security goals, attacks, services and mechanisms, virus and malicious programs, cryptography concepts and definitions, symmetric and asymmetric encryption, hash functions, digital signatures, entity authentication, access control, authentication, passwords, authorization, ethical hacking, principles of foot-printing, social engineering, scanning, enumeration, system hacking, types of attacks and counter measures such as: sniffing, denial of service, IP spoofing, buffer overflows.

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CI402 Artificial Intelligence (Elective)

Definition of AI, general problem solving approaches in AI, disciplines of AI, applications of AI, production systems, logic based systems, the logic of propositions and predicates, principles in logic programming, structured approach to knowledge representation, overview of fuzzy logic and other intelligent systems.

CE450 Digital Systems Design (Elective)

Digital System Design Methodologies, Programmable Logic devices, FPGA and CPLD architecture, Function Evaluation, CORDIC algorithms, Clock design consideration- Timing Margins, clock skew, clock distribution, Practical design and I/O, Memory, Memory interfacing, Bus architecture, A simple computer design.

CI400 Artificial Intelligence (Elective)

Definition of AI, general problem solving approaches in AI, disciplines of AI, applications of AI, production systems, logic based systems, the logic of propositions and predicates, principles in logic programming, structured approach to knowledge representation, overview of fuzzy logic and other intelligent systems.

IT450 Software Engineering (Elective)

This course provides an in-depth study of the fundamental principles underlying Software Engineering. It covers the software lifecycle starting with requirements engineering, continuing through design, and implementation, and with integration and

testing. It also examines key cross-lifecycle activities such as project management, measurement, and quality assurance, project planning, and risk analysis, project scheduling and tracking.

IT460 Android Programming (Elective)

A Comprehensive introduction to the design and implementation of Android applications for handheld systems, Software architecture, development environments (Android Studio, Eclipse), develop Android applications in Java. Android topics are included, SQLite , Content Providers, Fragments, Activities, intents, and loads more.

CI406 Image Processing (Elective)

This course introduces the basic theories and methodologies of digital image processing. Topics include intensity transformations for image enhancement, two-dimensional discrete Fourier transform, spatial and frequency domain linear image filtering, nonlinear image filtering, binary image processing, edge detection, image segmentation, and digital video processing basics. This course makes extensive use of MATLAB as an analysis, design, and visualization tool.

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