University of Mosul/ College of Engineering /Courses

The second level for the academic year 2020-2021

Computer Department Engineering

second academic level (second semester)									
Notes	**Course Code**	**prerequisite**	**Number of units**	**The number of working hours**	**Theoretical number of hours**	**Course Name**		**Requirement type (Compulsory-optiona)l**	**Requirement name**
						In English	**In the Arabic language**		
Compulsory for students of the department	ENGE220	Calculus I,II	2	-	2	Numerical Analysis	تحليلات عددية	**Optional**	**college requirements**
	ENGC225	-	2	-	2	Engineering Management	إدارة هندسية	**Mandatory**	
Compulsory for students of the department	ENGE230	Engineering Mathematics I	3		3	Engineering Mathematics II	رياضيات هندسية II	**Optional**	
	DIEL251	Electronic circuits	4	2	3	Digital Electronics	الكترونيات رقمية	**Mandatory**	**Department requirements**
	MIPR252	Microprocessors1	3	2	2	Micro-Processor II	معالجات دقيقة II	**Mandatory**	
The students chooses only course	MECO257	-	2	-	2	Magnetics & Energy Conversion	مغناطيسية و تحويل طاقة	**Optional**	
	RECO255					Reconfigurable Computing	الحوسبة القابلة لإعادة التشكيل		
The students chooses only course	INTH254	-	2	-	2	Information Theory	نظرية المعلومات	**Optional**	
	DIMA256					Discrete Mathematics	الرياضيات المتقطعة		
			18	**4**	**16**	Total hours and units of the second semester			

University of Mosul
College of Engineering
Computer Engineering Dept.

Numerical Analysis (ENGE220)

Lab Tutorial Theory

2

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	13

above.	
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).	14
Final Exam.	15
Text Books	
Numerical Methods for Engineers: With Software and Programming Applications, Steven C. Chapra and Raymond P. Canale, Fourth Edition. 2003.	
Reference Books	
Numerical Methods in Engineering with Matlab, Jaan Kiusalaas, 2005.	
Numerical Analysis Using Matlab and Excel, Steven T. Karris, Third Edition, 2007.	

روابط الكتب:

http://www.civilittee-hu.com/uploads/1/numerical/book6th.pdf

https://www.academia.edu/10031572/_Jaan_Kiusalaas_Numerical_Methods_in_Engineering_Book_ZZ_org_

https://www.academia.edu/29942825/Numerical_Analysis_Using_MATLAB_and_Excel_Third_Edition

University of Mosul
College of Engineering
Computer Engineering Dept.

Engineering Management (MIPR252)

Lab	Tutorial	Theory
		2

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)	1
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	10
Table of Quantities and Specifications	11
Quality management and quality control	12
Maintenance Management	13
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	

University of Mosul
College of Engineering
Computer Engineering Dept.

Engineering Mathematics II (ENGE230)

Lab	Tutorial	Theory
		3

Course Objectives:	
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**
Definition and Classification of differential equation DE (ordinary and partial, order, degree, Linear and non-linear).	1
Solutions of differential equations (general and particular solutions)	2 – 3
1st order ordinary DEs (Linear ,separable homogeneous, exact , non homogeneous)	4 – 6
2nd order ordinary DEs(Linear 2nd order DEs with constant coefficients, Undetermined coefficients method, Variable of parameter method, 2nd order DEs with variable coefficients)	7 – 9
Application of second order ordinary differential equations	10
Laplace transform properties and application, Laplace Inverse Transform, Laplace transform of unit step function.	11
Laplace Inverse Transform, Laplace transform of unit step function.	12
1st Shifting theorem (Translation in S- domain) 2nd Shifting theorem (Translation in Time) Convolution Theorem	13 – 14
Solution of Differential Equations by Laplace Transformation	15
Text Books	
1. Advanced Engineering Mathematics 10th Edition, By Reyszig ERWIN, Publisher 2011. 2. Calculus By Thomas Finny 13th Edition, Person Publisher, 2016	

University of Mosul
College of Engineering
Computer Engineering Dept.

Digital Electronics (DIEL251)

Lab	Tutorial	Theory
2		3

Course Objectives:	
This course focuses on what digital electronics means, digital gates design with electronic devices, logic levels, power dissipations , fan – in and fan –out of for all gates . The course includes activities and exercises that guide students to interface and deal with many problems issues in the digital electronics basics and design product so it will be easier to face such of these problems in the future.	
Course Details:	
Article	**Weeks**
Introduction to digital electronics	1
The digital IC characteristics	2
Bipolar logic circuits design and analysis : Resistor transistor logic RTL	3
Diode transistor logic DTL	4
Transistor transistor logic TTL	5
Emitter coupled logic ECL	6
I2L	7
The Field effect transistror FET	8
MOSFET logic circuits design and analysis	9
NMOS and PMOS logic circuits	10
Complementary Metal Oxide CMOS logic circuits	11
Sequential MOS logic circuits	12-13
Regeenarative logic circuits and Semiconductor memories	14-15
Text Books	
1.“Analysis and Design of Digital Integrated Circuits” by: David A. Hodges. 2.“Digital Integrated Circuits Analysis and Design” by: John E. Ayers. 3.LTSPICE Design Tool	

University of Mosul
College of Engineering
Computer Engineering Dept.

Micro-Processor II (MIPR252)

Lab	Tutorial	Theory
2		2

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	**Weeks**
The 8086 Microprocessor's address decoding and memory interface	1, 2
The Basic Input / Output Interfaces to the 8086 Microprocessor	3
The 8X86 Registers (16, 32, and 64-bits)	4
Introduction to Protected Mode	5, 6
Arithmetic Co-processor	7
Data Formats	8
80x87 Architecture	9
Instruction Set	10, 12
MMX Technologies	13
Introduction to 8X86 Microprocessors' archetecture	14, 15
Text Books	
1) Walter Triebel and Avtar Singh, The 8088 and 8086 Microprocessors: programming, Interfacing, software, Hardware, Applications, 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.	

University of Mosul
College of Engineering
Computer Engineering Dept.

Magnetics & Energy Conversion (MECO257)

Lab Tutorial Theory

2

Course Objectives:	
As the world population grows and places more demand on limited fossil fuels, renewable energy becomes more relevant as part of the solution to the impending energy dilemma. Renewable energy is now included in national policies, with goals for it to be a significant percentage of generated energy within the coming decades. A comprehensive overview, Introduction to Renewable Energy explores how we can use the sun, wind, biomass, geothermal resources, and water to generate more sustainable energy.	
Course Details:	
Article	**Weeks**
Introduction to solar power energy	1
Overview of the major source of energy	2
How solar Panel convert light into electricity	3
Calculating Energy Efficiency	4
Electrical and Mechanical components of a solar panel system	5
Review	6
Introduction to wind power energy	7
Wind Power Fundamentals	8
Wind Energy Part 2	9
Test 1	10
Principles of magnetism and how to use them	12
Electric motor and transformer	13
Electromagnetic waves and their properties	14
Antennas: their characteristics, types and applications	
Review	15
Test 2	
Text Books	
- Introduction to Renewable Energy by Vaughn C. Nelson. - Renewable Energy: An Essential Guide (Essential Guides) by Mark Boxall	

University of Mosul
College of Engineering
Computer Engineering Dept.

Reconfigurable Computing (RECO255)

Lab	Tutorial	Theory
		2

Course Objectives:	
This course will cover the basic concepts of reconfigurable computing and the importance of it in designing the digital systems and it will includes the reconfigurable computing technologies such as FPGAs (Field Programmable Gate Arrays), reconfigurable computing design flow and implementation using Hardware Description Languages (HDLs) especially VHDL programming.	
Course Details:	
Article	**Weeks**
Introduction application and comparison • General Purpose Computing • Domain Specific Computing • Application Specific Computing • Reconfigurable Computing	1
Reconfigurable Computing Hardware •Programmable logic, an overview of PLA, PAL, SPLD and CPLD	2
Reconfigurable Computing Device (FPGA) • FPGA structure• FPGA technologies •FPGA vendors	3
Programming Reconfigurable Systems and implementation •Design flow and modeling with HDLs •VHDL	4
VHDL language •Code structure of VHDL	5
•Data type of VHDL	6
• Operator and attributes of VHDL	7
•Concurrent statement of VHDL	8 – 9
•Sequential statement of VHDL	10 – 11
•Signal and variables	12
•State machine of VHDL	13
•System design of VHDL	14
Text Books	
1- C Bobda, Introduction to Reconfigurable Computing: Architectures, Algorithms, and Applications, Springer, 2007. 2- Brain Hold :"digital logic Design",4th Edition, Newmans,2002. 3-Voinci A. pedroni,"Circuit design with VHDL",MIT press,Cambridge,London2004.	

University of Mosul
College of Engineering
Computer Engineering Dept.

Information Theory (INTH254)

Lab	Tutorial	Theory
		2

Course Objectives:	
This is an undergraduate level course on information theory' The course involves both a reading /lecture/discussion and a term project' We will read and discuss topics on various aspects of information theory: like the ability to store, process and communicate data, whether in natural or artificial systems. Also learning informatics-related topics such as including compression, communication, and learning from data.	
Course Details:	
Article	**Weeks**
1. Introduction to Information Theory. The Concept of Information	1
2, First concepts of Probability theory	2
3. Conditional and joint entropy. Mutual Information	3
4. Relationship between I and H. Joint entropy. Conditional entropy	4
5. Maximum entropy of a discrete source	5
6. Discrete Memory-less Channels. Channel Capacity	6
7. Introduction to Coding**.** Information theory Vs. Coding theory	7
8. Type of codes: fixed length & variable length	8
9. Source Coding. Shannon-Fano Coding	9
10. Huffman Coding	10
11. Hamming Coding	11
12. Error-detection Code	12
13. Linear Block Code	13
14. Cyclic Block Code	14
Text Books	

- Stephen C. Wilson, ”Digital Communication and coding", Prentice-Hall, 1996.
- Ghahramani, Z., 2006. Information theory. Encyclopedia of Cognitive Science.
- Brillouin, L., 2013. Science and information theory. Courier Corporation.

University of Mosul
College of Engineering
Computer Engineering Dept.

Discrete Mathematics (DIMA256)

Lab Tutorial Theory

2

Course Objectives:	
This is an introductory course in discrete mathematics. The goal of this course is to introduce students to ideas and techniques from discrete mathematics that are widely used in science and engineering. This course teaches the students techniques in how to think logically and mathematically and apply these techniques in solving problems. To achieve this goal, students will learn logic and proof, sets, functions, as well as algorithms and mathematical reasoning. Key topics involving relations, graphs, trees, and formal languages and computability are covered in this course.	
Course Details:	
Article	**Weeks**
1- Sets and Functions	1
2- Growth of Functions	2
3- Integer properties and Matrices	3 – 4
4- Mathematical Induction	5 – 6
5- Recursion	7
6- Sequences and SummationsA	8
7- Arithmetic Algorithms	9
8- Computational Complexity of Algorithms	10
Mid Term Exam	
9- Graphs and its Applications	11 - 12
10- Trees and its Applications	13 - 14
Text Books	
Discrete Mathematics and Its Applications by Kenneth H. Rosen, SEVENTH EDITION	