المقررات الدراسية / كلية الهندسة / جامعة الموصل

قسم الهندسة / الحاسوب

المرحلة الأولى

الفصل الاول

عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المادة	
			باللغة الإنكليزية	باللغة العربية
3	٣	2	Computer Principles	اساسيات الحاسوب
١	-	١	Human Rights	حقوق انسان
٣	-	3	Mathematics ١	الرياضيات ١
١	٣	-	Engineering Drawing	الرسم الهندسي
4	٢	3	Electrical Circuits Analysis1	تحليل الدوائر الكهربائية**1**
٣	٢	٢	Digital System Fundamentals	مبادئ النظم الرقمية
٣	-	3	Physics	فيزياء
١٨	١٠	١٤	مجموع ساعات ووحدات	

University of Mosul		**Computer Principles**	
College of Engineering			
Computer Engineering Dept.		**Lab Tutorial Theory**	
		3	**2**

Course Objectives:
Computing Fundamentals and Office 2013 applications will be covered during this course. Computing Fundamentals focuses on hardware and software and how they work together. The course includes activities and exercises that guide students to explore the Windows operating system, change settings, and customize the desktop. Students also learn how to manage files and folders. On the other hand, the Key Applications focuses on two of the Microsoft Office ٢٠١٣ applications: Word and Excel.

Course Details:	
Article	**Week**
(a) Computer Fundamental	
1- Computers and Operating System	1 - 2
2- Software and Hardware Interaction	3 - 4
3- Windows File Management	5
4- Operating System Customization	6
5- Computer Hardware	7 - 8
(b) Key Applications	
1- Exploring Microsoft Office 2013	9
2- Getting Started with Word Essentials	10
3- Editing and Formatting Documents	11 - 12
4- Getting Started with Excel Essentials	13
5- Organizing and Enhancing Worksheets	14
6- Creating Formulas and Charting Data	15

Text Books:
1-2015 Computer Literacy BASICS: A Comprehensive Guide to IC3 Connie Morrison, Dolores Wells, Lisa Ruffolo Cengage Learning. ISBN: 128576658X
2- IC3 GS5 Certification Guide Using Windows 10 & Office 2016, Print ISBN: 978-1-55332-463-8

Course Objectives:
Among the objectives of the human rights course is to raise awareness of the Iraqi woman (the mother) about her role in the field of exercising her role within her small family, which serves as a micro-community and to exercise her role towards her children by granting them (children's rights), which are included in the framework of (human rights) because the child is the most important pillar and infrastructure In the Iraqi society, which serves as the first nucleus for the establishment of a healthy and healthy society, free from psychological complexes and behavioral disorders, and raising the awareness of the mother about her duties towards her children, not to practice beating and psychological and physical violence, and to treat them in a sound and humane manner, and that the circumstances and daily hard work do not reflect on her behavior towards her children, and this in my opinion is one of the most important goals Which I seek to consolidate when teaching the subject (Human Rights), which considers the rights of the child as one of the most important points and pillars,In addition to directing the father to treat her children with dignity and produce a healthy child mentally, physically and psychologically. Introducing the Iraqi human rights stipulated in the Iraqi constitutions, especially the permanent Iraqi constitution of 2005. Awareness of individuals about the types of rights they enjoy, such as the first generation of rights represented by civil and political rights and the second generation Of rights such as economic, social and cultural rights. Activating the role of civil society institutions in the field of Iraqi human rights. Introducing human rights and spreading a culture of awareness among individuals of the types of rights they enjoy as citizens.

Course Details:	
Article	**Week**
What is right and what is human	1
What are human rights	2
Historic Human Rights in Iraqi Civilizations, in Greek Civilization, Roman and Persian Civilization	3

Historical Human Rights in the Middle Ages Feudalism, the Church, and the Institution of Monarchy (King)	4
Historical Human Rights in the Middle Ages Feudalism, the Church, and the Institution of Monarchy (King)	5
Human rights in law legislation	6
revolutions of the west	7
East revolutions and human rights	8
Human rights in the Universal Declaration of 1948	9
Economic, social and cultural human rights	10
modern human rights	11
Regional recognition of human rights	12
European Convention on Human Rights 1953	13
The Arab Organization for Human Rights 1998	14
Text Books:	
كتب المقرر العلمي الاساسية ، مصادر خارجية ، ونصوص ومواثيق الامم المتحدة في مجال حقوق الانسان والاعلان العالمي الصادر عام ١٩٤٨.	

University of Mosul	Mathematics 1
College of Engineering	Lab Tutorial Theory
Computer Engineering Dept.	1 3

Course Objectives:	
To present the fundamental concepts of multivariable Mathematics and to develop student understanding and skills in the topic necessary for its applications to engineering, and science.	
Course Details:	
Article	**Week**
Prerequisites for Mathematics	1-5
Coordinates and Graphs in the Plane	
Slope, and Equations for Lines	
Functions and Their Graphs	
Shifts, Circles and Parabolas	
A Review of Trigonometric Functions	
Limits and Continuity	6-10
Limits	
The Sandwich Theorem and $(\sin\theta)/\theta$	
Limits Involving Infinity	
Continuous Functions	
Derivatives	11-15
Text Books:	
1- **Mathematics by Thomas and Finny.**	
2- **Mathematics and Analytic Geometry by Thomas and Finny**	

Course Objectives:
An engineering drawing is a type of technical drawing used to define the requirements for engineering products or components. Typically, the purpose of an engineering drawing is to clearly and accurately capture all geometric features of a product or component so that a manufacturer or engineer can produce the required item. It may also describe the process of making the item, may be used to convey engineering ideas during the design process, or may provide a record of an existing item.

Course Details:	
Article	**Week**
Introduction and familiarization of students with engineering drawing, which includes the following: Learn about engineering tools and how to use them. Types of pens used in drawing geometric shapes. Board layout and address field numbers. - How to deal with the engineering board and the engineering board and how to install it on the board. Types of lines in engineering drawing: visible lines, hidden lines, center lines, dimensional lines, and segment lines. Drawing an applied painting on the subject: ------------------ Painting No . (1) - HW1	1 - 2
Various engineering operations: Introducing the scale of drawing and its types: civil, mechanical, and the scale of magnification and reduction. Teaching students how to apply and draw the following engineering operations: • Draw a straight line parallel to a known straight from a point outside it. Drawing a bisector for a given line Drawing tangents and identifying points of tangency and how to locate them Drawing a	3 - 4

known arc so that it touches two known straight lines between them Angle: right, acute and obtuse •. Arc a circle on the outsideFinding the center of a given arc touches the arc of a known circle and passes through a point outside it. • Draw regular geometric shapes: equilateral and polygon, pentagon and hexagon. Drawing the inverse figure • Draw three applied paintings on the subject. Plate No. 2 (W.C., Plate No. 1,4) W.H..	
The theory of vertical projection of objects: Types of projection in drawing and its practical importance Types of projections resulting from vertical projection adopted in the projection of different geometrical objects Frontal, vertical and side projections right and left side How to arrange and draw the required projections for an object on the drawing board Drawing three applied paintings on the subject, plate No. (4----) WC, plate No. (6,5W.H)	5 - 6
Drawing three-dimensional models: types of three-dimensional models and their practical benefits * Isometrics * Drawing measurement axes and how to put dimensions on them * Linking between the given projections and the process of imagining and drawing the symmetrical body Drawing three application panels on the subject Panel No. 1--- (WC, Plate No. 7,8W.H	7 – 9
Drawing the third omitted projection of the body: • How to deduce the omitted projection from two known locations of the body • Drawing the omitted projection of bodies with inclined surfaces • Drawing two applied paintings on the subject - plate No. WH	10 – 11
Geometric sections: the rules followed in cutting objects * Marking cut areas and leaving blanks and uncut parts * Abnormal areas during cutting that were not marked: inclined and vertical supports and appendages in the body Drawing two applied paintings on the subject ---- Plate No. (7) --- (WC, plate number)44W.H	12 - 15
Text Books:	
Engineering Drawing and Graphic Technology, By : French &Vierk , 12th edition, 1978	

The basic objective of this course is to introduce students to the fundamental theory and mathematics for the analysis of Direct Current (DC) and Alternating Current (AC) electrical circuits.

Course Details:	
Article	**Week**
Introduction: electrical metirials, basic quantities [ch1]	1-2
Basic relation: Ohm's law, dependent & independent sources, series & parallel resistor circuits, Y Δ transformation.[ch2]	3-4
Kirchhoff's laws .[ch2]	5-6
AC signals. [ch8]	7-8
AC circuits: capacitance & inductance.[ch6,8]	9- 10
Phasors. [ch8]	11-12
AC circuits analysis. [ch8,ch9]	13-14
Text Books:	
Text book: BASIC ENGINEERING CIRCUIT ANALYSIS 10th Ed by J. Irwin Co-text book: BASIC ENGINEERING CIRCUIT ANALYSIS 11th Ed by J. Irwin, and ENGINEERING CIRCUIT ANALYSIS Text book2:	

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Digital System Fundamentals

Lab	Tutorial	Theory
2		2

Course Objectives:	
Giving a thorough understanding of the binary system, Boolean algebra, Karnaugh map, Sequential Circuit, and their applications.	
Course Details:	
Article	**Week**
Number System	1
Boolean Algebra	2 – 3
Logic Circuit	4 – 5
Minimization by Karnaugh maps	6 – 7
Digital Components: Adders, Comparators, Decoder, Multiplexer,..etc…	8 – 11
Sequential cct.: Counters, registers.	12 – 15

Text Books:
1- Digital Fundamental, 10th Edition, Thomas L. Floyd,UBS,2011.
2- Digital Design, Moshe Mano, prentice Hall,2002

Course Objectives:	
Study the basics of manufacturing devices.	
Course Details:	
Article	**Week**
Atomic Structure and types of materials.	1
Effect of gravitational, effect of electric field in the atom.	2
Energy bands in the atom.	3
Crystalline structure and bond types.	4
Fermi-dirac function and Fermi level.	5
Exam	6
Introduction to conductors.	7
Mobility and conductivity in conductors.	8
Resistivity and current density in conductors.	9
Introduction to semiconductors.	10
electron distribution in semiconductors.	11
p-type and n-type of semiconductors.	12
Mobility and conductivity in semiconductors.	13
Resistivity and current density in semiconductors.	14
Exam	15
Text Books:	
١- فيزياء الإلكترونيات، وكاع الجبوري ، ٢- الخواص الكهربائية والمغناطيسية للمواد، وكاع الجبوري	
3- Electronic Devices, Floyd, 4- Material Science, Kakani	

المرحلة الأولى

الفصل الثاني

عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المادة	
			باللغة الإنكليزية	باللغة العربية
٢	-	٢	English Language	اللغة الانكليزية
3	٣	2	Programing using C++	البرمجة بأستخدام لغة **C++**
١	-	١	Democracy	ديمقراطية
٣	-	3	Mathematics ٢	الرياضيات ٢
١	٣	-	Engineering Drawing by Computer	الرسم الهندسي بواسطة الحاسوب
4	٢	3	Electrical Circuits Analysis 2	تحليل الدوائر الكهربائية ٢
3	2	2	Digital System Design	تصميم النظم الرقمية
٣	-	3	Electronics Physics	فيزياء الإلكترونيات
٢٠	10	16	مجموع ساعات ووحدات	

English Language

Lab	Tutorial	Theory
		2

Course Objectives:

Course Objectives:
This course develops further knowledge of the grammar and of essential vocabulary in order to lead the students to an advanced level of proficiency. Emphasis is placed on developing listening, speaking, reading and writing skills through an integrated approach. It focuses on grammar and fundamental writing skills.   By the end of the course, students are expected to: 1. Understand the main ideas of a variety of written and spoken texts 2. Participate effectively in a short conversation using appropriate language 3. Produce a range of text types in the form of a logical and cohesive paragraph 4. Select appropriate vocabulary to talk about feelings, opinions and experiences. 5. Recognize, understand and use a number of phrasal verbs and collocations. 6. Use effective organizational strategies that include introductions, paragraphs, transitions, and conclusion

Course Details:

Article	Week
Grammar	1-5
Vocabulary	6-10
Everyday English	11-15

Text Books

New Headway Beginner Fourth Edition Student's Book and iTutor Pack, View larger,Part of New Headway Fourth Edition, By: Liz Soars & John Soars,ISBN:9780194771047,2013

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Programing using   C++

Lab   Tutorial   Theory

  3   2

Course Objectives:	
1.This course introduces students to C++ programming language. 2. Understanding the effort needed to successfully develop engineering-oriented software.	
Course Details:	
Article	**Week**
Introduction	1
Basic program construction: Keywords, Identifiers, comments, variables, Assignment statements, Input and output Statements.	2
Arithmetic and logical expression: Arithmetic operators, logical operators, relational operators.	1
Selection statements: if, if-else, switch..case	2
Loop statements: for, while, do...while	2
functions	2
Arrays and Vectors	2
Pointers	1
Structures and Structure type functions	2
Text Books:	
1-C++ How to Program, 8/E, Paul Deitel & Harvey Deitel, ©2012 2-The Complete Reference in C++ By Herbert Schildt, 4th edition,2003.	

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Democracy

Lab   Tutorial   Theory

1

Course Objectives:	

Course Details:	
Article	**Week**
التطور التاريخي لمفهوم الديمقراطية	1
تعريف الديمقراطية	2
اشكال الديمقراطية	3
شروط نجاح وعناصر و اركان النظام الديمقراطي	10-4
مفهوم الانتخابات و تكييفها القانوني	11
تقييم النظام الديقراطي	١٢-١٣
جماعات الضغط	15-14

Text Books:

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Computer Engineering Dept.

Mathematics 2

Lab	Tutorial	Theory
	1	3

Course Objectives:	

This subject provides students with the basic skills of Mathematics, which is the core of many mathematical disciplines such as optimization, financial mathematics, statistics, simulation, etc. This subject introduces students to the fundamental concepts and skills of Mathematics.

Course Details:	

Article	Week
Integration	1-3
Mathematics and Area.	
Formulas for Finite sums.	
Definite Integrals.	
The Fundamental Theorems of Integral Mathematics.	
Indefinite Integrals.	
- Mathematics and Area. Integration by Substitution –Running the Chain Rule Backward	
Applications of Definite Integrals	4-8
Areas between Curves- Mathematics and Area.	
Volumes of Solids of Revolution-Disks and Washers	
Cylindrical Shells-An Alternative to Washers.	
Lengths of Curves in the Plane	
Areas of Surfaces of Revolution.	
The Mathematics of Transcendental Function	9-11
Inverse Function and Their Derivatives.	
Ln x ,ex , and Logarithmic Differentiation.	

Indeterminate Forms and Hospital's Rule	
Other Exponential and Logarithmic Function.	
The Inverse Trigonometric Function.	
Derivatives of Inverse Trigonometric Functions.	
Techniques of Integration	12-13
Basic Integration Formulas.	
Integration by Parts.	
Trigonometric Integrals.	
Trigonometric Substitutions.	
Rational Functions and Partial Fractions.	
Using Integral Tables.	
Improper Integrals.	
Plane Curves and Polar Coordinates	14-15
Text Books:	

1- Mathematics by Thomas and Finny.

2- Mathematics and Analytic Geometry by Thomas and Finny

Course Objectives:	
Each students the basic commands and tools necessary for professional 2D drawing, design and drafting using AutoCAD.	
Course Details:	
Article	**Week**
Introduction to computer drawing programs with the definition of AutoCAD	1
ORTHO , Line , Point :drawing commands Zoom, Ds, Limit :Drawing command settings Ellipse ,circle ,Arc	2
Xline , Ray , Mline , Pline,polygon :Completion of drawing commands , change commands : Erase, Oops Watch orders :Zoom, Regen	3
Jump on graphic properties (snap object/)Track Polar Array , Stretch, Scale, Rotate, Move, Copy: change orders	4
,Chamfer ,Fillet ,Trim ,Extend :Completion of change orders Mirror ,Lengthen ,Offset	5
Filter point properties (Filter Point),Jump on impact points(Track),. Color, Pan, Help, Fill , Donut , Solid :other orders,Use of font types	6
Two things related to drawing points : Divide, Measure,Changing the concept of dimensions in the file : units,, Distance , ID, Area, Dblist , List, Mass (Inquiry) Question orders,properties, Properties ,Quick Select, Status	7
Style, Text, DDEdit , Spell, : Find, MText Writing and writing commands,Filling enclosed spaces in 2D Fill with standard samples :Hatch Edit, Bhatch,clamps(GRIBS)	8
Insert drawings on dimensions QDIM , Dimstyle ,Dim : Dimensioning	9
Design center, ADCenter: (Design Center)	10
MInsert ,Insert , Block :(Blocks) Integrated template work	11
Mold arts commands ١٢, XclipRefedit , Xattach , Xref :	12
Layers	13
Standard 3D holograms	14
Better visibility commands :Shademode , H	15
Text Books:	
Engineering Drawing and Graphic Technology, By : French &Vierk , 12th edition, 1978 AutoCAD, 2021	

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Electrical Circuits Analysis 2

Lab	Tutorial	Theory
2		3

The basic objective of this course is to introduce students to the fundamental theory and mathematics for the analysis of Direct Current (DC) and Alternating Current (AC) electrical circuits.

Course Details:

Article	Week
Circuit theory: source transformation, superposition, Mesh analysis, Nodal analysis, Thevenin's& Norton's theorem, maximum power transfer [ch3,5,8,9]	1-3
Steady-State Power Analysis [ch10]	4-6
Transient circuits: RL, RC & RLC [ch7]	7-9
Resonant circuits. [ch11]	10-12
Three-phase circuits. [ch11]	13-15

Text Books:

Text book: BASIC ENGINEERING CIRCUIT ANALYSIS 10th Ed by J. Irwin Co-text book: BASIC ENGINEERING CIRCUIT ANALYSIS 11th Ed by J. Irwin, and ENGINEERING CIRCUIT ANALYSIS Text book2:

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Digital System Design

Lab	Tutorial	Theory
2		2

Course Objectives:
Introduction to digital system design through modeling, synthesis, and simulation computer-aided design.

Course Details:	
Article	**Week**
Introduction to Digital Systems Design	1-2
Implementing Logic Functions using MSI and Programmable Devices	3-4
Implementing Technology Trade-offs PLDs	5-6
Design and Analysis of MSI Digital Devices	7-8
SD, ASM Chart, Transition Map, Timing Diagram	9-10
Synchronous Sequential act, Mealy and Moore, implicit table, state reduction and assignment.	11-12
Synchronous design using PLD	13
Asynchronous cct. Fundamental mode and pulse mode. Design steps	14
Hazards	15
Text Books:	
1- Digital Fundamental, 10th Edition, Thomas L. Floyd,UBS,2011.	
2- Digital Design, Moshe Mano, prentice Hall,2002	
3- Modern digital design by Richard S. Sandige (McGraw-Hill1990)	
4-Introduction to Logic Design – Alan B. Marcovitz (McGraw-Hill Higher Education 2010).	

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Electronics Physics

Lab   Tutorial   Theory

3

Course Objectives:	
Study the basics of manufacturing devices.	
Course Details:	
Article	**Week**
PN-junction diode	1
Potential barrier, drift current	2
Depletion layer and capacitor, forward and reverse bias	3
Temperature effect on diode characteristics.	4
Exam	5
Types of diodes 1	6
Types of diodes 2	7
Diodes applications 1	8
Diodes applications 2	9
Transistors	10
PNP and NPN	11
Transistor currents	12
Biasing of transistors	13
Characteristic curves	14
Exam	15
Text Books:	
١- فيزياء الإلكترونيات، وكاع الجبوري ، ٢- الخواص الكهربائية والمغناطيسية للمواد، وكاع الجبوري	
3- Electronic Devices, Floyd, 4- Material Science, Kakani	

المرحلة الثانية

الفصل الاول

عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المادة	
			باللغة الإنكليزية	باللغة العربية
3	-	3	Engineering Mathematics 1	رياضيات هندسية ١
2	-	2	Engineering Economy	الاقتصاد الهندسي
4	٣	3	Analog Electronics	الكترونيات تناظرية
3	٣	2	Microprocessors 1	معالجات دقيقة 1
2	-	2	Statistics	إحصاء
٣	٢	2	Object Oriented Programing	البرمجة بالكائنات الموجهة
3	٢	2	Programmable Logic Design using HDL	تصميم منطق قابل للبرمجة بأستخدام HDL
٢٠	١٠	١٦	مجموع ساعات ووحدات	

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Engineering Mathematics 1

Lab	Tutorial	Theory
	1	3

Course Objectives:	
i) To develop logical understanding of the subject. ii)To develop **mathematical** skill so that students are able to apply **mathematical** methods & principals in solving problem from **Engineering** fields. iii) To make aware students about the importance and symbiosis between **Mathematics** and **Engineering** Also this course gives the students the ability to solve and investigate the differential equations using different methods, all types of differential equations will covered (1st order and second order , linear and non- linear) , in doing so, the students will gain an advantage for the next courses in that some signal processing and control system problems that will be easier to solve. Also, the Laplace transform can be analyzed and more information about this transform can be gained and investigated.	
Course Details:	
Article	**Week**
Function of two or more variables	1 – 2
Limits & Continuity	
Partial derivatives (definitions, functions of more than two variables)	
Second order partial derivatives	
Chain rule for functions of two or three variables	
Maxima and minima and saddle point	
Multiple integral	3 – 7
Double integral	
Properties of double integral	
Double integral over regions	
Iterated or revised integrals-finding the limits of integration	
Average Value ,Areas, moments, and center of mass	
Double integrals in polar form	

Integrals in polar coordinates	
Limits of integration In polar form	
Changing Cartesian integrals into polar form	
Triple integrals	
Properties of triple integrals	
Fourier Analysis	8 – 11
Trigonometric form of Fourier Series	
Wave form Symmetry	
Odd and Even Functions	
Half Wave Symmetry	
Sum and Shift of function	
Line Spectrum (harmonic) the Fourier Series	
Complex Exponential form of the Fourier Series	
Fourier Transformation	
Vector analysis	12 – 15
Introduction to Vectors: definition, notation, properties	
Vector algebra: addition, subtraction, multiplications	
Vector functions: lines, planes, fields	
Vector differential Mathematics: derivative, Gradient, Laplacian, divergence, curl.	
Eigen values and Eigen vectors.	
Applications	
Text Books	
[1] E. Transcendentals, G. B. Thomas, M. D. Weir, J. Hass, and C. Heil, *Mathematics*, 13th ed. 2014. [2] E. Kreyszig, *Advance Engineering Mathematics*, 10 th. 2011. [3] Mathematics By Thomas Finny 13th Edition, Person Publisher, 2016	

[1]   E. Transcendentals, G. B. Thomas, M. D. Weir, J. Hass, and C. Heil, *Mathematics*, 13th ed. 2014.
[2]   E. Kreyszig, *Advance Engineering Mathematics*, 10 th. 2011.
[3]   Mathematics By Thomas Finny 13th Edition, Person Publisher, 2016

Course Objectives:

The lectures include introducing engineering economics, , and how to use engineering to reduce cost and achieve quality

Course Details:				
		Lab	**Tutorial**	**Theory**
Article			**2**	**Weeks**
الاقتصاد الهندسي (تعاريف ، مصطلحات ومفاهيم)				١
Engineering Economics (Definitions, Concepts)				٢
الفائدة والعلاقات الاقتصادية				٣
Interest and Economic relationships				٤
التدفق النقدي Cash flow				٥
والقيمة الزمنية لرأس المال capital time value				٦
المقارنة بين البدائل Comparison between alternatives				٧
طريقة القيمة الحالية present value Concept				٨
الكلفة السنوية المكافئة Equivalent annual cost				٩
سعر الخصم Economic Appraisal discount Rate التقييم الاقتصادي				١٠
فترة الاسترداد Payback period				١١
معدل العائد الداخلي internal rate of return				١٢
الاستبدال Replacement				١٢
الاندثار Depreciation				١٣
طريقة جمع ارقام السنوات (SOYDD)				١٣
القسط الثابت (DBD)				١٤
التضخم inflation				١٤
نقطة التعادل Breakeven Point				١٥
تحليل الحساسية sensitivity analysis				١٥
الجدوى الاقتصادية والفنية feasibility Study				١٥
Text Books				
1- Behavior in organizations, by J.Greenberg and R.Baron,prentice Hall,2000,687 pages				

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Analog Electronics

Lab	**Tutorial**	**Theory**
3		**3**

Course Objectives:	
To introduce the analysis and design of analog electronic circuits and subsystems using BJT, FET transistors, operational amplifiers	
Course Details:	
Article	**Week**
Amplifier: bipolar transistors: Biasingcct. AC cct,, frequency response	1 – 4
Field Effect Transistors : JFET, MOSFET, Biasing and AC cct.	5 – 6
Feed Back: a- Negative b- Positive	7 - 8
Operational Amplifiers	9 – 12
Power Amplifiers	13 – 14
Introduction to IC fabrication	15
Text Books	
1-Electronic devices and circuit theory' Robert L. Boylestad' Louis , Nashelsky, Prentice Hall, 1991. 2-Electronic Devices. By Floyd.2012. Prentice Hall .	

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Microprocessors 1

Lab   Tutorial   Theory

3   2

Course Objectives:	
Gives the students the ability to understand the basics of the Microprocessors, through studying the 8086 Microprocessor's architecture, instructions, writing programs in assembly, and design the basic interfacing circuits.	
Course Details:	
Article	**Week**
Introduction to Microprocessors	1
The Architecture and Buses of the 8086 Microprocessor	2
The 8086 Microprocessor's Addressing modes	3
The 8086 Microprocessor Instruction set, Debug, and MASM software	4
The Data-transfer instructions' group	5
The Logical and Shift & Rotate instructions' group	6
The Loop and Branching instructions' group	7
The Arithmetic instructions' group	8
The String instructions' group	9
The Control instructions' group	10
Evaluation Exam	11
The BIOS and DOS Interrupts	12
The BIOS and DOS Interrupts	13
Machine language coding	14
Machine language coding	15
Text Books	
1) The 8088 and 8086 Microprocessors: programming, Interfacing, software, Hardware, Applications, by: Walter Triebel and Avtar Singh, 4th edition, prentice-Hall, 2002. 2) The Intel microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit extensions: architecture, programming, and interfacing by: Barry B. Brey—8th ed.	

Course Objectives:	
This course provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science.	

Course Details:	

Article	Week
Role of statistics in science, types of statistics (Descriptive and Inferential), data presentation (Arithmetic mean, Median, Mode).	1
Descriptive statistics, histogram frequency distribution, data limits, data tabulations, polygon, ogive.	2
Basic Concepts of Probability Theory (random events and sample space), relationship between statistics and probability.	3
Sets and probabilistic models, axioms of probability, rule of Probability	4
The definition of conditional probability and their properties	5
Multiplication rule, total probability theorem, Bayes' theorem.	6
Three events, mutually and non-mutually events	7
Counting, permutation, combination	8
The definition and classification of random variable (Discrete and Continuous), type of discrete distribution.	9
Discrete probability distributions, Binomial and Poisson Distribution.	10
Continuous distribution , normal distribution	11
Test of hypothesis, types of errors in hypothesis testing, hypothesis tests of means.	12
Test of the mean with unknown population variance, hypothesis test of two means with known population variance.	13
The principles design of experiments, one way and two way ANOVA (ANOVA: the Analysis of Variance).	14

Text Books
1- Introduction to Probability and Statistics for Engineers, Holický, Milan. 2- Introduction to Statistics, K. M. AL_Rawi, Second Edition, 2000. 3- Statistics and Probability for Engineering Applications With Microsoft« Excel, W.J. De Coursey. 4- Probability and Statistics for Engineering and the Sciences, Jay Devore. 5- Fundamentals of Probability and Statistics for Engineers, T.T. Soong 6-Numerical Methods for Engineers: With Software and Programming Applications, Steven C. Chapra and Raymond P. Canale,

Course Objectives:	
This course introduces the fundamentals of object-oriented programming.Understanding the effort needed to successfully develop engineering-oriented software.	
Course Details:	
Article	Weeks
Introduction	1
Object oriented programming characteristics	2
Object and Classes	2
Arrays and string fundamentals and Arrays as class Member Data	1
Operator overloading	1
Inheritance	2
Virtual Function	2
Streams and Files	2
Templates and Exceptions	1
The standard template library	1
Text Books	
1-C++ How to Program, 8/E, Paul Deitel & Harvey Deitel, ©2012 2- Object Oriented Programming in C++ by Robert Lafore, Techmedia Publication.2002.	

University of Mosul
College of Engineering
Computer Engineering Dept.

Programmable Logic Design using HDL

Lab	Tutorial	Theory
2		2

Course Objectives:
To instruct the student in the use of VHDL (very high speed Circuit hardware description language) for designing the behavior of digit systems

Course Details:

Article	Week
Basic principles of digital Systems, PAL., PLD review	1
FPGA structure	2-3
VHDL Language	4-5
Circuit Design in VHDL	6-7
code structure of VHDL	8
Data type of VHDL	9
Operator and attributes of VHDL	10
Concurrent statement of VHDL	11
Sequential statement of VHDL	12
State machine of VHDL	13-14
System design of VHDL	15

Text Books-29

1- Voinci A. pedroni, "Circuit design with VHDLL", MIT press, Cambridge, London 2004.
2- Thom A.S. "digital with CPLA application and VHDL.
3- Brain Hold : "digital logic Design", 4th Edition, Newmans, 2002

المرحلة الثانية

الفصل الثاني

عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المادة	
			باللغة الإنكليزية	باللغة العربية
٢	-	٢	English Language-Pre-intermediate	اللغة الانكليزية ما قبل المتوسط
3	-	3	Engineering Mathematics 2	رياضيات هندسية 2
2	-	2	Engineering Management	ادارة هندسية
4	٣	3	Digital Electronics	الكترونيات رقمية
3	٣	2	Microprocessors 2	معالجات دقيقة ٢
2	-	2	Numerical Analysis	تحليلات عددية
3	2	2	Data Structures	هياكل البيانات
١٩	٨	١٦	مجموع ساعات ووحدات	

Course Objectives:
English Language will be covered during this course. It focuses on developing communication between teacher and students to give them more opportunities to show their own thoughts and opinion. The course includes activities and exercises that guide students to support their skills in conversation. Students also learn how to manage correct language by using correct grammar. The efforts will be directed towards teaching students how to think beyond common classroom tasks and awaken their desire to excel in English. Four skills will be focused on: reading, writing, listening and speaking.

Course Details:	
Article	**Week**
Tenses: present and past. Future form. Questions+Form/ exercises	1
Present simple: form+use. Present continuous:form+use Have/have got exercises	2
Past simple: form+use. Past continuous:form+use exercises	3
Expressions of quantity: much/many, some/any, a lot/lots of exercises	4
Verb patterns: like doing and would like to do, will/going to exercises	5
What….like? comparative and superlative exercises	6
Present perfect: form/use, present perfect and past simple exercises	7
Have to: introduction to modal auxiliary verbs exercises	8
Time tenses, first condition exercises	10-9
Verb patterns: used to, form/use, with past tense exercises	12-11
The passive + Second conditional exercise	15-13

Text Books
Text Book: Pre-Intermediate Student's Book - New Headway Plus by John and Liz Soars

Course Objectives:	
i) To develop logical understanding of the subject. ii)To develop **mathematical** skill so that students are able to apply **mathematical** methods & principals in solving problem from **Engineering** fields. iii) To make aware students about the importance and symbiosis between **Mathematics** and **Engineering**	
Course Details:	
Article	**Week**
Definition and Classification of differential equation DE (ordinary and partial, order, degree, Linear and non-linear).	2-1
Solutions of differential equations (general and particular solutions)	4-3
1st order ordinary DEs (Linear ,separable homogeneous, exact , non homogeneous)	6-5
2nd order ordinary DEs(Linear 2nd order DEs with constant coefficients, Undetermined coefficients method, Variable of parameter method, 2nd order DEs with variable coefficients)	8-7
Application of second order ordinary differential equations	10-9
Laplace transform properties and application, Laplace Inverse Transform, Laplace transform of unit step function.	12-11
Laplace Inverse Transform, Laplace transform of unit step function.	13
1st Shifting theorem (Translation in S- domain) 2nd Shifting theorem (Translation in Time) Convolution Theorem	14
Solution of Differential Equations by Laplace Transformation	15
Text Books	

[1]   E. Transcendentals, G. B. Thomas, M. D. Weir, J. Hass, and C. Heil, *Mathematics*, 13th ed. 2014.
[2]   E. Kreyszig, *Advance Engineering Mathematics*, 10 th. 2011.
[3]   Mathematics By Thomas Finny 13th Edition, Person Publisher, 2016

Course Objectives:
Engineering management is a scientific system that works on the application of administrative principles in engineering activities, whether in the context of planning, coordination or control, where engineering management is one of the most important forms of modern management that has emerged recently to try to improve the administrative and scientific skills of workers in the field of engineering, and try to improve Performance levels and continuous development in line with the major developments in the administrative field in general and the engineering administrative field in particular. Where the study of engineering management as a science leads to the selection of highly skilled and distinguished individuals in the field   of practical and professional performance of workers in the engineering field to link administrative sciences with engineering sciences.

Course Details:

Article	Weeks
Administration and organization (definitions and terms, organization and organizational structures, committees, correspondences and technical reports)	١
Methods and stages of decision-making	2
Engineering Project Management (Definitions, Project Phases)	3
Project Time Planning (Critical Path Method CPM)	4
- bar charts	5
- sagittal charts	6
- Precedence charts	7
Types of project control (time, costs, quality)	8
Methods for choosing a project site and managing the work site	9
Contracting, its types and project assignment methods	١0
Table of Quantities and Specifications	١1
Quality management and quality control	١٣-١٢
Maintenance Management	١٥-١٤

Text Books
1- Behavior in organizations, by J.Greenberg and R.Baron,prentice Hall,2000,687 pages 2- An introduction to Management Science, Anderson at al , south western ,2000,848 pages

Course Objectives:	
Gives the students the ability to understand the supporting chips for the 8086 Microprocessor and learn the internal structure, programming, and interfacing.	
Course Details:	

Article	Week
The 8086 Microprocessor's address decoding and memory interface	1
The Basic Input / Output Interfaces to the 8086 Microprocessor	2
The 8X86 Registers (16, 32, and 64-bits)	3-4
Introduction to Protected Mode	5-6
Arithmetic Co-processor	7
Data Formats	8
80x87 Architecture	9-10
Instruction Set	11-12
MMX Technologies	13
Introduction to 8X86 Microprocessors' archetecture	14-15

Text Books	
1) The 8088 and 8086 Microprocessors: programming, Interfacing, software, Hardware, Applications, by: Walter Triebel and Avtar Singh, 4th edition, prentice-Hall, 2002. 2) The Intel microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit extensions: ...amming, and Interfacing by: Barry B. Brey—8th ed.	

Course Objectives:	

To introduce the fundamentals of numerical methods used for the solution of engineering problems and to improve the computer skills of the students	
Course Details:	
Article	**Week**
Concepts and role for the numerical method in engineering, approximations, and errors, the definition of Round-off error and truncation error, absolute and relative true/approximation error.	1
Numerical Solution of Nonlinear Algebraic Equations (Roots of Equations): Bracketing Methods (Graphical, Bisection, and False-Position method).	2
Open Methods (Simple fixed-point iteration and Newton-Raphson and secand methods).	3
Numerical Solution of linear algebraic equations (system): the difference between the direct and indirect methods, Singular and ill/well-conditioned system, Partial and complete Pivoting, Convergence Criteria, Jacobi iterative method.	4
The gauss-Seidel iterative method, Gauss-Seidel iterative with the relaxation factor method. Tri-diagonal systems and its solution.	5
Curve Fitting: Classification of Curve Fitting (Regression and Interpolation), the concepts of regression, and Least Square Criterion, Linear Regression.	6
Nonlinear Regression, popular nonlinear regression models (Exponential, Power, Growth, and Polynomial model), the Linearization of the first three nonlinear models.	7
Polynomial Regression, the concepts of Interpolation, Lagrangian Interpolation Method (linear, and quadratic).	8
The cubic version of Lagrangian Interpolation, cubic spline Interpolation (Cheney and Kincaid Formula). Tri-diagonal systems and its solution.	9
Numerical Integration: Trapezoidal Rule (equal and non-equal segment width), Simpson's 1/3 Rule (equal and non-equal segment width).	10
Numerical Differentiation: Tayler series and truncation error, The approximation of the first derivative (FDA, BDA, and CDA), The approximation of the second derivative (FDA, BDA, and CDA).	11
Numerical Solutions of Ordinary Differential Equation(ODE): mathematically background, Classification of Differential Equations (Initial Value Problem "IVP" and Boundary Value Problem "BVP"), The numerical methods for solving the IVP (Euler's, Heun's, and Midpoint methods).	12
Fourth-order Runge-Kutta method for solving the IVP, Numerical solution for Systems of ODEs with the two methods above.	13-14
The numerical methods for solving the BVP: The shooting method adaptation together with the two above methods used to solve the IVP, introduction anaother to another methods (finite difference, finite volume, finite element method).	15
Text Books	
1-Numerical Methods for Engineers: With Software and Programming Applications, Steven C. Chapra and Raymond P. Canale, Fourth Edition. 2003.	
Numerical Analysis Using Matlab and Excel, Steven T. Karris, Third Edition, 2007.	
Numerical Methods in Engineering with Matlab, Jaan Kiusalaas, 2005.	

University of Mosul

College of Engineering

Computer Engineering Dept.

Data Structures

Lab   Tutorial   Theory

Course Objectives:	
Review algorithms for solving problems that use data structures such as arrays linked lists, stacks, queues, graphs and trees, and those that are used for list manipulation, graph manipulation (e.g., depth-first search), and tree traversals. Moreover, implementing algorithms in C++ using good programming style for data structures	
Course Details:	
Article	**Week**
Introduction and review	1
Information hiding, Encapsulation, Design and implementation of list ADTS using arrays and linked lists	2
Recursion in Programming and Problem Solving Recursive valued functions: Factorial, Classical problems: Ackermann's function, 8-Queens problem, Towers of Hanoi, detecting palindromes Relation to mathematical induction	3 – 4
Stacks: Stack ADT, implementation using arrays, linked lists, and list ADTS, Applications: Checking balanced braces, recognizing strings, depth-first searches on graphs	5 – 6
Queues: Queue ADT, implementation using arrays, linked lists, and list ADTS, Applications: breadth-first searches, recognizing palindromes.	7 – 8
Trees : Introduction, Terminology, Traversals, Applications: Binary Trees, Tree ,Huffman's algorithm	9 - 10
Introduction to Graph theory	11
Hashing Techniques	12
Speed memory Trade off	13
Text Books-29	
1- M.A. Weiss, Data structure and algorithm analysis in C++ Addison Wesley, 2006. 2- Michael T. Goodrich, Roberto Tamassia, David M. Mount , Data structure and algorithm in C++,2011	

المرحلة الثالثة

الفصل الاول

عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المادة	
			باللغة الإنكليزية	باللغة العربية
2	-	2	English Language – Intermediate	اللغة الانكليزية – المتوسط
4	3	3	Data Communications and Networks 1	اتصالات البيانات و الشبكات 1
3	-	3	Signals and Systems	اشارات و انظمة
٣	-	3	Computer Architecture 1	معمارية الحاسوب ١
3	٣	2	Computer Interface	موائمة الحاسوب
3	٣	2	Operating Systems 1	انظمة تشغيل ١
2	-	2	Artificial Intelligence Principles	أساسيات الذكاء الصناعي
20	9	17	مجموع ساعات ووحدات	

Course Objectives:
This course develops further knowledge of the grammar and of essential vocabulary in order to lead the students to an advanced level of proficiency. Emphasis is placed on developing listening, speaking, reading and writing skills through an integrated approach. It focuses on grammar and fundamental writing skills.   By the end of the course, students are expected to: 1. Understand the main ideas of a variety of written and spoken texts 2. Participate effectively in a short conversation using appropriate language 3. Produce a range of text types in the form of a logical and cohesive paragraph 4. Select appropriate vocabulary to talk about feelings, opinions and experiences. 5. Recognize, understand and use a number of phrasal verbs and collocations. 6. Use effective organizational strategies that include introductions, paragraphs, transitions, and conclusion

Course Details:

Article	Week
Grammar	1 - 5
Vocabulary	6 - 10
Everyday English	11 - 15

Text Books
  New Headway Beginner Fourth Edition Student's Book and iTutor Pack, View larger,Part of New Headway Fourth Edition, By: Liz Soars & John Soars,ISBN:9780194771047,2013

University of Mosul			**Data**
College of Engineering			**Communications and Networking 1**
Computer Engineering Dept.			

Lab	Tutorial	Theory
3		3

Course Objectives:

This is an under graduate level course on data communication. The course involves both a reading/lecture/discussion and a term project. We will read and discuss topics on various aspects of data communication: Data & Signals, Digital & Analog transmission, Transmission Media, Switching, Error Detection and Correction and Data Link Control.

Course Details:

Article	Week
1. Introduction to Data Communications and Underlying Technologies	1
2. The OSI Model and the TCP/IP Protocol Suite	1
3. Data and Signal communication Transmission	1
4. Network Devices and communication Transmission Media	1
5. Analog and Digital communication Transmission	2
6. Bandwidth Utilization, Analog and Digital Modulation, Multiplexing, Spreading	2
7. Switching (Circuit-Switched and Packet networks)	1
8. Error Detection and Correction	2
9. Multiple Access Links and Protocols	2
10. Data-Link Control Protocols (Point-to-Point Protocol, HDLC)	2

1. Tanenbaum A.S. , "Computer Network",5th, Edition, Prentice-Hall Publishing,2014
2. Stallings W. , "Data & Computer Communications", 8th Edition , Prentice-Hall Publishing,2012 .
3. Forouzan B.,"Data, Communications and Networking", '5th Edition McGraw-Hill Publishing,2013

Course Objectives:	
This course provides the basic knowledge necessary to understand the signal. It presents how can convert the continues signal by studying the steps that used to transform into digital signal . then this course content all basic principle about digital signals and system.	
Course Details:	
Article	**Week**
Review of Continuous- Time Signals and system	1
Sampling theory and its basic principle	1
Elementary Discrete Time Signals	1
Classification of Discrete Time Signals	1
Input –output Description system	1
Classification of Discrete Time System	1
Differences Equation (D.E)	1
Time –Domain Representation	1
Interconnection of Discrete Time system	1
Impulse Response h(n)	1
Convolutional methods	2
De convolutional Methods	2
Frequency Domain Representation and Frequency response	1
Text Books:	
1. Fundamental of Digital Signal Processing By L.C. Ludeman 2. Digital Signal Processing With Computer Application By P.A. Lynn	

University of Mosul
College of Engineering
Computer Engineering Department

Computer Architecture 1

Lab   Tutorial   Theory

٣

Course Objectives:	
This course provides the basic knowledge necessary to understand the hardware operation of digital computer. It presents the various digital components used in the organization and design of digital computer and it shows the necessary steps that designer must go through in order to design an elementary basic computer.	
Course Details:	
Article	**Week**
Digital logic circuits and digital components review	1
Data representation: Signed number representation	1
Data representation: Fixed and floating point representation	1
Registers, bus and memory transfer	1
Arithmetic micro-operations	1
Logic and shift micro-operations	1
Application of logic micro-operations	1
Basic Computer hardware design: Instruction codes and registers	1
Basic Computer hardware design: Computer instructions	1
Basic Computer hardware design: Timing, control and instruction cycle	1
Basic Computer hardware design: Memory reference instructions	1
Basic Computer hardware design: Register reference instructions	1
Basic Computer hardware design: Input-output and interrupt instructions	1
Basic Computer hardware design: Complete design	1
Programming of Basic Computer	1
Text Books	

1. M. Morris Mano "Computer System Architecture"
2. V.P Heuring and H.F Jordan "Computer System and Architecture"

University of Mosul
College of Engineering
Computer Engineering Dept.

Computer Interface

Lab	Tutorial	Theory
٣	-	٢

Course Objectives:
Learn both hardware and software aspect of I/O interfaces into microprocessor-based systems: and gain hands- on experience with, common microprocessor peripherals such as PPL. URATs. Timers. ADC and DAC, DMA, PIC. Understanding the main I/O chips in terms of (internal architecture, I/O programming and applications.

Course Details:	
Article	**Week**
1. Basic I/O Interfacing	1
2. Programming 8255, Modes of operation(0,1,2)	1
3. Interface example –keyboard matrix, 7-segment Display, Printer	1
4. 8253, 8254 Timer Interfacing	2
5. ADC and DAC chips and their interfacing	1
6. Direct Memory Access	1
7. Serial I/O Interface	1
8. USART 8251,UART 16650	1
9. Serial I/O devices-mouse, modem	1
10.Interrupts programming 8259	2
11.8279 programmable keyboard/Display controller	1
12.PC bus standards & interface	2
Text Books:	

University of Mosul
College of Engineering
Computer Engineering Dept.

Operating Systems

Lab ٣

Theory 2

Course Objectives:
The course provides an introduction to the design and implementation of operating systems. The students will be introduced to different operating systems and their structures to moreover to cover process management (processes, threads, CPU scheduling, synchronization, and deadlock).

Course Details:	
Article	**Week**
1. Introduction to Operating Systems.	1
2. Operating-System Structures	2
3. Processes	2
4. Threads	1
5. Synchronization Tools	2
6. Synchronization Examples	2
7. CPU Scheduling	3
8. Deadlocks	2
Text Books	
1. Operating Systems Concepts, 10th Edition Silberschatz, Abraham, Galvin, Peter B., and Gagne, Greg	

JohnWiley&Sons.,Inc. ISBN: 9781119320913.

2. An Introduction to GCC: For the GNU Compilers GCC and G++, Brian J. Gough, Richard M. Stallman, Network Theory Ltd, ISBN : 978-0954161798

Course Objectives:
This course let the students to be familiar with some of the new algorithms and methods in soft computing. The algorithms are based on the natural behavior of the different organisms. Also, to give the ability to apply these methods in designing and understanding real-world systems

Course Details:

Article	Week
Introduction to artificial intelligence/soft computing	1
Supervised and un Supervised methods	2
Classification algorithms	2
Neural networks	2
Fuzzy logic	1
Introduction to evolutionary algorithms	1
Genetic algorithm	1
Optimization algorithms	1
Regression	1
Clustering algorithms	1
Dimensionality reduction	1
Reinforcement Learning	1

Text Books:

1. **Principles of Soft Computing** by S.N. Sivanandam
2. **Soft Computing and its Applications** by Kumar S. Ray
3. **Soft Computing** by D. K. Pratihar
4. **Pattern Recognition And Machine Learning** by Christopher M. Bishop
5. **Soft Computing and its Applications** by Kumar S. Ray

المرحلة الثالثة

الفصل الثاني

عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المادة	
			باللغة الإنكليزية	باللغة العربية
4	٣	3	Data Communications and Networks 2	اتصالات البيانات و الشبكات ٢
3	-	3	Digital Signal Processing	معالجة الاشارة الرقمية
٣	-	3	Computer Architecture 2	معمارية الحاسوب ٢
3	٣	2	Embedded Systems	الانظمة المضمنة
3	٣	2	Operating Systems 2	انظمة تشغيل ٢
٢	-	٢	Image Processing	معالجة الصور
٢	-	٢	Database System	قواعد البيانات
20	**٩**	**17**	**مجموع ساعات ووحدات**	

University of Mosul
College of Engineering
Computer Engineering Dept.

Data
Communications and Networks 2

Lab	Tutorial	Theory
٣		3

Course Objectives:
This is an under graduate level course on computer networking. The course involves both a reading/lecture/discussion and a term project. We will read and discuss topics on various aspects of computer networking: Internet design principles, LAN/MAN/WAN, congestion/flow control, network topology, routing, TCP/IP, Performance analysis and Network applications.

Course Details:

Article	Week
1- Wired LANs: all Ethernet Networks Types	1
2- Connecting LANs, Backbone Networks, and Virtual LANs	1
3- Wireless LAN & Bluetooth	1
4- Network Layer and IPv4 and IPv6 Addresses & Headers	2
5- Network Layer Protocols: Address Mapping, Error Reporting. and Multicasting	2
6- Network Layer: Unicast & Multicast Routing protocols	2
7- Transport Layer Protocols: User Datagram Protocol (UDP) and Transmission Control Protocol (TCP)	2
8- Congestion Control and Quality of Service	1
9- Application Layer Standard Client-Server Protocols (DHCP, DNS,FTP,TFTP,HTTP,TELNET, SMTP, POP, IMAP, SNMP)	2
10- Network security fundamentals	1
1. Tanenbaum A.S. , "Computer Network",5th, Edition, Prentice-Hall Publishing,2014 2. Stallings W. , "Data & Computer Communications", 8th Edition , Prentice-Hall Publishing,2012 .	

3. Forouzan B.,"Data, Communications and Networking", '5th Edition McGraw-Hill Publishing,2013

University of Mosul
College of Engineering
Computer Engineering Dept.

Digital Signal Processing

Lab   Tutorial   Theory

3

Course Objectives:	
This course provides the basic knowledge necessary to understand the digital filters. then this course content all basic principle about digital signals and system, types of filter and how design filter	
Course Details:	
Article	**Week**
The introduction of Z -transform	1
The relationship between Z transform and Laplace transform	1
The ROC (Reign of Convergence) and Transfer function	1
Review of digital filter design	1
Explain the principle of design filter	1
Types of filters	1
Filter design prosedure	1
Types of realization system (digital system)	1
The IIR filter design	1
Numerical Methods. - Biliner Transformation Method . - Impulse-Invariant Method	1
Butterworth Filter	2
Chebychev filter	2
The FIR filter design	1
Text Books:	
1. Fundamental of Digital Signal Processing By L.C. Ludeman 2. Digital Signal Processing With Computer Application By P.A. Lynn	

University of Mosul
College of Engineering
Computer Engineering Department

Computer Architecture 2

Lab	Tutorial	Theory
		٣

Course Objectives:		
This course provides the basic knowledge necessary to understand the principle of microprogrammed control. Also, highlights on the central processing unit and the RISC & CISC Characteristics. Finally, gives the understanding of pipeline concepts and design.		

Course Details:

S	Article	Week
Microprogrammed Control: Introduction		1
Microprogrammed Control: Mapping and sequencer		1
Microprogrammed Control: Micro-instructions		1
Microprogrammed Control: Micro-instructions programming		1
Microprogrammed Control: Design of decoding ALU control information		1
Microprogrammed Control: Design of microprogram sequencer		1
Microprogrammed Control: Condition and branching implementation		1
Central Processing Unit: General registers organization		1
Central Processing Unit: Stack organization		1
Central Processing Unit: Instruction format and addressing mode		1
Central Processing Unit: Flags (processor status word)		1
RISC & CISC characteristics		1
Pipelining concepts and design		1
Pipelining concepts and design		1
Pipelined processor		1

University of Mosul
College of Engineering
Computer Engineering Dept.

Embedded Systems

Lab	Tutorial	Theory
٣	-	٢

Course Objectives:

Introduce the fundamentals of embedded system design and implementation, including specifications and modeling of embedded systems, hardware/software partition and co-design: validation and implementation, peripherals and interfacing :memory : development methodologies and tools.

Course Details:

Article	Week
1. Micro-controller Micro-controller vs. Microprocessor, families	1
2. Micro-controller Architecture	1
3. Addressing modes, instruction set	1
4. Micro-controller timer/Counter modes	1
5. Micro-controller Serial Communication modes of operation	1
6. Micro-controller Interrupts	1
7. Networking protocol, Advanced Buses	1
8. power management	1
9. features and applications	1
10.AVR,ARM, Arduino	2
11.Co-Design	2
12.USB, embedded multiprocessors	2

Text Books:

1-   The ATmega640/1280/2560/V Microcontroller Data sheet.
2-   Embedded system Design: Embedded systems Foundations of Cyber-Physical Systems, Peter Marwedel, Spriner Nov. 16, 2010.

Course Objectives:
The operating system provides an established, convenient, and efficient interface between user programs and the bare hardware of the computer on which they run. In this course we will explore the core principles of operating systems design and implementation, including file systems and storage; memory management techniques; virtualization and distributed systems.

Course Details:

Article	Week
1. Overview of Process Management	1
2. Main Memory	2
3. Virtual Memory	2
4. Mass-Storage Structure	1
5. I/O Systems	2
6. File-System Interface	1
7. File-System Implementation	2
8. File-System Internals	1
9. Virtual Machines	1
10. Distributed Systems	2

Text Books

1. Systems Concepts, 10th Edition Silberschatz, Abraham, Galvin, Peter B., and Gagne, Greg JohnWiley&Sons.,Inc. ISBN: 9781119320913.
2. An Introduction to GCC: For the GNU Compilers GCC and G++, Brian J. Gough, Richard M. Stallman, Network Theory Ltd, ISBN : 978-0954161798

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College of Engineering
Computer Engineering Dept.

Image processing

Lab   Tutorial   Theory

Course Objectives:	
Cover the basic theory and algorithms that are widely used in digital image processing. Expose students to current technologies and issues that are specific to image processing systems.	
Course Details:	
Article	**Week**
Introduction & Fundamentals of Image	1
Introduction to image analysis, preprocessing, ROI, Image Algebra.	1
Spatial Filters, Image quantization methods.	2
Edge detection	2
Operators, Masks.	1
Noise in images	1
Noise removal	1
System model.	1
Image restoration	1
Image Compression	1
Discrete Transform, FFT, Cosine transforms	1
Wavelet Transform and examples	1
JPEG @ JPEG 2000	1
Text Books	
1- Rafael C.Gonzalez and Richard E.Woods,"Digital Image Processing, 3nd edition", Prentice Hall, 2008. 2-Linda Shapiro, "Computer Vision", The University of Washington, 2000: **3-** Digital Image Processing and Analysis,2018 by Taylor &	

University of Mosul
College of Engineering
Computer Engineering Dept.

Database System
Lab   **Theory**
                 2

Course Objectives:	
Introducing the theory of the relational model and relational, and its languages. Writing data manipulation and data definition commands in SQL. Specifying the functional and data requirements for typical database applications. Producing detailed data models and their associated logical schemas. Designing the structure and functionality of a form-based user interface for a database application	
Course Details:	
Article	**Week**
1.Introduction:Database Environment, Database Development	2
2. Modeling Data in the Organization	1
3. Logical Database Design and the Relational model, Physical Database Design and performance	1
4. SQL: Advanced SQL ,Getting Started with SQL in access,Beginning SQL Commands in access	2
5. Client/Server Database Environment: internet Database Environment, Data Warehousing, Creating and Populating	2
6. SQL Joins SOL Functions	1
7. SQL Query Development and Derived structures, SQL set Operations	2
8. Data and Database Administration , Distributed Database	2
9. Object-Oriented Data Modeling Object-Oriented Database Development	2
Text Books	
1- Hoffer, Prescott& McFadden, (2005). " Modern Database Management" , (7th ed.) Prentice- Hall, Inc. ISBN: 0-13-145320-3. 2- Bagui, S. & Earp, R(2004). "learning SQL A Step-Step Guide using Access" Addison-Wesley Publishing. ISBN: 0-32-111904-5	

المرحلة الرابعة

University of Mosul
College of Engineering
Computer Engineering Dept.

English Language –
Upper-Intermediate Level
Lab	Tutorial	Theory
0	**0**	**2**

الفصل الاول

عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المادة	
			باللغة الإنكليزية	**باللغة العربية**
2	-	٢	Graduation Project 1	مشروع تخرج ١
2	-	2	English Language – Upper Intermediate	اللغة الانكليزية – فوق المتوسط
4	٣	3	Fundamentals of Control Systems	أساسيات منظومات السيطرة
3	٣	2	Real Time Systems	انظمة الزمن الحقيقي
2	-	2	Software Engineering	هندسة البرمجيات
٣	٣	2	Wireless Networks	الشبكات اللاسلكية
2	-	2	Architecture of parallel processing	معمارية المعالجة المتوازية
18	٩	15	**مجموع ساعات ووحدات**	

University of Mosul	Fundamentals of Control Systems		
College of Engineering			
Computer Engineering Dept.	**Lab**	**Tutorial**	**Theory**

This is an under graduate level course on English L[...] upper-intermediate level. The course involves practicing the four language skills (reading, writing, listening, and speaking) as well as oral and written exams. We will read and discuss topics on various aspects of English Language such as: casual conversations, present simple, perfect, and continuous, narrative tense, being polite, future forms, expressions of quantity, exaggerations and understatement, relative clauses, make your point.

	Lab	Tutorial	Theory
		3	3

Course Details:

Course Objectives:

The course explains all principles and fundamentals of control system.

Unit 1: Home and away!	1
Unit 2: Been there, got the T-shirt	1
Unit 3: News and views	1
Unit 4: The naked truth	2
Unit 5: Looking ahead	2
Unit 6: Hitting the big time	2
Unit 7: Getting along	2
Unit 8: How remarkable!	2
Unit 9: The way we were	2

References

Oxford University Press. (2014). *New headway: upper-intermediate fourth edition*.

Course Details:

Article	Week
Differential equations of physical systems open & closed loop systems, transfer function of linear systems block diagram models.	1
Signal flow graph Models, State variables of dynamic systems. State equation.	1
Solution of state equation State diagram. Controllability & Observability	1
Analysis of state variable models Design with state feed back	1
Time response of 2nd order systems	2
Dynamic performance of 2nd order systems	1
The concept of stability Routh-Hurwritz criterion Relative stability	1
Root locus	2
Frequency response , Bode diagram , Nyquist criterion	2
PID controller design	1
Digital control system, Stability analysis in the Z-plane.Jury's test.	2

Text books

1- Royce D. Hrbor "Feedback control system"

2- Benjamin C. Kuo "Automatic Control System"

University of Mosul
College of Engineering
Computer Engineering Dept.

Real Time Systems

Lab	Tutorial	Theory
3		2

Course Objectives:
The course teaches all principles and fundamentals of real time system and gives all hardware and software components of any real time system.

Course Details:	
Article	**week**
Classifying real time system, HW & SW	1
Sensors: Characteristics & types	2
Signal conditioning	1
Data buses (GPIB & RS232)	1
Types of storage devices, non-volatile memories & interconnection between them	1
Single chip computer, board comp., multitasking	1
Real time software-control & software application	1
Processes interconnections & synchronization	2
Real time scheduler, deadlocks	1
Disk scheduler, multitasking O/S	1
Real time data base	1
R/T execution (HW & SW : linker, loader, assembler, translator, editors)	1
Real time languages	1
Text Books	
1- Real Time Microcomputer System Design (peter D. Lawrence) McGraw-Hill Education (ISE Editions).) 2- Measurement and Instrumentation Systems (W. Bolton) (Butterworth-Heinemann). 3- Measurement and Instrumentation Principles (Alan S. Morris) (British Library Cataloguing in Publication Data). 4- A practical introduction to real-time systems for undergraduate engineering (Douglas Wilhelm Harder, Jeff Zarnett, Vajih Montaghami and Allyson Giannikouris) (University of Waterloo Cinda)	

Course Objectives:	
The course deals with principles and fundamentals of Software Engineering .	
Course Details:	
Article	**Week**
Week 1: Introduction software engineering	**1**
Week 2: Software Process & Problem	**1**
Week 3: Software life-cycle Models	**1**
Week 4: Steps Wise Refinement- CASE	**1**
Week 5: Testing Principles	**1**
Week 6: Software cost Estimation	**1**
Week 7: Requirement Phase	**1**
Week 8: Planning Phase	**1**
Week 9: Design Phase	**1**
Week 10: Implementation & Integration Phase	**1**
Week 11: Maintenance Phase	**1**
Week 12: Project	**1**
Week 13: Project	**1**
Week 14: Project	**1**
Week 15: Introduction to Java Programming Language	**1**
Text Books	
1- Software Engineering with JAVA by Stephen R. Schach 2- Software Engineering Rosev. S. Pressman	

University of Mosul	**Lab**	**Tutorial**	**Theory**
College of Engineering Computer	**3**		**2**
Engineering Dept			

Course Objectives:
This is an under graduate level course on Wireless networking. The course involves both a reading/lecture/discussion   and a term project. We will read and discuss topics on various aspects of Wireless networking: EM waves principles, PAN/WAN/BAN, WMN, WSN, congestion/flow control, routing, TCP/IP, Performance analysis and Network applications.

Course Details:

Article	Week
Introduction to Electromagnetic waves,	1
Antenna and propagation	1
Wireless LANs (IEEE 802.llx)	2
Personal Area Network (IEEE 802.15x)	1
Broadband Area Network (BAN) (IEEE 802.16x)	1
Wireless WANs: Satellite Networks	1
Cellular Systems	2
Wireless mesh networking (WMN)	1
Wireless sensor Network & Internet of Things	2
Modern Wireless Technologies: UWB, Millimeters waves, Under water communication	1
Wireless networks architecture & applications	2

Text Books

Tanenbaum A.S. , "Computer Network",5th, Edition, Prentice-Hall Publishing,2014 Stallings W. , "Data & Computer Communications", 8th Edition , Prentice-Hall Publishing,2012 .

Forouzan B.,"Data, Communications and Networking", '5th Edition McGraw-HillPublishing,2013

Course Objectives:

provides the necessary knowledge to design a new computer system; to improve an existing one; to develop fast parallel computing algorithms and systems

Course Details:

Advanced computer architecture is centered around the concept of parallel processing. The development and application of these computer systems require a broad knowledge of the underlying hardware and software structures and close interactions between parallel computing algorithms and the optimal allocation of the machine recourses. This theory part of our course provides us with the necessary knowledge to design a new parallel computer system; to improve an existing one; to develop
fast computing algorithms.

Article	Week
1. Computer Speed	1
2. The Architecture of Standard Computers	1
3. Flynn Classification	1
4. The Performance, Cost and Amdahl's Law	1
5.Cache Memory	2
6. Memory Interleaving	1
7. Parallel Arithmetic (Carry Save Adder , Carry Save Multiplier)	2
8. SIMD Architecture (Vector Processor)	2
9. Digital Signal Processor	1
10. Array Processor (DFT and FFT processor)	2
11. Systolic Array Processor (1D)	1

1. K. Hwang and F.A. Briggs" computer Architecture and parallel processing"
2. Peter Pirch "Architectures for DSP"

المرحلة الرابعة

الفصل الثاني

عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المادة	
			باللغة الإنكليزية	باللغة العربية
2	-	٢	Graduation Project 2	مشروع تخرج ٢
2	-	2	Computer Graphics	الرسم بالحاسوب
٢	-	2	Cyber Security	الامن السيبراني
٣	٣	٢	Fundamentals of Mobile Systems	اساسيات الانظمة المتنقلة
٢	-	2	Elective course	مادة اختيارية
2	-	2	Biometrics Engineering	هندسة مقاييس حيوية
2	-	2	Professional Ethics	اخلاقيات مهنة
١٥	٣	١٤	مجموع ساعات ووحدات	

Course Objectives:
The description of this course provides an introduction to OpenGL graphical programming and various computer graphics algorithms in the two-dimensional space such as scanning transformation, pruning, geometric transformations with the most important characteristics and basics of the image, the human vision system, methods of representation and processing of digital images (image reduction and enlargement, damaged image recovery, noise removal, and methods for image compression by lossy and others), in addition to modern methods of pressing. This qualifies the student to deal with computer graphics and images and their processing required in computer uses and research related to this and in the labor market.

Course Details:

Article	We
Introduction to computer graphics	1,2
DDA Algorithm	3,4
Bresenham Algorithm	5,6
Scan conversion Algorithm	7,8
Clipping Algorithm	9,10
Transformations	11
Introduction to OpenGL	12
OpenGL programming	13
OpenGL examples	14
OpenGL applications	15
Text Books	

3- Computer Vision and Image Processing, By: Scott E. Umbaugh.
4- Introduction to Computer Graphics, By: F. M. Sprout.
5- Open G. L .- Silicon Graphics.

University of Mosul
College of Engineering Computer
Engineering Dept

Cyber Security

Lab	Tutorial	Theory
3		**2**

Course Objectives:
This is an under graduate level course on network security' The course involves both a reading /lecture/discussion and a term project' We will read and discuss topics on various aspects of network security: Ciphering &Encryption, block and stream ciphering, public key' cryptanalysis' key management and distribution and Applied security

Course Details:

Article	Week
Introduction to Modern Symmetric-Key Ciphers: Block and stream ciphering	2
Data Encryption Standard (DES)	1
Advanced Encryption Standard (AES)	1
Modern Symmetric-Key Ciphers	1
Asymmetric-key cryptography	2
Message Integrity and Message Authentication'	1
Cryptographic Hash Functions	1
Digital Signature	1
Entity Authentication	1
Security in the internet: IPSec, SSL/TLS,PGP,VPN, and Firewalls	1
Security at the Transport Layer: SSL and TLS	1
security at the ,application Layer: PGP and S/MIME	1
Wireless LAN Security	1
Text Books	

Tanenbaum A.S. , "Computer Network",5th, Edition, Prentice-Hall Publishing,2014 Stallings W. , "Data & Computer Communications", 8th Edition , Prentice-Hall Publishing,2012 .
Forouzan B.,"Data, Communications and Networking", '5th Edition McGraw-HillPublishing,2013

University of Mosul
College of Engineering
Computer Engineering Dept.

Biometrics Engineering

Lab	Tutorial	Theory
		2

Course Objectives:	
This course introduces students to the fundamental principles and methods used for biometric identification. The goals of this course are to understand the process of biometric recognition as well as the challenges it poses as means of establishing identity. The objective of the course is to provide students with the scientific foundations needed to design, implement, and evaluate large-scale biometric identification systems.	
Course Details: Methods and principles for the automatic identification/authentication of individuals. Technologies include fingerprint, face, and iris biometrics. Additional topics include biometric system design, performance evaluation, multi-modal biometric systems, and biometric system security.	
Article	**Week**
Week 1: Introduction to Biometrics Engineering	**1**
Week 2: Biometric Authentication Systems	**1**
Week 3: Human biometrics	**1**
Week 4: Biometric System Evaluation	**1**
Week 5: Face Authentication System	**2**
Week 6: Iris Authentication System	**2**
Week 7: Retina Authentication System	**2**
Week 8: Data Alignment	**1**
Week 9: Handwritten Authentication System	**2**
Week 10: Project	**2**

University of Mosul
College of Engineering Computer
Engineering Dept

Fundamentals of Mobile Systems

Lab	Tutorial	Theory
3		2

Course Objectives:
The objective of this course is to provide a comprehensive knowledge regarding mobile systems. This will include mobile systems engineering, high and low levels of mobile operating systems, mobile services for the Android and other mobile platforms, mobiles systems security and best practices for building mobile apps.

Course Details: This course include all the requirements for mobile systems and devices, principles and mobile networking fundamentals

Article	Week
Introduction to Mobile Systems	1
Mobile System Architecture	2
Mobile data management: Conflict detection and resolution, Partial replication	2
Mobile Systems Interface	1
Location awareness and Location privacy	2
Mobility models for Wireless Networks	1
Fundamentals of modern Cellular Networks and their architectures	1
Mobile ad-hoc networks and sensor networks	1
Mobile Systems and cloud computing	2
Mobile security platforms	2
Text Books	

1. D. P. Agrawal and Qing-An Zeng, "Introduction to Wireless & Mobile Systems," 4th Ed., Cengage Learning

2. John Krumm, "Ubiquitous Computing Fundamentals", CRC Press, 2010 Wei-Meng Lee , [Lee] Beginning Android 4 Application Development , Wiley, 2012

3. Reto Meier , "Professional Android 4 Application Development" , Wiley, 2012

University of Mosul
College of Engineering Computer
Engineering Dept

Professional Ethics

Lab	**Tutorial**	**Theory**
		2

Course Objectives:	
The objective of this course is to provide a comprehensive knowledge regarding Professional Ethics.	
Course Details:	
Article	**Week**
Introduction and concept of professional ethics.	١
Define ethical concepts.	١
Professions and ethical principles	١
Profession ethics.	1
Engineering profession	٢
Global dimensions of the engineering profession.	1
Principles of engineering ethics.	1

							1
The engineer's self-obligations under the ethics of the profession.							1
Obligations to employers.							١
Societal obligations.							١
Obligations to the profession.							١
Obligations to co-workers.							١
Environmental commitments.							١
Intellectual property in engineering assignment.							١
Text Books							

Others	Engineering Topics	Math & Basic Science	عدد الوحدات	اسم المادة		الفصل	المرحلة
				باللغة الإنكليزية	باللغة العربية		
	3		3	Computer Principles	اساسيات الحاسوب	1	**1**
1			1	Human Rights	حقوق انسان	1	**1**
		3	3	Mathematics **1**	الرياضيات **1**	1	**1**
	1		**1**	Engineering Drawing	الرسم الهندسي	1	**1**
		4	4	Electrical Circuits Analysis1	تحليل الدوائر الكهربائية **1**	1	**1**

	3		3	Fundamentals Digital System	مبادئ النظم الرقمية	1	1
		3	3	Physics	فيزياء	1	1
2			2	English Language	اللغة الانكليزية	2	1
	3		3	Programing using C++	البرمجة بأستخدام لغة C++	2	1
1			1	Democracy	الديمقراطية	2	1
		3	3	Mathematics 2	الرياضيات 2	2	1
	1		1	Engineering Drawing by Computer	الرسم الهندسي بواسطة الحاسوب	2	1
		4	4	Electrical Circuits Analysis 2	تحليل الدوائر الكهربائية 2	2	1
	3		3	Digital System Design	تصميم النظم الرقمية	2	1
		3	3	Electronics Physics	فيزياء الإلكترونيات	2	1
		3	3	Engineering Mathematics 1	رياضيات هندسية 1	1	2
2			2	Engineering Economy	الاقتصاد الهندسي	1	2
		4	4	Analog Electronics	الكترونيات تناظرية	1	2

				English Course	Arabic Course		
	3		3	Microprocessors 1	معالجات دقيقة 1	1	2
		2	2	Statistics	إحصاء	1	2
	3		3	Object Oriented Programing	البرمجة بالكائنات الموجهة	1	2
	3		3	Programmable Logic Design using HDL	تصميم منطق قابل للبرمجة باستخدام **HDL**	1	2
2			2	English Language-Pre-intermediate	اللغة الانكليزية ما قبل المتوسط	2	2
		3	3	Engineering Mathematics 2	رياضيات هندسية 2	2	2
2			2	Engineering Management	ادارة هندسية	2	2
	4		4	Digital Electronics	الكترونيات رقمية	2	2
	4		3	Microprocessors 2	معالجات دقيقة 2	2	2
		2	2	Numerical Analysis	تحليلات عددية	2	2
	3		3	Data Structures	هياكل البيانات	2	2
2			2	English Language – Intermediate	اللغة الانكليزية – المتوسط	1	3
	4		4	Data Communications and Networks 1	و اتصالات البيانات	1	3

				الشبكات 1		
	3	3	Signals and Systems	اشارات و انظمة	1	**3**
3		3	Computer Architecture 1	معمارية الحاسوب 1	1	**3**
3		3	Computer Interface	موائمة الحاسوب	1	**3**
3		3	Operating Systems 1	انظمة تشغيل 1	1	**3**
2		2	Artificial Intelligence Principles	أساسيات الذكاء الصناعي	1	**3**
4		4	Data Communications and Networks 2	اتصالات البيانات و الشبكات ٢	2	**3**
3		3	Digital Signal Processing	معالجة الاشارة الرقمية	2	**3**
3		**3**	Computer Architecture 2	معمارية الحاسوب 2	2	**3**
3		3	Embedded Systems	الانظمة المضمنة	2	**3**
3		3	Operating Systems 2	انظمة تشغيل 2	2	**3**
2		2	Image Processing	معالجة الصور	2	**3**
2		2	Database System	قواعد البيانات	2	**3**
2		2	Graduation Project 1	مشروع تخرج 1	1	**4**

2			2	English Language – Upper Intermediate	اللغة الانكليزية – فوق المتوسط	1	**4**
	4		4	Fundamentals of Control Systems	اساسيات منظومات السيطرة	1	**4**
	3		3	Real Time Systems	انظمة الزمن الحقيقي	1	**4**
	2		2	Software Engineering	هندسة البرمجيات	1	**4**
	3		3	Wireless Networks	الشبكات اللاسلكية	1	**4**
	2		2	Architecture of Parallel Processing	معمارية المعالجة المتوازية	1	**4**
	2		2	Graduation Project 2	**مشروع تخرج 2**	1	**4**
	2		2	Computer Graphics	الرسم بالحاسوب	2	**4**
	2		2	Cyber Security	الامن السيبراني	2	**4**
	3		3	Fundamentals of Mobile Systems	اساسيات الانظمة المتنقلة	2	**4**
	2		2	Elective Course	مادة اختيارية	2	**4**
		2	2	Biometrics Engineering	هندسة مقاييس حيوية	2	**4**
2			2	Professional Ethics	اخلاقيات مهنة	2	**4**

				مجموع الوحدات
18	93	39	150	مجموع الوحدات
12%	62%	26%	100%	النسبة المئوية%

المواد الاختيارية:

الاسم باللغة الانكليزية	الاسم باللغة العربية	
Distributed Systems	الانظمة الموزعة	١.
Programming Using Python	البرمجة بلغة بايثون	٢.
Industrial Networks	الشبكات الصناعية	٣.
Optical Communication and Computing	اتصالات و حوسبة ضوئية	٤.
Very Large Scale Integration Circuits	الدوائر المتكاملة واسعة النطاق	٥.