



الجامعة العراقية
كلية الهندسة
المقررات الدراسية
العام الدراسي
2023 - 2022
المفردات الدراسية

Network Engineering Department

First Class

Semester 1				Semester 2			
Code	Subject	Hrs.	Units	Code	Subject	Hrs.	Units
NE-111	<i>Mathematics I</i>	2	2	NE-121	<i>Mathematics II</i>	2	2
NE-112	<i>Electrical Circuits Analysis I</i>	2	2	NE-122	<i>Electrical Circuits Analysis II</i>	2	2
NE-113	<i>Logic Circuits Design</i>	2	2	NE-123	<i>Digital Systems Design</i>	2	2
NE-114	<i>Programming Techniques I</i>	2	2	NE-124	<i>English Language</i>	2	2
NE-115	<i>Engineering Drawing</i>	2	2	NE-125	<i>Human Rights & Democracy</i>	2	2
NE-116	<i>Technical Workshop</i>	2	2	NE-126	<i>Programming Techniques II</i>	2	2
NE-117	<i>Electronic Circuits Design I</i>	2	2	NE-127	<i>Electronic Circuits Design II</i>	2	2
NE-118	<i>Arabic</i>	2	2	NE-128	<i>Laboratories II</i>	6	4
NE-119	<i>Laboratories I</i>	6	4				

18

18

Second Class

Semester 1				Semester 2			
Code	Subject	Hrs.	Units	Code	Subject	Hrs.	Units
NE-211	<i>Mathematics III</i>	2	2	NE-221	<i>Mathematics IV</i>	2	2
NE-212	<i>Digital Electronics I</i>	2	2	NE-222	<i>Digital Electronics II</i>	2	2
NE-213	<i>Fundamentals of Operating Systems</i>	2	2	NE-223	<i>Network Operating Systems</i>	2	2
NE-214	<i>Computer Architecture I</i>	2	2	NE-224	<i>Computer Architecture II</i>	2	2
NE-215	<i>Object Oriented Programming</i>	2	2	NE-225	<i>Data Structures and Algorithms</i>	2	2
NE-216	<i>Networks Fundamentals</i>	2	2	NE-226	<i>Data Base Systems</i>	2	2
NE-217	<i>Communication Fundamentals</i>	4	4	NE-227	<i>Computer network</i>	4	4
NE-218	<i>Laboratories I</i>	6	4	NE-218	<i>English</i>	2	2
				NE-229	<i>Laboratories II</i>	6	4

20

22

Third Class

Semester 1				Semester 2			
Code	Subject	Hrs	Units	Code	Subject	Hrs	Units
NE-311	<i>Advanced Mathematics I</i>	2	2	NE-321	<i>Advanced Mathematics II</i>	2	2
NE-312	<i>Microprocessors</i>	2	2	NE-322	<i>Microprocessor Applications</i>	2	2
NE-313	<i>Signals and Systems</i>	2	2	NE-323	<i>Digital Signal Processing</i>	2	2
NE-314	<i>Data Communications</i>	2	2	NE-324	<i>Modern Control</i>	2	2
NE-315	<i>Antenna & Propagation</i>	2	2	NE-325	<i>Software Engineering</i>	2	2
NE-316	<i>Java Programming</i>	2	2	NE-326	<i>Wireless Network</i>	2	2
NE-317	<i>Distributed Database</i>	2	2	NE-327	<i>Image Processing</i>	4	4
NE-318	<i>Laboratories I</i>	6	4	NE-318	<i>English</i>	2	2
				NE-329	<i>Laboratories II</i>	6	4

18

22

Fourth Class

Semester 1				Semester 2			
Code	Subject	Hrs	Units	Code	Subject	Hrs	Units
NE-411	<i>Soft Computing I</i>	2	2	NE-421	<i>Soft Computing II</i>	2	2
NE-412	<i>Internet Programming</i>	2	2	NE-422	<i>Mobile Communication</i>	2	2
NE-413	<i>Parallel Processing</i>	2	2	NE-423	<i>Wireless Sensor Networks</i>	2	2
NE-414	<i>Information Theory</i>	2	2	NE-424	<i>Networks security</i>	2	2
NE-415	<i>Network Protocols</i>	2	2	NE-425	<i>Networks Management</i>	2	2
NE-416	<i>Queuing Theory & Systems</i>	2	2	NE-426	<i>Digital Communications</i>	2	2
NE-417	<i>English</i>	2	2	NE-427	<i>Laboratories II</i>	6	4
NE-418	<i>Laboratories I</i>	6	4				
NE-419	<i>Graduation Project</i>					4	4

18

20



College of engineering
Network Engineering department
NE-111 –**Math I**
Syllabus

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قسم الشبكات

Subject : Math I	Theoretical Hrs. per week: 2
Code : NE-111	Applied Hrs. per week : 0
Year : 1 st	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 3

Objective of the course

The student learns the basic principles of real functions and derivatives, methods and applications.

Week No.	Topics
1	The Rate of Change of Function I: Coordinates for the plane, Increments & distance, The slope of a straight line. Equations of a, straight line
2	The Rate of Change of Function II: Functions & graphs, Slopes of quadratic & cubic curves, The slope of the curves $y=f(x)$, Derivatives, Velocity & other rates of change
3	The Rate of Change of Function III: Properties of limits, Infinity as a limit, Continuous functions.
4	Derivatives I: Formal differentiation. Polynomial functions & their derivatives. Products, power, & quotients.
5	Derivatives II: Implicit differentiation & fractional powers. Tangent line approximation. The chain rule & parametric equations. A brief review of trigonometry. Angles between curves.
6	Derivatives III: Derivatives of trigonometric functions. Newton's method for approximating solutions of equations. Inverse functions & the Picard method.
7	Applications of Derivatives I: Curves sketching. The sign of the first derivatives. Concavity & points. Asymptotes & symmetry. Maxima & minima. Theory. Maxima & minima. Problems
8	Mid-course Exam
9	Integration I: Indefinite integrals. Applications. Determining constants of integration. Integrals of trigonometric functions.
10	Integration II: Definite integrals. The area under a curve. Calculating areas as limits. The fundamental theorems of integral calculus.
11	Integration III: Integration by substitution Differentials. Rules for approximating definite integrals.
12	Applications of Definite Integrals I: Area between two curves. Distance. Calculating volumes by slicing.
13	Applications of Definite Integrals II: Length of plane curve. Area of a surface of revolution. Average value of a function.
14	Transcendental Functions I: The inverse trigonometric functions. Derivatives of the inverse trigonometric functions. The natural logarithm & its derivatives.
15	Transcendental Functions II: Properties of natural logarithm. The exponential function e^x . The function a^x & a^u . The function $y=\log_a u$
Text Book: Calculus & Analytic Geometry. Author: Thomas & Finney Edition & year public: Pearson Education Inc, 11 th Ed 2008	



College of Engineering
Network Engineering Department
NE-112 – **Electrical Circuit Analysis I**
Syllabus

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قسم هندسة الشبكات

Subject : Electrical Circuits I	Theoretical Hrs. per week: 2
Code : NE-112	Applied Hrs. per week : 2
Year : First	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 5

Objective of the course

At the end of the course, the student will learn the direct- current (DC) part of electrical circuits and different methodologies to analysis DC circuits. The core subjects covered in this course include Ohm's law, Kirchhoff's laws, node voltage analysis, mesh current analysis, Thevinon , Norton, super-position theorems, and transient analysis.

Week No.	Topics
1-3	1- Electrical circuit fundamentals, Ohm's law, Kirchhoff's laws 1-1 Electrical circuit, electrical current, voltage difference, notations 1-2 Types of voltages, types of currents, power and energy. 1-3 Resistors and resistivity, types of resistors, color coding of resistors. 1-4 Ohm's law, linear and non-linear resistors. 1-5 Temperature effect and coefficients of resistor. 1-6 Series and parallel circuits, Kirchhoff's laws. 1-7 Dependent and Independent voltage and current sources.
4-9	2- Circuit analysis and networks theorems 2-1 Node voltage analysis 2-2 Mesh current analysis, and branch current method. 2-3 Thevinon theorem 2-4 Norton theorem 2-5 Super-position circuit analysis theorem 2-6 Sources transformation. 2-7 Delta -star , and star - delta transformation 2-8 Maximum power transfer
10	Mid-course Exam
11-15	3- Transient analysis 3.1 Inductance, and capacitance 3.2 Transient circuit analysis 3.3 First-order transient circuits 3.4 Second-order transient circuits. .
Text book : Electrical Engineering, principles and applications, third edition, Allan R. Hambley.	



College of engineering
Network Engineering department
NE-113 – Logic Circuits Design
Syllabus

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قسم هندسة الشبكات

Subject : Logic Circuits Design	Theoretical Hrs. per week: 2
Code : NE-113	Applied Hrs. per week : 2
Year : First	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 5

Objective of the course

Students are supposed to learn the basic techniques and methodologies for designing and analyzing digital systems and how to apply these techniques to build specific circuits. Core topics covered include number systems, Logic Gates, Boolean Algebra, combinational circuits, and various related optimization techniques.

Week No.	Topics
1-5	1- Number System, Operation, and Code 1-1 Decimal Numbers. 1-2 Binary numbers, Decimal-to-Binary Conversion. 1-3 Binary Arithmetic 1-4 1's and 2's Complements of Binary Numbers. 1-5 Signed Numbers, Arithmetic Operations with Signed Numbers. 1-6 Hexadecimal Numbers. 1-7 Octal numbers. 1-8 Binary Coded Decimal (BCD). 1-9 Digital Codes.
6-7	2- Logic Gates 2-1 The Inverter (NOT Gate). 2-2 The AND Gate. 2-3 The OR Gate. 2-4 The NAND Gate. 2-5 The NOR Gate. 2-6 The Exclusive-OR Gate and Exclusive-NOR Gates.
8-10	3- Boolean Algebra and Logic Simplification 3-1 Boolean Operations and Expressions. 3-2 Laws and Rules of Boolean Algebra. 3-3 Simplification Using Boolean Algebra. 3-4 Standard Forms of Boolean Algebra. 3-5 The Karnaugh Map, SOP Minimization.
11	Mid-Term Exam
12-15	4- Combinational Logic Analysis 4-1 Basic Combinational Logic Circuits. 4-2 Implementing Combinational Logic. 4-3 Combinational Logic Using NAND and NOR Gates. 4-4 Logic Circuit Operation with Pulse Waveform Inputs.

Text book :

- 1- Thomas L. Floyd, Digital Fundamentals, 10th Edition, Pearson Prentice Hall.
- 2- M. Morris Mano, Michael D., Digital Design, 4th edition, Ciletti Prentice Hall



College of engineering
Network Engineering Department
NE- 114 -Programming Techniques I
Syllabus

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Subject: Programming Techniques I	Theoretical Hrs. per week: 2
Code : NE-114	Applied Hrs. per week : 2
Year : First	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 5

Objective of the course

The objectives of this course are to provide an introduction to basic programming techniques, including the design and implementation of algorithms, structured programming techniques, and an introduction to a high-level language, including arrays.

Week No.	Topics
1	Computers and their uses/ Hardware/Software, Programming languages/How to use/ run programs.
2	Using computers in problem solving/ requirement specifications/ analysis.
3	Design and representation of algorithms/ implementation / testing and verification/ program documentation.
4	Input and output/ data types.
5	Arithmetic and logical operators, precedence of operators.
6	C++ program control and structured programming Selections, If statement, nested if statement, if-else if ladder else.
7	Switch-case statements, nested switch-case statement.
8	Counter controlled and sentinel controlled repetition.
9	Counter controlled and sentinel controlled repetition.
10	The do-while and while loops.
11	Skipping loop iterations break and continue and exit() function..
12	Labels and goto statement, nested loops.
13	Using the array data structure to represent lists and tables of values, One-dimensional array creation, initialization and processing.
14	Two-dimensional array creation, initialization and processing.
15	Mid-course Exam

References

1. Mastering c++ by sorhan sami & oqeli saleh 2002.
2. [Cay S. Horstmann](#), Computing Concepts with C++ Essentials, 3rd edition, John Wiley, 2003.
3. Lesley Anne Robertson, Computing concepts with C++ essentials, 5th Ed. 2007.



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Network Engineering department
NE-115 – Engineering Drawing
Syllabus

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Subject : Engineering Drawing	Theoretical Hrs. per week: 2
Code : NE-115	Applied Hrs. per week : 2
Year : First	Tutorial Hrs. per week : -
Semester: 1 st	Total Hrs. per week : 4

Objective of the course

At the end of this course, students are able to:

1. Produce an engineering drawing to communicate.
2. Draw a complete drawing with proper dimensions and scale.
3. Differentiate different type of drawings.
4. Read and analyze engineering drawings.
5. Produce work in a given time.
6. Using the computer in the engineering drawing.

Week No.	Topics
1	Lines, lettering and Sketching.
2	Simple Drawing Operations.
3	Geometrical Construction: Triangular and Polygon Drawing.
4	Drawing Tangential Arcs and Ellipses. Introduction to AutoCAD and drawing aids
5	
6	
7	Introduction to orthogonal Projection Drawing. Basic drawing orders and Modify orders in AutoCAD. Writing And Dimensions in AutoCAD
8	
9	
10	Mid Exam
11	Isometric Projection Drawing. Three dimensions in AutoCAD
12	
13	Isometric Projection Drawing: Circle and Curves. Three dimensions in AutoCAD
14	
15	
References:	
1. Rendow Yee., <i>Architectural Drawings (2ND Edition)</i> , New Jersey , USA, 2003.	
2. عبد الرسول الخفاف,الرسم الهندسي,وزارة التعليم العالي والبحث العلمي,الجامعة التكنولوجية	



College of engineering
Network Engineering department
NE-116 – Technical Workshop
Syllabus

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Subject : Technical workshop	Theoretical Hrs. per week: -
Code : NE-116	Applied Hrs. per week : 2
Year : First	Tutorial Hrs. per week : -
Semester: 1 st	Total Hrs. per week : 2

Objective of the course

Technical workshop aim to improve the student's skills that deals with an electronic component and any physical entity in an electronic system used to affect the electrons or their associated fields in a manner consistent with the intended function of the electronic system. Components are generally intended to be connected together, usually by being soldered to a printed circuit board (PCB), to create an electronic circuit with a particular function (for example an amplifier, radio receiver, or oscillator). Components may be packaged singly, or in more complex groups as integrated circuits. Some common electronic components are capacitors, inductors, resistors, diodes, transistors, etc. Components are often categorized as active (e.g. transistors and thyristors) or passive (e.g. resistors, diodes, inductors and capacitors).

Week No.	Topics
1	Introduction to technical workshop, devices and tools
2	Resistors, definitions, type and color code
3	Resistors experimental , series and parallel circuits
4	Capacitors, tests, charging and discharging circuits
5	Transformer, tests, types, AC and DC circuits
6	Transformer, voltage test, step-down and step-up test
7	Rectifier Circuits, center tapped circuits
8	Mid-course Exam
9	Zener: definition, types, test
10	Voltage regulation circuits
11	Voltage shifting circuits
12	Practical exam
13	LED, definition, type and test
14	LED circuits
15	Troubleshoot and problem
References: A textbook of workshop technology (R.s. KHurmi) (J.K.Gupta)	



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NE-117 -Electronic Circuit Design I
Syllabus

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Subject : Electronic Circuit Design I	Theoretical Hrs. per week: 2
Code : NE-117	Applied Hrs. per week : 2
Year : First Year	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 5

Objective of the course

The objective of this course is to enable the student to have a solid background in electronic physics and the analysis of the characteristics and circuits of diode and zener diode. In addition, the student will learn the specifications and applications of the diode and zener diode.

Week No.	Topics
1-2	Introduction
	1-1 Atomic structure & electronic state (orbit, energy and valence) of electron.
	1-2 semiconductors, conductors and isolators.
	1-3 effects of temperature on depletion layer and P-N junction.
3-5	Characteristics of Diode
	2-1 forward and reverse bias and its relations.
	2-2 the diode operation and its conditions.
	2-3 zener region in terms of voltage and power dissipations
	2-4 DC & AC resistance.
	Mid-Term Exam
6-8	Specifications of diode
	3-1 diode capacitance
	3-2 reverse recovery time
	3-3 diode measuring and testing
9-15	Diode applications
	4-1 load line analysis
	4-2 series diode configuration
	4-3 parallel & series configurations
	4-4 half – wave rectifier and peak reverse voltage
	4-5 full wave rectifier and related circuits (biased, diode clippers and clampers)
	4-6 zener diode and its applications

References: "Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed.

" Electronic Devices (Conventional Current Version), 9th Edition), by Floyd.



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Code :NE-118 Arabic

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Syllabus

Subject : Arabic	Theoretical Hrs. per week: 2
Code : NE-118	Applied Hrs. per week : 0
Year : First	Tutorial Hrs. per week : 0
Semester: 1 st	Total Hrs. per week : 2

Objective of the course

على الطالب معرفة علامات الشكل وكيفية استخدامها بالجملة ورسم وكتابة الهمزة ومعرفة حركاتها و ضوابط كتابتها ومعرفة استخراج المشتقات في اللغة العربية لكي يكون ملما بها .

Week No.	Topics
1-3	1- علامات الترقيم 2- كتابة الهمزة (همزة القطع وهمزة الوصل) 3- همزة المتوسطة وهمزة المتطرفة
4-9	4- مكملات و ضوابط الكتابة (التنوين , المده , الشده) 5- العدد 6- الخط العربي 7- المعلقات 8- المشتقات (اسم الفاعل , اسم المفعول , اسما الزمان والمكان , اسم الاله) 9- الفاعل
10	Mid-course Exam
11-15	11- مواضع حذف همزة الوصل 12- الفرق بين التاء والتاء 13- المفعول به 14- درس تطبيقي في المفردات 15- امتحان يومي
Text book : الكتاب لسبيويه مغني اللبيب لابن هشام	



College of Engineering
Network Engineering Department
NE-121 – **Mathematics II**
Syllabus

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Subject : Mathematics II	Theoretical Hrs. per week: 2
Code : NE-121	Applied Hrs. per week : 0
Year : First	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 3

Objective of the course

At the end of the course, the student will be familiar with basic principles of integration techniques, partial derivatives, and solution of different types of differential equations.

Week No.	Topics
1-4	1- Techniques of integration 1-1 Basic integration formulas. 1-2 Integration by parts. 1-3 Partial fractions 1-4 Trigonometric substitutions. 1-5 Improper integral
5-9	2- Multivariable functions and partial derivatives 2-1 Functions of several variables 2-2 Limit and continuity. 2-3 Partial derivatives. 2-4 Differentiability. 2-5 Linearization 2-6 Differentials 2-7 The chain rule 2-8 Partial derivatives and constrained variables 2-9 Tangent plane extreme values and saddle points
10	Mid-term Exam
11-15	3- Differential equations 3-1 First order differential equations, variable separable, homogeneous, linear first order. 3-2 Non-homogeneous second order with constant coefficients. 3-3 Method of undetermined coefficients 3-4 Variation of parameters and reduction of order
References : 1. Thomas calculus, 12 th edition, Thomas, Maurice D. Weir. 2. Mathematics for Engineer: A modern interactive approach, 2 nd edition, Tony Croft and Robert.	



College of Engineering
Network Engineering Department
NE122 – **Electrical Circuits Analysis II**
Syllabus

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قسم هندسة الشبكات

Subject : Electrical Circuits Analysis II	Theoretical Hrs. per week: 2
Code : CR-CE122	Applied Hrs. per week : 2
Year : First	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 5

Objective of the course

At the end of the course, the student will learn the fundamentals of Alternating current (AC) electrical circuits and analysis of single and three-phase systems. The main topics covered in this course includes alternating quantities, analysis of single and three phase systems, and resonance phenomenon in AC circuits

Week No.	Topics
1-3	1- Alternating quantities 1-1 Types and definition of parameters. 1-2 Electrical and mechanical angles and speed waveform, instantaneous and peak values. 1-3 Average and rms values of waveforms 1-4 Form factor and peak factor, phasor quantities. 1-5 Voltage and current relationships of pure resistor, pure inductive, and capacitive elements .
4-6	2- Analysis of single-phase AC circuits 2-1 The phasor diagram, series, parallel and complex impedances. 2-2 Power in AC, power factor and power factor correction, power triangle. 2-3 Star –delta , and delta-star transformation. 2-4 AC circuit analysis and network theorems. 2-5 Maximum power transfer.
7-9	3- Analysis of three-phase AC circuits 3-1 Introduction 3-2 Balanced 3-phase systems 3-3 Analysis of star-star, star-delta, delta-star, and delta-delta circuits 3-4 Power calculations in balanced 3-phase circuits. 3-5 Measurement of average power in three-phase circuits, 2 watt meters method
10	Mid-term Exam
11-15	4- Resonance 4-1 Series and parallel resonance circuits. 4-2 Quality factor and selectivity. 4-3 Half power frequency and bandwidth
Text book : . Electrical Engineering, principles and applications, third edition, Allan R. Hambley.	



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NE-123 – **Digital Systems Design**
Syllabus

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Subject : Digital Systems Design	Theoretical Hrs. per week: 2
Code : CNE-123	Applied Hrs. per week : 2
Year : First	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 5

Objective of the course

Students are supposed to learn the basic techniques and methodologies for designing and analyzing digital systems and how to apply these techniques to build specific circuits. Core topics covered include Functions of Combinational Logic, Latches, Flip-Flops, and Timers, Counters, Shift Registers, and various related optimization techniques.

Week No.	Topics
1-5	1- Functions of Combinational Logic. 1-1 Basic Adders, Parallel Binary Adders. 1-2 1's and 2's Complement Subtractor, 2's Complement Adder-Subtractor, BCD Adder. 1-3 Comparators 1-4 Code converters. 1-5 Decoders, Encoders. 1-6 Multiplexers (Data Selectors), Demultiplexers.
6-8	2- Latches, Flip-Flops, and Timers. 2-1 Latches 2-2 Edge-Triggered Flip-Flops. 2-3 Flip-Flop operating Characteristics and Applications. 2-4 The Astable multivibrators. 2-5 One-Shots.
9	Mid-Term Exam
10-13	3- Counters 3-1 Asynchronous Counters. 3-2 Synchronous Counters. 3-3 Design of Synchronous Counters.
14-15	4- Shift Registers 4-1 Basic Shift Register Operations. 4-2 Serial In/Serial out Shift Registers. 4-3 Serial In/Parallel out Shift Registers. 4-4 Parallel In/Serial Out Shift Registers. 4-5 Parallel In/parallel Out Shift Registers. 4-6 Bidirectional Shift Registers.
Text book : 1- Thomas L. Floyd, Digital Fundamentals, 10 th Edition, Pearson Prentice Hall. 2- M. Morris Mano, Michael D., Digital Design, 4 th edition, Ciletti Prentice Hall.	



College of engineering
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NE-124 –English Language
Syllabus

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Subject : English Language	Theoretical Hrs. per week: 2
Code : NE-124	Applied Hrs. per week : -
Year : First	Tutorial Hrs. per week : -
Semester: 2 nd	Total Hrs. per week : 2

Week No.	Topics
1	Word Processing Sentences with reduced clauses :Reduced adjective clauses
2	Databases and spreadsheets Reduced Adverb clauses
3	Graphics &Multimedia Exercises
4	Programming Sentences with inverted parts
5	Analyst Programmer Invert the subject and verb with question words
6	Exam
7	Languages Invert the subject and verb with place expressions
8	Low-level systems Invert the subject and verb with negatives
9	IT Manger Invert the subject and verb with comparisons
10	Issues in Computing Exercises
11	Careers in Computing Make verbs agree after prepositional phrases
12	Reading Make verbs agree after expressions of quantity
13	Exam
14	Reading Make verbs agree after certain words
15	Reading Exercises
Text book: 1. Eric H. Glendinniy, Basic English for Computing, Oxford Univ. Press, 1 st Ed., 2003 2. John McEwen, Longman Preparation Course for the TOEFL test, Longman, 1 st Ed., 2004.	



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NE-125 – Human Rights & Democracy
Syllabus

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قسم الشبكات

Subject : Human Rights & Democracy	Theoretical Hrs. per week: 2
Code : NE-125	Applied Hrs. per week : -
Year : First	Tutorial Hrs. per week : -
Semester: 2 nd	Total Hrs. per week : 1

Week No.	Topics
1	حقوق الانسان في الحضارات القديمة: حقوق الانسان في الحضارات اليونانية والمصرية
2	حقوق الانسان في حضارات العراق القديمة
3	حقوق الانسان في الشرائع والاديان السماوية: في الديانة اليهودية والمسيحية،
4	في الاسلام
5	مصادر حقوق الانسان: المصادر الدولية ، المصادر الوطنية ،
6	دستور جمهورية العراق
7	ضمانات حقوق الانسان: على الصعيد الداخلي، على الصعيد الدولي،
8	في الاسلام
9	دور المنظمات الاقليمية في حماية حقوق الانسان: اتفاقية الاوربية، الاتفاقية الامريكية،
10	الميثاق الافريقي، الميثاق العربي
11	مستقبل حقوق الانسان: التقدم التكنولوجي واثره على الحقوق والحريات،
12	العولمة وحقوق الانسان
13	نشأة وتطور حقوق الطفل: مدلول الطفل، التطور التاريخي لحقوق الطفل، لدى الامم والحضارات، لدى الديانة المسيحية
14	حقوق الطفل في الاسلام
15	حقوق الطفل في الاتفاقية الدولية لعام 1989
المصدر: حقوق الانسان والطفل والديمقراطية المؤلف: أ.د. ماهر صالح علاوي الجبوري وآخرون الناشر وسنة الطبع: وزارة التعليم العالي والبحث العلمي – جامعة تكريت، 2009	



College of engineering
Network Engineering Department
NE- 126-Programming Techniques II
Syllabus

الجامعة العراقية
كلية الهندسة
قسم هندسة الشبكات

Subject: Programming Techniques II	Theoretical Hrs. per week: 2
Code : NE-126	Applied Hrs. per week : 2
Year : First	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 5

Objective of the course

The objectives of this course are to provide an introduction to basic programming techniques. Introduction to a high-level language, including arrays, procedures, Pointers, and recursion.

Week No.	Topics
1	String (Read / Write / Process ArrayElements
2	Functions in C/C++ / new function creation return values and call.
3	Formal parameters call by value and call by reference/ Math and other standard library functions
4	Create a call by pointer reference/ formal reference.
5	Prototype, Local, global, and static variables in functions.
6	The importance of prototype, the difference between local and global, and the mean of static variables.
7	Pass arrays to functions/ multiple-subscripted arrays.
8	C/C++ Pointers/ pointer variable definitions and initialization.
9	Pointers and pointers operators/ using pointers to pass arguments to functions by reference.
10	Relationships among pointers, arrays and strings.
11	C++ characters and strings/ character handling library(ctype)/ string conversion utility library (stdlib)/ string/ character I/O standard library (stdio) and string handling library(string).Data Types and Type DeclarationC Expressions and Operators
12	User defined data types, C structures.
13	Union, bit manipulations and numerations.
14	Mid-course Exam
References 1. Mastering c++ by sorhan sami & oqeli saleh 2002. 2. Cay S. Horstmann, Computing Concepts with C++ Essentials, 3rd edition, John Wiley, 2003. 3. Lesley Anne Robertson, Computing concepts with C++ essentials, 5th Ed. 2007.	



College of engineering
Network engineering department
NE-127-**Electronic Circuit Design II**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Electronic Circuit Design II	Theoretical Hrs. per week: 2
Code : NE-127	Applied Hrs. per week : 2
Year : First Year	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 5

Objective of the course

This course aims to enable the student to have a solid background in physical structure of BJT, and FET transistors, also the analysis and biasing circuits of the BJT and FET transistors.

Week No.	Topics
1-3	Introduction to transistor structure
	2-1 transistor structure and its operations
	2-2 analysis of currents.
4-7	Configuration of transistor
	3-1 bias configuration of a common- base
	3-2 bias configuration of a common- emitter
	3-3 bias configuration of a common- collector
	Mid-Term Exam
8	Transistor amplifications, The operation of transistor and its limitations.
9	DC biasing circuit and its characteristics.
10,11	Voltage divider, emitter stabilize and voltage feedback, Common- base and emitter follower configurations, Saturation level of transistor,
12	Transistor switching configuration.
13-15	FET construction, and biasing circuits

References: "Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed.
" Electronic Devices", By Floyd. 9th ed.



College of engineering
Network Engineering department
NE-211-Mathematics III
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Math III	Theoretical Hrs. per week: 2
Code : NE-211	Applied Hrs. per week : -
Year : 2 nd	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 3

Objective of the course

By covering the course in (Math III) **Engineering Mathematics - I**, the students will be able to:

- Know the basics of matrices and vectors.
- how to solve simple ordinary differential equation of 1st and 2nd order.
- how to apply concepts of Vector Algebra to Statics, how to apply the concepts of Differential and Integral Calculus in solving the problems of Dynamics.
- Understand their engineering application

Week No.	Topics
1	Matrices: Matrices and determination.
2	Matrix addition and multiplication.
3	Linearly dependent and linearly independent, solving a system of linear equations.
4	Cramer's rule, The Gaussian elimination method.
5	Matrix inverse, by Gauss elimination method, by Cofactor method.
6	Rank of matrix, how to find a rank of a matrix.
7	Eigen value & Eigen vector.
8	Mid-course Exam
9	Vectors: vectors in space, product of two vectors, scalar product, vector product.
10	Equations of lines and planes in space.
11	Angles between planes, triple products.
12	Ordinary differential equations: 1 st order differential equations (1 st ODE), variable separable.
13	1 st ODE: homogenous, linear, exact.
14	2 nd ODE: homogenous, non-homogenous.
15	Undeterminant coefficient, variation of parameters.
References:	
- "Thomas Calculus", 12th ed, George B. Thomas , Maurice D. Weir. - "Mathematics for Engineers: A modern interactive approach", 2nd ed, Tony Croft and Robert Davison.	



College of engineering
Network Engineering department
NE-212 – **Digital Electronics I**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم هندسة الشبكات

Subject : Digital Electronics I	Theoretical Hrs. per week: 2
Code : NE-212	Applied Hrs. per week : 2
Year : 2 nd	Tutorial Hrs. per week : 0
Semester: 1 st	Total Hrs. per week : 4

Objective of the course

After learning this course, the students should be able to:

- Understand the construction and working of different combinational circuits etc.
- Understand different flip-flops and its applications.
- Understand different sequential logic circuits and basic design of sequential circuits and counters. Understand different types of memories and its applications.
- Understand the fundamentals of D/A and A/D converters

Week No.	Topics
1	Introduction and implementations of excitation table of flip flops
2	Non-inverting OP-AMP. & Inverting OP-AMP.
3	Voltage follower. & Voltage adder.
4	Integrator. & Differentiator.
5	Difference Amp.
6	Adder Amp.
7	EXAM
8	A/D convertors. & Simultaneous ADC. Counter type ADC.
9	Continuous ADC.
10	Successive approximation ADC. & Variable resistor network.
11	D/A Convertor.
12	Resistive divider DAC. & Binary ladder DAC.
13	DAC accuracy and resolution.
14	EXAM
15	Review
Text Book : Digital Design Author : Morris Mano Edition & Year Public: Prentice Hall, 4 th Ed., 2006	



College of engineering
Network Engineering department
NE-213 –Fundamentals of operating System
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Fundamentals of operating System	Theoretical Hrs. per week: 2
Code : NE-213	Applied Hrs. per week : -
Year : 2 nd	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 3

Objective of the course

The student will be taught principles of modern operating systems. In particular, the course will cover details of concurrent processes, multi-threads, CPU scheduling, memory management, file system, storage subsystem, and input/output management, The course will integrate theory and practice through coordinated lecture and lab hours.

Week No.	Topics
1	Introduction to operating systems
2	Operating system structures, computer hardware properties
3	Process concept in modern operating systems
4	Multi-processes
5	Thread concept and multi-threading
6	Process synchronization, critical section problem
7	Process synchronization. Classical problem.
8	Mid-course exam
9	Deadlocks in multi-processing
10	Memory management
11	Virtual memory management
12	CPU scheduling algorithms
13	File system
14	Disk subsystem
15	Review

Textbook

A. Silberschatz, P.B. Galvin and Greg Gagne "Operating System Concepts", 9th Ed., Wiley, 2013



College of engineering
Network Engineering department
NE-214 – **Computer architecture I**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Computer architecture	Theoretical Hrs. per week: 2
Code : NE-214	Applied Hrs. per week : -
Year : 2 nd	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 3

Objective of the course

This course is meant to be a capstone course in computer engineering that draws together concepts from digital logic design, computer organization, system-level software, computing, and engineering design.

Week No.	Topics
1	Introduction: organization and architecture structure and function.
2	Computer evaluation and performance : history of computer , designing for performance , Pentium and power PC evolution
3	Computer function and interconnection (I) :computer components , computer functions
4	Computer function and interconnection (II): interconnection structure, bus interconnection, PCI.
5	Cache memory: computer memory system, cache memory principles, elements of cache design.
6	Internal memory: semiconductor main memory, error correction, DRAM organization.
7	Input / Output(I) : external devices , I/O modules , programmed I/O.
8	Input / Output(II) : DMA , I/O channel and processors
9	Computer architecture: arithmetic and logic unit , integer arithmetic floating point representation , floating point arithmetic
10	Instruction-Level Parallelism and Superscalar Processors Overview, Design Issues, Pentium 4
11	Instruction sets: machine instruction, type of operands, data type, and operations addressing modes, instruction formats.
12	Reduced Instruction Set Computers (RISCs), Instruction Execution Characteristics The Use of a Large Register File, Compiler-Based Register Optimization Reduced Instruction Set Architecture, RISC Pipelining MIPS R4000, SPARC, The RISC versus CISC Controversy,
13	CPU structure: processor organization , register organization CPU function : instruction cycle , instruction pipelining
14	Parallel Organization, Parallel Processing, The Use of Multiple Processors, Symmetric Multiprocessors, Cache Coherence and the MESI Protocol, Clusters,
15	Multicore Computers, Hardware Performance Issues, Software Performance Issues, Multicore Organization, Case study Pentium and power PC processor.

Text book: Computer Organization and Architecture: Designing for Performance,

Author : William Stallings

Edition & Year public : 8/E ,Prentice- Hall,2009



College of engineering
Network Engineering department
NE-215 – **Object Oriented Programming**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Object oriented programming	Theoretical Hrs. per week: 2
Code : NE-215	Applied Hrs. per week : 2
Year : 2 nd	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 5

Objective of the course

Upon completion of this course, you should

- understand Object-Oriented Programming concepts and techniques,
- understand the principles of software engineering in Object-Oriented languages,
- understand the fundamentals of programming in C++,
- be able to design and implement Object-Oriented software to solve moderately complex problems,
- be able to write good program documentation.

Week No.	Topics
1	Introduction.
2	Programming in C and C++-control structures, functions, pointers, arrays and structures.
3	Introduction to Software Engineering-life cycle: analysis, design, implementation and maintenance
4	Object-Oriented programming model-encapsulation, information hiding, polymorphism, inheritance.
5	C++/Object-Oriented concepts-classes, information hiding, encapsulation
6	Simple linked data structures-linked lists, stacks, queues
7	C++/Object-Oriented concepts-operator overloading
8	Mid-course Exam
9	C++/Object-Oriented concepts-inheritance, and polymorphism.
10	C++ templates, streams and stream I/O.
11	C++ file processing, string class, string stream processing.
12	C++ legacy code topics, standard template library.
13	Fundamental computing algorithms C simple searching and sorting (linear and binary search, selection and insertion sort).
14	Practices and exercises .
15	Projects, exams and review.

References:

- Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, C++ Primer, Addison-Wesley Professional; 5th edition, ISBN-10: 0321714113, or ISBN-13: 978-0321714114
- Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley Professional, 4th Edition, ISBN-10: 0321563840 ISBN-13: 978-0321563842 (advanced)
- Robert Lafore, Object-Oriented Programming in C++ , Sams Publishing, 4th Edition,



College of engineering
Network Engineering department
NE-216 –Network Fundamentals
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Network Fundamentals	Theoretical Hrs. per week: 2
Code : NE-216	Applied Hrs. per week : 2
Year : 2 nd	Tutorial Hrs. per week : 2
Semester: 1 st	Total Hrs. per week : 6

Week No.	Topics
1	Networks Basics I Definition of network, Network Standards.
2	Networks Basics II Different types of networks, How to connect to a networks?
3	Advantages & Disadvantages of Networks Communications, Sharing Information, & Sharing Devices & services
4	The Internet I The Telephone Network, The computer network (the Internet), How to connect to the Internet?
5	The Internet II Internet Service Provider (IS) , What is an Intranet?
6	Email Fundamentals I What is Electronic Mail (email), Internal and external email, How an email address works
7	Email Fundamentals II The structure of an email message, Email options and attachments, Advantages and disadvantages of email
8	Internet Terminology I HTML, URLs, HTTP and HTTPS
9	Internet Terminology II Cookies & Encryption
10	Web Browsing I What a Browser does? , Examples of Browsers
11	Web Browsing II Search Engines and finding information.
12	Web Browsing III e-Commerce web sites, Social Networking websites
13	Safety and Privacy I Data Security, Ergonomics Safeguarding your data
14	Safety and Privacy II Protecting your Privacy
15	Ethical Behavior
References: - Textbook : Larry Peterson (Computer Networks, a system approach), 4th Editioin, 2007 - B.A Forouzan, McGraw (TCP/IP Protocol Suite), 4rd edition Hill 2010	



College of engineering
Network Engineering department
NE-217 –Communication Fundamentals
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Communication Fundamentals	Theoretical Hrs. per week: 4
Code : Ne-217	Applied Hrs. per week : 2
Year : 2 nd	Tutorial Hrs. per week : 2
Semester: 1 st	Total Hrs. per week : 8

Objective of the course

Week No.	Topics
1	Introduction to Communication Systems
2	Analogue Modulation : AM, DSBSC, VSB
3	SSB, FM, PM, narrow band FM
4	PLL demodulators, FLL loops.
5	Sampling systems: Time and Frequency Division multiplexing systems
6	Nyquist Principle, PAM, PPM, and PWM
7	Principles of Noise : Random variables, white noise, shot..
8	Mid-course Exam
9	Thermal and Flicker Noise, Noise in cascade amplifiers
10	Pulse Code Modulation : PCM and its derivatives
11	Quantising Noise, and Examples
12	Digital Communication Techniques : ASK, FSK
13	PSK, QPSK
14	QAM, and M-ary QAM.
15	Case Studies Spread Spectrum Systems, Mobile radio concepts, GSM and Multiple Access Schemes Mobile radio
References:	
- "Electronic communication systems", 2nd ed, Roy Blake. - Communication systems, 4th edition, Simon Haykin. - Introduction to Communication Systems – Ferrel G. Stremmler - Data communications and networking, 4th P edition, Behrouz A. Forouzan.	



College of engineering
Network Engineering department
NE-221 –Math IV
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Math IV (Eng. Math II)	Theoretical Hrs. per week: 2
Code : NE-221	Applied Hrs. per week : -
Year : 2 nd	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 3

Objective of the course

Week No.	Topics
1	Periodic functions: even, odd and orthogonal functions.
2	Fourier sin, Fourier cos.
3	Fourier series: Half range expansion series, Fourier even & Fourier odd.
4	Convergence of Fourier series.
5	Applications: heat equation.
6	Applications: wave equation.
7	Partial derivatives, function of several variables.
8	Mid-course Exam
9	Partial differentiation.
10	Definitions.
11	Properties.
12	Total differential.
13	Chain rule.
14	Gradient & directional derivatives.
15	Maxima, Minima & saddle points for the surface $z=f(x,y)$.
References: - "Thomas Calculus", 12 th ed, George B. Thomas , Maurice D. Weir. - "Advanced Engineering Mathematics", Erwin Kreyszig.	



College of engineering
Networks Engineering department
NE-222 – **Digital Electronics II**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم هندسة الشبكات

Subject : Digital Electronics	Theoretical Hrs. per week: 2
Code : NE-222	Applied Hrs. per week : 2
Year : 2 nd	Tutorial Hrs. per week : 0
Semester: 2 nd	Total Hrs. per week : 4

Objective of the course

After learning this course, the students should be able to:

- Understand the construction and working of different combinational circuits etc.
- Understand different flip-flops and its applications.
- Understand different sequential logic circuits and basic design of sequential circuits and counters. Understand different types of memories and its applications.
- Understand the fundamentals of D/A and A/D converters

1	Basic definitions Analysis.
2	Mealy machine.
3	Moore. Machine Design.
4	ASM charts. & the Principle components of an ASM chart.
5	Conversion of a state diagram to ASM chart.
6	Design by using JK flip-flops, D-flip-flops, multiplexer, and PLA.
7	EXAM
8	Analysis procedures. Reduction of primitive flow table. Cycles and races. Hazards.
9	CMOS, TTL, ECL. & Propagation delay. & Switching speed limitations.
10	Power dissipation.
11	PLD advantages. & ROM as PLD. & PLA and PAL. & SPLD. & CPLD.
12	FPGA. & GAL. HAL.
13	The main features to VHDL. Design Units. & Structural modeling
14	Data flow modeling. & Behavioral modeling. & Mixed style of modeling.
15	EXAM
Text Book : Digital Design Author : Morris Mano Edition & Year Public: Prentice Hall, 4 th Ed., 2006	



College of engineering
Network Engineering department
NE-223 –Network Operating Systems
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : operating system II (advanced)	Theoretical Hrs. per week: 2
Code : NE-223	Applied Hrs. per week : -
Year : 2 nd	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 3

Objective of the course

This course covers general issues of design and implementation of advanced modern operating systems. The focus is on issues that are critical to the applications of distributed systems and computer networks, which include interprocess communication, distributed processing, sharing and replication of data and files. Approximately two third of the course will be devoted to basic concepts and techniques, and the remaining third will be on assorted current topics in modern operating systems and distributed systems.

Week No.	Topics
1	Distributed systems
2	Issues in communication, Remote Procedure Call , Remote Method Invocation
3	Message- and Stream-Oriented communication
4	Processes and threads
5	Code migration and distributed scheduling , Naming
6	Clock Synchronization
7	Distributed mutual exclusion and distributed deadlocks , Distributed transaction
8	Mid-course Exam
9	Consistency models , Replication
10	Fault tolerance
11	Distributed commit and failure recovery , Distributed file systems (NFS, AFS & coda)
12	Security in distributed systems
13	Security: authentication
14	Distributed middleware: CORBA
15	Case studies: DCOM and JINI
Text book:	
1- Andrew S. Tanenbaum and Maarten van Steen. “Distributed Systems: Principles and Paradigms”, Prentice Hall, 2nd Edition, 2007. (Required)	
2- Randy Chow and Theodore Johnson. “Distributed Operating Systems & Algorithms”, Addison-Wesley, 1997.	



College of engineering
Network Engineering department
NE-224 – **Computer architecture II**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Computer architecture II	Theoretical Hrs. per week: 2
Code : NE-224	Applied Hrs. per week : -
Year : 2 nd	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 3

Objective of the course

This course is meant to be a capstone course in computer engineering that draws together concepts from digital logic design, computer organization, system-level software, computing, and engineering design.

Weeks	Topics
4	Memory Organization: • Concept of RAM/ROM, basic cell of RAM • Associative memory, Cache memory organization • Virtual memory organization.
4	I/O Organization: • Introduction to Peripherals & their interfacing. • Strobe based and handshake-based communication, DMA based data transfer, I/O processor
4	Parallel Processing: • Characteristics of Multiple Processors • Interconnection structure and arbitration, • Inter-process communication and synchronization
2	Multi-core Computers • Hardware and software performance, • Multi-core organization.
References 1. Morris Mano" Computer System Architecture", Third edition 2. Joseph D. Dumas" Computer Architecture Fundamentals and Principles of Computer Design " , CRC Press, 2006. 3. Miles J. Murdocca," Principles of Computer Architecture" ,Prentice Hall,1999 4. Miles J. Murdocca, Vincent P. Heuring, " Computer Architecture and organization :An integrated Approach", Wiley, 2012 5. Subrata Ghoshal, " Computer Architecture and organization From 8085 to Core 2Duo and beyond", Glyph International Pvt. Ltd, 2011 6. William Stallings " Computer Organization and Architecture Designing for Performance", 8th Edition, 2010	



College of engineering
Network Engineering department
NE-225 – **Data structures and algorithms**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Data structures and algorithms	Theoretical Hrs. per week: 2
Code : NE-225	Applied Hrs. per week : 2
Year : 2 nd	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 5

Objective of the course

The objective of the course is to teach students how to design, write, and analyze the performance of C/C++ programs that handle structured data and perform more complex tasks, typical of larger software projects. Students should acquire skills in using generic principles for data representation & manipulation with a view for efficiency, maintainability, and code-reuse.

Week No.	Topics
1	Lists, Stacks, and Queues: Abstract Data Types (ADTs) ,The List ADT, vector and list in the STL, Implementation of vector
2	Implementation of list, The Stack ADT, The Queue ADT
3	Trees: Preliminaries, Binary Trees, The Search Tree ADT–Binary Search Trees, AVL Trees
4	Splay Trees, Tree Traversals (Revisited), B-Trees, Sets and Maps in the Standard Library
5	Hashing: General Idea, Hash Function, Separate Chaining
6	Hash Tables Without Linked Lists, Rehashing, Hash Tables in the Standard Library, Extendible Hashing
7	Priority Queues (Heaps), Model, Simple Implementations, Binary Heap
8	Mid-course Exam
9	Applications of Priority Queues, d-Heaps, Leftist Heaps, Skew Heaps
10	Binomial Queues, Priority Queues in the Standard Library
11	Sorting: Preliminaries, Insertion Sort, A Lower Bound for Simple Sorting Algorithm
12	Shellsort, Heapsort, Mergesort, Quicksort.
13	Indirect Sorting, A General Lower Bound for Sorting, Bucket Sort, External Sorting
14	Algorithm Design Techniques: Greedy Algorithms, Divide and Conquer.
15	Dynamic Programming, Randomized Algorithms, Backtracking Algorithms
References:	
- Data Structures and Algorithm Analysis in C++ (3rd edition), by M. A. Weiss. Addison-Wesley, ISBN-10: 032144146X & ISBN-13: 9780321441461 - C++ How to Program (5th Edition), by (Harvey & Paul) Deitel & Associates. Prentice Hall, ISBN-10: 0131857576 & ISBN-13: 9780131857575	



College of engineering
Network Engineering department
NE-226 – **Database Systems**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Database systems	Theoretical Hrs. per week: 4
Code : SNE-226	Applied Hrs. per week : 2
Year : 2 nd	Tutorial Hrs. per week : 2
Semester: 2 nd	Total Hrs. per week : 8

Objective of the course

Upon successful completion of this class, the student will be able to take on projects where student need to design and develop databases as part of an entire information system.

Week No.	Topics
1	Introduction: Learning PHP & MySQL place in the world of development, Components of a PHP application, & requesting data from a webpage
2	Exploring PHP : PHP and HTML Text, & Coding Building Blocks
3	PHP Decision Making : Expressions, Operator Concepts, Conditionals, & Looping
4	Functions : Calling Functions, Defining Functions, & Object-Oriented Programming
5	Arrays : Array Fundamentals
6	MySQL : MySQL Database, Managing the Database, Using phpMyAdmin, Database Concepts, & Structured Query Language
7	PHP & MySQL interaction : The Process, Querying the Database with PHP Functions, & Using PEAR
8	Forms : Building a form, & Templates
9	XHTML : XHTML and XML Namespaces, & Generating XHTML with PHP
10	Modifying My_SQL Objects and PHP Data – I : Changing Database Objects from PHP, Manipulating Table Data, & Displaying Results with Embedded Link.
11	Modifying MySQL Objects and PHP Data – II : Presenting a Form to Add and Process in One File, Updating Data, Deleting Data, & Performing a Subquery
12	Cookies, Sessions, and Access Control : Cookies, PHP and HTTP Authentication, Sessions, & Using Auth_HTTP to Authenticate
13	Security : Session Security
14	Validation & error handling : Validating User Input with JavaScript, Pattern Matching, & Redisplaying a Form After PHP Validation Fails
15	Sample Applications : Configuration File, Page Framework, Database, Displaying a Postings Summary, Displaying a Posting and Its Comments, Adding and Changing Posts, & Adding and Changing Comments
Textbook : Learning PHP and MySQL Author : Michele E. Davis and Jon A. Phillips Edition/Publisher : 7 th Ed., O'Reilly	



College of engineering
Network Engineering department
NE-227 –Computer Network
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Computer Network	Theoretical Hrs. per week: 2
Code : NE-227	Applied Hrs. per week : 2
Year : 2 nd	Tutorial Hrs. per week : 2
Semester: 2 nd	Total Hrs. per week : 6

Week No.	Topics
1	Introduction to Computer Networks I: NETWORK TOPOLOGIES, THE ETHERNET LAN, IP (Internet Protocol) Addressing
2	Introduction to Computer Networks II: ASSEMBLING A HOME NETWORK, Securing the Home Network, IP Addressing in the Home Network5, ASSEMBLING AN OFFICE LAN, TESTING AND TROUBLESHOOTING A LAN, ANALYZING COMPUTER NETWORKS
3	Physical Layer Cabling: Twisted Pair, INTRODUCTION, STRUCTURED CABLING, Horizontal Cabling, UNSHIELDED TWISTED-PAIR CABLE, Shielded Twisted-pair Cable, TERMINATING CAT6/5E/5 UTP CABLES, Computer Communication, Straight-through and Crossover Patch Cables, CABLE TESTING AND CERTIFICATION, Testing the CAT6 Link, 10 Gigabit Ethernet over Copper Overview, Alien Crosstalk (AXT), Signal Transmission, TROUBLESHOOTING COMPUTER NETWORKS, Installation, Cable Stretching, Cable Failing to Meet Manufacturer Specifications, CAT5e Cable Test Examples
4	Interconnecting the LANs: INTRODUCTION, THE OSI MODEL, THE NETWORK BRIDGE, THE NETWORK SWITCH, Hub-Switch Comparison, Managed Switches, Multilayer Switches.
5	Interconnecting the LANs: THE ROUTER, The Router Interface: Cisco 2800 Series, The Router Interface—Cisco 2600 Series, The Router Interface—Cisco 2500 Series, INTERCONNECTING LANS WITH THE ROUTER, Gateway Address, Network Segments, CONFIGURING THE NETWORK INTERFACE—AUTONEGOTIATION, Auto-Negotiation Steps, Full Duplex/Half Duplex.
6	TCP/IP: INTRODUCTION, THE TCP/IP LAYERS, The Application Layer, The Transport Layer, The Internet Layer.
7	TCP/IP: INTRODUCTION : The Network Interface Layer, NUMBER CONVERSION, Binary-Decimal Conversion, Decimal-Binary Conversion, Hexadecimal Numbers, IPV4 ADDRESSING, Private IP Addresses, IP Address Assignment.
8	TCP/IP: INTRODUCTION : SUBNET MASKS, CIDR BLOCKS, IPV6 ADDRESSING, ANALYZING COMPUTER NETWORKS—FTP DATA PACKETS.
9	Introduction to Router Configuration : INTRODUCTION, ROUTER FUNDAMENTALS, Layer 3 Networks, THE CONSOLE PORT CONNECTION, Configuring the HyperTerminal Software (Windows), THE ROUTER'S USER EXEC MODE (ROUTER>), The User EXEC Mode
10	Introduction to Router Configuration : . Router Configuration Challenge—The User EXEC Mode, THE ROUTER'S PRIVILEGED EXEC MODE (ROUTER#), Hostname, Enable Secret, Setting the Line Console Passwords, Fast Ethernet Interface Configuration, Serial Interface Configuration, Router Configuration Challenge—The Privileged EXEC Mode, TROUBLESHOOTING THE ROUTER INTERFACE
11	Wide Area Networking: INTRODUCTION, THE LINE CONNECTION, Data Channels, Point of Presence, T1 Framing, Line Coding Formats, FRAME RELAY, Establishing a Frame Relay Connection, Configuring Frame Relay Point-to-Point on the Router Networking Challenge—Frame Relay, ATM, Establishing the ATM Connection, DIAL-IN ACCESS.
12	Wide Area Networking: Analog Modem Technologies, Cable Modems, ISDN, xDSL Modems The Remote Access Server, VPN, Configuring a VPN Virtual Interface (Router to Router), Troubleshooting the VPN Tunnel Link, Configuring a VPN Server, Configuring a Remote Client's VPN Connection, WIDE AREA NETWORK ROUTING, INTERNET ROUTING, Configuring BGP, Networking Challenge—BGP, ANALYZING INTERNET DATA TRAFFIC, Utilization/Errors Strip Chart, Network Layer Matrix, Network Layer Host Table, Frame Size Distribution
13	Wireless Networking: INTRODUCTION, THE IEEE 802.11 WIRELESS LAN STANDARD, 802.11 WIRELESS NETWORKING, Bluetooth WiMAX, RFID (Radio Frequency Identification), SECURING WIRELESS LANS, CONFIGURING A POINT-TO-MULTIPOINT WIRELESS LAN
14	Optical Networking: INTRODUCTION, THE NATURE OF LIGHT, Graded-Index Fiber Single-Mode Fibers, FIBER ATTENUATION AND DISPERSION, Attenuation, Dispersion, Dispersion Compensation.
15	Optical Networking: OPTICAL COMPONENTS, Intermediate Components, Detectors, Fiber Connectorization, OPTICAL NETWORKING, ARCHITECTURES, Defining Optical Networking, Building Distribution, Campus Distribution, SYSTEM DESIGN AND OPERATIONAL ISSUES

Textbook: Networking,
Author : Jeffery S. Beasley
- Edition/Publisher : 2nd edition, Prentice Hall, 2008.



College of engineering
Network Engineering department
NE-311 – **Advanced Math I**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Advanced Math I	Theoretical Hrs. per week: 2
Code : NE-311	Applied Hrs. per week : -
Year : 3 rd	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 3

Objective of the course

Teaching students advanced engineering mathematics.

Week No.	Topics
1	Laplace Transform
2	Properties of LT
3	Unit step function
4	Inverse LT
5	Applications of LT
6	Vector Analysis: Lines and planes
7	Dot and cross product
8	Gradient, Divergence and Curl
9	Line Integral and Greens Theorem
10	Special functions – Gamma and Beta
11	Bessel function, Legendre function
12	Complex Variables
13	Cauchy-Riemann equation
14	Elementary Complex function
15	Integration in complex plane
References: - E.Kreyszig “Advanced engineering mathematics” - C.Ray Wylie “Advanced engineering mathematics”	



College of engineering
Network Engineering department
NE-312 – Microprocessors
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Microprocessors	Theoretical Hrs. per week: 2
Code : NE-312	Applied Hrs. per week : 0
Year : Third	Tutorial Hrs. per week : 1
Semester: First	Total Hrs. per week : 3

Objective of the course

After taking this course, the student will be able to: • Understand the up-front need to factor in the integration, test, verification and validation of a system in determining the system requirements and architecture. • Review and evaluate the various system integration, test, verification, and validation models in use today. • Plan the integration, verification and validation of the system of interest being developed. • Understand the criticality of defining, documenting and managing interfaces during system development. • System engineer and architect the integration and test environment. • Select suitable test methods, techniques, and metrics. • Apply fault diagnosis techniques. • Adopt a systems perspective when making integration and test decisions that affect the determination of performance, development time, or total ownership cost of the system.

Week No.	Topics
1	Introduction:
2	Systems Engineering Overview
3	Requirements Validation
4	System Interfaces
5	System Architecture Validation
6	System Integration
7	Black Box Test Cases
8	Mid-course Exam
9	White Box Test Cases
10	System Verification
11	System Transition
12	System Validation
13	Integration and Test Architecture
14	Fault Diagnosis
15	Course review

Textbook1 : Jan Tretmans, editor, Tangram: Model-based integration and testing of complex high-tech systems, Embedded Systems Institute.



College of engineering
Network Engineering department
NE-313-Signals and systems
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : signals and system	Theoretical Hrs. per week: 2
Code : CNE-313	Applied Hrs. per week : 2
Year : 3 rd	Tutorial Hrs. per week : 1
Semester: 1	Total Hrs. per week : 5

Objective of the course

The objective of this course is to provide a basic introduction to the theory of digital signal processing (DSP)

Much of what we do extends these ideas to the field of discrete time systems. Major parts of the course will concentrate on signal analysis using Fourier transforms, linear system analysis, Filter design and a few more topics

Week No.	Topics
1	Introduction to discrete linear systems
2	[1] Discrete time signals. [2] Special sequences. [3] Shift invariance
3	[4] Stability and causality. [5] Impulse response. [6] Difference equations.
4	Discrete-Time Fourier Transform and Linear Time Invariant Systems
5	Transform definitions.
6	Frequency response of linear time invariant systems. Phase and group delays. Matlab computations.
7	The Z transform
8	Mid-course Exam
9	Properties of digital filters
10	Averaging filter. Recursive smoother
11	First-order notch filter. Second-order unity gain resonator.
12	All-pass filters. Comb filters.
13	Equalization filters. Group delay, linear phase, all-pass, minimum phase
14	Fourier transforms, sampling continuous-time signals: the sampling theorem. Aliasing
15	Re-sampling digital signals.
[1] Digital Signal Processing: A Computer-Based Approach, S. K. Mitra, McGraw-Hill, Third edition, 2006. [2] The Student Edition of MATLAB, Prentice-Hall, New Jersey. [3] Supplementary class notes, available over the USC Distance Education Network.	



College of engineering
Network Engineering department
NE-314 –Data Communications
Syllabus

الجامعة العراقية
كلية الهندسة
قسم البرمجيات

Subject : Data Communications	Theoretical Hrs. per week: 2
Code : NE-314	Applied Hrs. per week : 0
Year : Third	Tutorial Hrs. per week : 0
Semester: 1 st	Total Hrs. per week : 2

Objective of the course

The students will learn the fundamentals of system communication included the types of signals, principles of coding, transmission mode, digital modulation and types of transmission media. This course will describe and explain the important fundamentals and the corner stone to build a system communication, In additional the basic process which applied to transferred data inside this system will be discussed.

Week No.	Topics
1	Basic Concepts of Data Communication
2	Signaling waveform for binary base band data. (ON-OFF, Polar, Bi-Polar, PRZ, Manchester, Differential Manchester)
3	Modulated Carrier waveforms. (ASK, PSK, FSK)
4	Multiplexing : (TDM, FDM, WDM)
5	Circuit Switching Technique.
6	Monthly Exam
7	Message Switching Technique.
8	Mid-course Exam
9	Packet Switching Technique.
10	Information and System Capacity. -Channel Capacity.
11	Modulated Pulses. (PAM, PWM, PM) -Pulse Code Modulation.
12	Error Probability and error rate.
13	Error detection and Correction Techniques.
14	Transmission Media Types and Concepts
15	Transmission Media Types and Concepts
References: 1- Data Communications and Networking Behrouz A. Forouzan, 4th Edition McGraw-Hill. 2- Communication Systems Engineering John G. Proakis, Masoud Salehi, Prentice-Hall International.	



College of Engineering
Network Engineering Department
NE-315 – **Antenna & Propagation**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم هندسة الشبكات

Subject : Antenna and Propagation	Theoretical Hrs. per week: 2
Code : NE-315	Applied Hrs. per week :
Year : third	Tutorial Hrs. per week :
Semester: 1 st	Total Hrs. per week : 2

Objective of the course

The objective of this course is to introduce the fundamental principles of antenna to analysis of antenna systems. Students will learn how to characterize antennas and how to use antennas. Different types of antennas and their applications will be introduced, with focus on linear wire antennas, loop antennas, microstrip patch antennas, antenna arrays, smart antenna and the design considerations of using antennas in wireless communication systems in addition to radio wave type and its propagation

Text book:

- Electrical Engineering, principles and applications, third edition, Allan R. Hambley.
- Antenna Theory analysis and design, third edition , Constantine A. Balanis

Week No.	Topics
1-2	-Introduction to Antenna Fundamentals: Definition and functions of an antenna, Types of Antennas and their Applications. -Comparison between an antenna & transmission line, radio communication link with transmitting antenna and a receiving antenna, radiation patterns of antennas-field and power patterns.
3-4	-Antenna parameters and definitions: beam area, beam width- Half-Power Beam width (HPBW) and First Null Beam width (FNBW) ,beam efficiency ,polarization. -Radiation Intensity , Directivity and directive gain, radiation resistance, radiation efficiency, resolution, Antenna aperture-physical and effective apertures, effective height, antenna field zones,
5-6	Point sources and arrays: Power patterns of various sources, Arrays of 2 isotropic point sources, non-isotropic point sources, principles of pattern multiplication, linear arrays of non-isotropic point sources of equal amplitude & spacing, broad side, end fire arrays, radiation pattern determination of linear arrays, Dolph-Tchebysheff distribution for linear arrays.

7	Mid-course Exam (1)
8-9	Wire Antennas • Electric Dipole and Thin Linear Antenna: Short electric dipole radiation of short dipole, various field components radiation patterns, radiation resistance of linear antenna, radiation resistance of half wave dipole, monopole antenna, folded dipole antenna. • Loop Antenna: EMF equation of loop antenna, directivity, Small loop short magnetic dipole, comparison of far field of small loop and short dipole loop antennas, field pattern of circular loop antenna & its radiation resistance. • Helical antenna: Helical geometry, transmission radiation modes. • Yagi-Uda antenna
10	Aperture Antennas • Reflector antenna: Radiation mechanism, types of reflector antennas: Parabolic reflector. • Slot, Horn antenna: its pattern, principle of complementary antennas and horn antenna
11	Smart antenna and its application
12	Antennas for special applications: Antennas design consideration for satellite communication, radar, remote sensing, antenna for terrestrial mobile communication systems, GPR, Embedded antennas.
13-14	Radio wave propagation: Modes of propagation, Ground Wave Propagations, Structure of troposphere and ionosphere, Characteristic of ionosphere layers, Sky wave propagation, Fading, ionosphere absorptions, Multi-hop propagation, Space wave propagation and Super refraction
15	Mid-course Exam (2)



College of engineering
Network Engineering department
NE-316–Java programming
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : java programming	Theoretical Hrs. per week: 2
Code : NE-316	Applied Hrs. per week : 2
Year : 3 rd	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 5

Objective of the course

- the student will be knowledgeable enough about basic Java language syntax and semantics to be able to successfully read and write Java computer programs;
- be comfortable using the Java Application Programming Interface (Java API) to learn about and then to successfully and appropriately use an already-written Java class;
- have obtained experience designing, implementing, testing, and debugging graphical user interfaces that respond to user events using Java;
- have obtained experience designing, implementing, testing, and debugging Java classes, applications, and applets.

Week No.	Topics
1	Intro to Java
2	Java basics
3	Java objects
4	Intro to graphical user interfaces (GUIs) in Java -- includes intro to Java event handling and intro to Swing
5	Intro to GUIs in Java, continued
6	Intro to layout managers
7	Intro to layout managers, continued
8	Mid-course Exam
9	(tentative) Intro to applets
10	Intro to threads
11	Input/output and files
12	Intro to collections and generics
13	packages and jars
14	Review and examples
15	Review and examples.

Text book:
"Core Java™, Volume I - Fundamentals", 9th Edition, Cay Horstmann, Gary Cornell, Pearson Education, 2011, ISBN 978-0-13-708189-9



College of engineering
Network Engineering department
NE-317-**Distributed Database**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Distributed Database (Adv. DB)	Theoretical Hrs. per week: 2
Code : NE-317	Applied Hrs. per week : 2
Year : 3rd	Tutorial Hrs. per week : 1
Semester: 1	Total Hrs. per week : 5

Objective of the course

This course covers basic technology and advanced research topics in connection with distributed data management and big data. It will cover the following topics.

- Parallel database management
- Distributed databases and distributed query processing
- Data mining.

Week No.	Topics
1	Introduction,
2	Parallel database architecture, speedup, scale-up I/O parallelism,
3	Inter-query and Intra-query parallelism, Inter-operational and Intra-operational parallelism
4	parallel query evaluation, Design of parallel systems,
5	<i>Distributed Databases</i> , Study of DDBMS architectures
6	Comparison of Homogeneous and Heterogeneous Databases
7	Analysis of Concurrency control in distributed databases,
8	Mid-course Exam
9	Implementation of Distributed query processing.
10	Distributed data storage, Distributed transactions
11	Commit protocols, Availability,
12	Distributed query processing
13	Introduction to data mining
14	Data mining functionalities
15	clustering - k means algorithm,
1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database system concepts", 5th Edition, McGraw Hill International Edition 2. Jiawei han, Micheline Kamber, "Data Mining: Concepts and systems", Morgan Kaufmann Publishers	



College of engineering
Network Engineering department
NE-321 –Advanced Math II
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Advanced Math II	Theoretical Hrs. per week: 2
Code : NE-321	Applied Hrs. per week : -
Year : 3 rd	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 3

Objective of the course

This course is of the main mathematical techniques in engineering and physics. It is intended to provide some background for courses in those disciplines with a mathematical requirement that goes beyond calculus. Model problems in mathematical physics are studied in detail. Applications are emphasized throughout.

Week No.	Topics
1	Partial Differential Equation
2	Diffusion equation, separation of variables.
3	Laplace's Equation, wave Equation
4	Sturm Lioville Theory.
5	PDE in more than one space dimension (Cartesian coordinates)
6	Non-homogenous PDE / Method of Eigen function expansion.
7	Numerical solution of nob-linear equations.
8	Mid-course Exam
9	Bisection method, newton's and secant methods.
10	Fixed points and functional iteration.
11	Roots on polynomials.
12	Approximating functions:
13	Newton's divided differences, Lagrange interpolating polynomials.
14	Hermite interpolation.
15	Spline interpolation.
References:	
- "Advanced Engineering Mathematics", 9th ed, Erwin Kreyszig, 2005 - "Mathematics for engineers: A modern interactive approach ", 2nd ed, Tony Croft and Robert Davison, 2003.	



College of engineering
Network Engineering department
NE-322 – Microprocessors application
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Microprocessors application	Theoretical Hrs. per week: 2
Code : NE-322	Applied Hrs. per week :2
Year : third	Tutorial Hrs. per week : 1
Semester: 2nd	Total Hrs. per week : 5

Objective of the course

After taking this course, the student will be able to: • Understand the up-front need to factor in the integration, test, verification and validation of a system in determining the system requirements and architecture. • Review and evaluate the various system integration, test, verification, and validation models in use today. • Plan the integration, verification and validation of the system of interest being developed. • Understand the criticality of defining, documenting and managing interfaces during system development. • System engineer and architect the integration and test environment. • Select suitable test methods, techniques, and metrics. • Apply fault diagnosis techniques. • Adopt a systems perspective when making integration and test decisions that affect the determination of performance, development time, or total ownership cost of the system.

Week No.	Topics
1	Representing Binary Code With LED Array
2	Representing BCD Code With LED Array
3	Seven Segment Interfacing
4	Square Traffic Light
5	Light Detected Resistor (LDR).
6	IC Tester
7	Stepper Motor
8	Mid-course Exam
9	Rotate The Stepper Motor Bidirectional
10	Reading Switches Status And Output To Leds.
11	Using Switches As Input To Control Mechanical Press
12	Converting Analogue Input (Variable Pot) To Digital
13	Generating Sine Wave Using DAC
14	Motor Control
15	Temperature Control
Jan Tretmans, editor, Tangram: Model-based integration and testing of complex high-tech systems, Embedded Systems Institute.	



College of engineering
Network Engineering department
NE-323 –Digital signal processing

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Digital signal processing	Theoretical Hrs. per week: 2
Code : NE-323	Applied Hrs. per week : 0
Year : 3rd	Tutorial Hrs. per week : 1
Semester: 2	Total Hrs. per week : 3

Syllabus

Objective of the course

The objective of this course is to provide an introduction to the Fourier and Laplace transforms and concepts such as linearity and shift invariance that are used in the description and analysis of linear analog systems. Much of what we do extends these ideas to the field of discrete time systems. Major parts of the course will concentrate on signal analysis using Fourier transforms, linear system analysis, Filter design and a few more advanced topics. We will study the discrete Fourier transform and its properties. The Students will also study the sampling theorem and the relationship between continuous and discrete time transforms.

Week No.	Topics
1	Fourier transforms, sampling
2	A/D conversion and quantization D/A conversion , Polyphase decomposition
3	Polyphase DFT filterbanks ,Bandpass sampling
4	The discrete Fourier transform
5	Definition of DFT and relation to Z-transform ,Properties of the DFT. Linear and periodic convolution using the DFT. Zero padding, spectral leakage, resolution and windowing in the DFT.
6	The fast Fourier transform.
7	Decimation in time FFT ,Decimation in frequency FFT.
8	Mid-course Exam
9	Digital filter design, Finite impulse response (FIR) filters,
10	[1] Window design techniques. [2] Kaiser window design technique. [3] Equiripple approximations.
11	Infinite impulse response (IIR) filters, Bilinear transform method. Examples of bilinear transform method.
12	Structures and properties of FIR and IIR filters and review
13	[1] IIR - Direct, parallel and cascaded realizations. [2] FIR – Direct and cascaded realizations.
14	[3] Coefficient quantization effects in digital filters [4] Final review.
15	Final Exam
[1] Digital Signal Processing: A Computer-Based Approach, S. K. Mitra, McGraw-Hill, Third edition, 2006.	
[2] The Student Edition of MATLAB, Prentice-Hall, New Jersey.	
[3] Supplementary class notes, available over the USC Distance Education Network.	



College of Engineering
Network Engineering Department
NE-324–**Modern Control Engineering**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم هندسة الشبكات

Subject : Modern Control Engineering	Theoretical Hrs. per week: 2
Code : NE-324	Applied Hrs. per week : 2
Year : Third	Tutorial Hrs. per week : 1
Semester: 2 nd	Total Hrs. per week : 5

Objective of the course

The course provides the students the essential knowledge related to control system. Also the course aims at giving the student adequate skills in mathematical modelling, block diagram reduction, time domain analysis (transient and steady state) and control system stability.

Week No.	Topics
1-3	1- Introduction to Control Systems 1-1 Introduction 1-2 Examples of Control Systems 1-3 Closed-Loop Control Versus Open-Loop Control
4-8	2- Mathematical Modeling of Control Systems 2-1 Introduction 2-2 Transfer Function and Impulse-Response Function 2-3 Block Diagram Reduction 2-4 Modeling in State Space 2-5 Mathematical Modeling of Mechanical Systems 2-6 Mathematical Modeling of Electrical Systems
9	Mid-course Exam
10-13	3- Transient and Steady-State Response Analyses 3-1 First-Order Systems 3-2 Second-Order Systems 3-3 Routh's Stability Criterion 3-4 Steady-State Errors
14-15	4- Root-Locus Method 4-1 Root-Locus Plots 4-2 Root-Locus Plots of Positive Feedback Systems
Text book : [1] Modern Control Engineering” by Ogata K., 4th Edition 2002. [2] Control system engineering, N. S. Nise 6th edition.	



College of engineering
Network Engineering department
NE-325 – **Software engineering**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Software engineering Modeling	Theoretical Hrs. per week: 2
Code : NE-325	Applied Hrs. per week : -
Year : Third	Tutorial Hrs. per week : 1
Semester: second	Total Hrs. per week : 3

Objective of the course

The aim of this course is to introduce some types of system model that may be developed as part of the requirements engineering and system design processes, the student should understand how graphical models can be used to represent software systems;

Week No.	Topics
1	System Modeling, Context models, interaction models.
2	Interaction models, behavioral models, Model driven engineering.
3	Architectural design decisions, Architectural views
4	Architectural patterns, Application architectures
5	Design and implementation, Object-oriented design using the UML, Design patterns
6	Implementation issues.
7	open source development
8	Mid-course Exam
9	Software testing, Development testing, Test-driven development
10	Release testing, User testing
11	Evolution processes
12	Program evolution dynamics
13	Software maintenance
14	Legacy system management
15	Case studies.
Text book: "Software engineering", by Ian Sommerville, 9 th edition, Addison-wesley, 2011 ISBN-13: 978-0-13-703515-1	

Al Iraqia University
Engineering College, Network Department
3rd Grade:
Class-Wireless Networks NE-326
Syllabus

Textbook:

- *Wireless Sensor Networks: Principles and Practice*, Fei Hu, Xiaojun Cao. CRC Publishers, 2010.

Additional course material:

Lecture slides and research papers:

- Yick, J., Mukherjee, B., & Ghosal, D. (2008). Wireless sensor network survey. *Computer Networks*, 52(12), 2292–2330. <https://doi.org/10.1016/j.comnet.2008.04.002>

Credit distribution:

Task	Grade
Quizzes , homework, and activities	20 points
Assignment	20 points
Total Average	40 points
Final Exam	60 points
Final result	100

Academic dishonesty: Academic dishonesty (Such as: behavior in class, exam and copying reports) will be dealt with according to the Honesty Policy of Al-Iraqia University.

Class objectives and description:

This course will cover the fundamental and principles of Wireless Network then the students will be guided to Wireless Sensor Network area. We will cover the latest research in this area. We will cover all aspects of these unique and important systems, from the hardware and radio architecture through protocols and software to applications. Topics will include sensor network architectures, hardware platforms, quality of service (QoS) management and routing protocols.

Each student must complete a semester-long course project related to wireless sensor networks and the topic that he/she will be assigned.

Class Project:

The class project is an important component of this course. Students will be able to put their gained knowledge to practice and demonstrates their skills. The project topics should be approved by the instructor.

In general, two possible arrangements will be allowed:

1. *Building a framework of Wireless Network:*

The students will be permitted to work individually or form groups of 2-3 members and propose an application. The group is expected to develop the protocols, Hardware platform and software and then demonstrates a working prototype network that suits the picked application.

Students are required to justify all design decisions made and compile that and all learned lessons in a professionally written project report.

2. *Investigating an open research problem in the context of Wireless Networks:*

For this arrangement, a student can work alone or with at most one additional classmate. The students are expected to survey the literature, propose a solution, and validate the performance. Students are to prepare a well-written paper that describes the problem, details, and justifies the solution and discusses the volition results.

Assignment Presentation

Presentation and demonstrations of projects are scheduled during the classes. Selection of the presenter will be performed by groups. After the individual's presentation, all team members **SHOULD** participate in addressing any questions posed.

The content, arguments, and ability to address questions will provide the basis for the presentation score. Project scoring will be based on the following criteria:

Criteria	Points
Understanding the problem and its complexity.	15
Application of the course material.	15
Identifying the design alternatives and feasibility (practicality) of the approach.	15
Paper organization of the project.	10
Demonstration of data backed decisions.	10
Ability to defend the data (answer questions)	10
Compelling nature of the argument (ability to sell)	5
Organization / Completeness of the presentation.	10
Creativity, development of a unique approach.	10
TOTAL	100

Then the score will be converted to:

20 POINTS

Course Work Policy

- Failure to complete the required in-class presentations for the reading assignment(s) results in the loss of the entire associated grade.
- Late homework is not accepted unless an extension is preapproved by the instruction.

Topic outline:

Week	Title	Description
1.	• Introduction to course details • What is Wireless Network.	Course Information, Introduction to Wireless Networks, History, and Motivations,
2.	• Ch1: What is Wireless Sensor Network • Broad classification and Taxonomy of various issues and Challenges in a WSN.	Introduction. Power consuming and Data Rates Challenges, Framework and Design factors Applications and Performance metrics,
3.	• Ch2: IEEE 802.15.4 Standard	IEEE 802.15.4 Standard and Wireless Sensor Network
4.	• Full Function Device and Reduced Function Device. • IEEE 802.15.4 Topologies	According to the IEEE 802.15.4 standard.
5.	• Ch3: General Wireless Sensor Node Architecture	System-on-Chip and Component-based Design
6.	• Microcontroller Selection. • Communication Device Selection. • Sensing Device Design	According to the microcontroller conditions and requirements because the controller is considered as the heart of the sensor node,
7.	Assignment Evaluation	20% From the grade
8.	• Ch4: Embedded Software Design for WSNs	Embedded software design is the most important and difficult task in wireless sensor network design and development.
9.	• Ch5: Routing Technologies in WSNs	A routing protocol is software that sits in the network layer and is responsible for deciding on which output route an incoming packet should be transmitted.
10.	• Ch6: Optimization of Sink Node Positioning	The signals from the individual sensors of WSNs are often transferred to the Internet or other terminals via several sink nodes
11.	Ch6: Continue	
12.	Mid Term Exam	** Based on Availability.
13.	Special Topic 1.	Based on the requirements for the students' graduation projects.
14.	Special Topic 2.	



College of engineering
Network Engineering department
NE-327–Image processing
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Image processing	Theoretical Hrs. per week: 4
Code : NE-327	Applied Hrs. per week : 2
Year : 3 rd	Tutorial Hrs. per week : 2
Semester: 2 nd	Total Hrs. per week : 8

Objective of the course

The purpose of this course is to impart knowledge on the basic concepts of the image processing.

To study the image fundamentals and mathematical transforms necessary

1. for image processing. To study the image enhancement techniques.
2. To study image restoration procedures
3. To study the image compression procedures
4. To study the image segmentation and representation techniques

Week No.	Topics
1	DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS: Elements of visual perception,
2	Image sampling and quantization Basic relationship between pixels – Basic geometric transformations- Introduction to Fourier Transform and DFT
3	Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh
4	Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.
5	IMAGE ENHANCEMENT TECHNIQUES: Spatial Domain methods: Basic grey level transformation – Histogram equalization
6	Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters : Smoothing – Sharpening filters – Homomorphic filtering.
7	IMAGE RESTORATION: Model of Image Degradation/restoration process – Noise models
8	Mid-course Exam
9	Inverse filtering -Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition.
10	IV-IMAGE COMPRESSION: Lossless compression: Variable length coding, LZW coding
11	Bit plane coding predictive coding-DPCM - Lossy Compression: Transform coding, Wavelet coding.
12	Basics of Image compression standards: JPEG, MPEG, Basics of Vector quantization..
13	IMAGE SEGMENTATION AND REPRESENTATION: Edge detection – Thresholding - Region Based segmentation
14	Boundary representation: chain codes- Polygonal approximation – Boundary segments.
15	boundary descriptors: Simple descriptors-Fourier descriptors – Regional descriptors –Simple descriptors- Texture.
TEXT BOOKS 1. Rafael C Gonzalez, Richard E Woods 2nd Edition, “ <i>Digital Image Processing</i> ” - Pearson Education, 2003. 2. William K Pratt, “ <i>Digital Image Processing</i> ” John Willey, 2001.	



College of Engineering
Networks Engineering department
NE411 – Soft Computing I
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Soft Computing I	Theoretical Hrs. per week: 2
Code : NE411	Applied Hrs. per week : 2
Year : Fourth	Tutorial Hrs. per week : 1
Semester: First	Total Hrs. per week : 5

Objectives of the course

The objectives of this course are to:

- Introduce the basic principles, techniques and applications of soft computing.
- Study the concepts and algorithms involved in neural networks.
- Explain Artificial Neural Networks and its categories.
- Design NN based solutions for real-world and engineering problems.
- Apply and analyze various neural network architectures and learning rules.

Week No.	Topics
1	Introduction to Soft Computing
2	Concept exploration of Neural networks, Genetic algorithm and Fuzzy logic
3	Biological and artificial neurons, classifications of artificial neural networks
4	Types of NN Activation Functions and Neuron response calculation
5	NN Learning Algorithms and Decision Boundary
6	Hebbian, Perceptron and Delta Learning Rules
7	Back Propagation NN
8	Mid-course Exam
9	Hopfield Network
10	Bidirectional Associative Memory (BAM) NN
11	Adaline Neural Network
12	Kohonen Network
13	Self-organizing Network, Adaptive Resonance Theory (ART)
14	Hybrid approaches (neural networks, fuzzy logic, genetic algorithms sets).
15	Case Studies and applications

Textbooks:

- 1- Aliev,R.A, Aliev,R.R., Soft Computing and its Application, World Scientific Publishing Co. Pte. Ltd., 2001, ISBN 981-02-4700-1
- 2- Charu C. Aggarwal, Neural Networks and Deep Learning: A Textbook, Springer, 1st Edition, 2018, ISBN-13 : 978-3319944623
- 3- S.N. Sivanandam& S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011



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Network Engineering departmen
NE-412 – **Internet programmin**
Syllabus

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قسم الشبكات

Subject : Internet Programming	Theoretical Hrs. per week: 2
Code : NE-412	Applied Hrs. per week : 0
Year : Fourth	Tutorial Hrs. per week : 1
Semester: First	Total Hrs. per week : 3

Course objectives

This course provides students the opportunity to: **1.** Present the student with basic web design knowledge. **2.** Provide the student with techniques required to create interactive web applications. **3.** Familiarize the student with how relational database servers, such as MySQL and Oracle, can be used to power a web based application. **4.** Introduce students to TCP/IP networking concepts and the creation of client/server applications. **5.** Familiarize the student with the creation of Java applications and Applets.

Week No.	Topics
1	Introduction to HTML : Introduction to Internet programming, HTML language, Description and running through IE, How to write codes in HTML?, Headings, titles. The body in HTML language, background colors, pages and breaks
2	Lists & Tables in HTML language : Ordered list and unordered list, creating table, table attributes and features
3	Images : Images , Combining paragraphs with table and images.
4	Forms in HTML I : Command buttons, Textboxes and text areas, Checkboxes and radio buttons.
5	Forms in HTML II : Select lists in Forms, combining Forms with images and tables, Introduction to dynamic programming, client side versus server side
6	Client-Side Programming and Server-Side Programming : Client-Side Programming and Server-Side Programming, JavaScript, What is JavaScript, What JavaScript can do?, What JavaScript can't do?, The Script Tag, Handling older browsers, JavaScript Statements, Script statement execute, JavaScript data types, Variables, Data type conversions
7	Arithmetic Operators : Arithmetic operators, Comparison operators, Examples and solutions Control Structures (if statement, if-else statement), Loops (for loop), Functions, Function parameters
8	Mid-Course Exam
9	Variable scope in JavaScript : Variable scope in JavaScript, Test-1 : JavaScript variables, loops and decisions. Arrays, creating, assignment and accessing array data, Document object in arrays, examples and solutions
10	Window and Document objects : Window and Document objects, the window object, creating window, properties and methods: window.status, window.alert, window.confirm, window.prompt The location object, the history object, the document object, the link object, Examples and solutions
11	Forms and Form elements : Forms and Form elements, creating a form, form properties, text object, button object, checkbox object, Radio object, Select object, Passing form data to functions, Submitting forms, Strings, Math and Date, Examples and solutions.
12	Images and dynamic HTML : Images and dynamic HTML, the image object, interchanging images, prechaching images, creating image rollover, Examples and solutions. The String object (in detail), Examples and solutions
13	The events: The event object, Event handler, Event properties, Window event-handler, layer event handler, mouse event handler, other event handlers
14	Global functions: Global functions and statements, eval(), escape(), isNaN(), number(), parseFloat(), parseInt(), string(), unescape(), unwatch(), watch()
15	Data-Entry : Data-Entry validation, isEmpty(), isNumber(), isInteger(), isPosInterger Test 3: Images, Strings, and Global functions String : The String object, Examples and solutions
Text book-1: The Complete Internet and World Wide Web Programming Training course	
Author : Harry M.Deitel, Paul J. Deitel, Tom Nieto , Edition & Year public : Prentice Hall PTR,2000	



College of engineering
Network Engineering department
NE-413 – **Parallel Processing**
Syllabus

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قسم الشبكات

Subject : Parallel processing	Theoretical Hrs. per week: 2
Code : NE-413	Applied Hrs. per week : 0
Year : Fourth	Tutorial Hrs. per week : 1
Semester: First	Total Hrs. per week : 3

Objective of the course

This course will center on making students experts in using various forms of commodity-based parallel processing. The lectures will focus on the architectural and implementation details, and algorithms and programming methods, needed to obtain good performance from these systems. Entering students are expected to be comfortable writing C programs and to have had some exposure to the basic concepts of computer architecture.

Week No.	Topics
1	Introduction, Parallel architectures
2	Parallel algorithm design.
3	Shared memory programming
4	Message passing programming
5	Combining MPI and OpenMP, Debugging MPI programs
6	Floyd's algorithm
7	Performance analysis
8	Mid-course Exam
9	Matrix-vector multiplication
10	Matrix multiplication, Finite difference methods
11	Sorting
12	Combinatorial search,
13	External memory sorting
14	Heterogeneous architectures
15	Load balancing

Textbook 1: John Hennessy and David Patterson, *Computer Architecture: A Quantitative Approach*, Morgan Kauffman Publisher.

Textbook 2: Parallel Programming in C with MPI and OpenMP by M.J. Quinn, McGraw-Hill Science/Engineering/Math, 1 st edition, 2003, ISBN: 0072822562.



College of Engineering
Network Engineering Department
NE- 414 – Information Theory
Syllabus

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Subject : Information Theory and Coding	Theoretical Hrs. per week: 2
Code : NE-414	Applied Hrs. per week : 0
Year : Forth	Tutorial Hrs. per week : 1
Semester: 1 st	Total Hrs. per week : 3

Objective of the course

At the end of the course, the student will be able to understand the amount of information, entropy, channel capacity, source coding.

Week No.	Topics
1-3	1- Information 1-1 Sample space, elements and events. 1-2 Probability and probability line. 1-3 Complement, intersection of two events, mutually exclusive and union. 1-4 Venn diagram 1-5 Permutations and combinations. 1-6 Bayes theorem. 1-7 Random variables: discrete and continuous random variable.
4-9	2- Information and basic element of communication system 2-1 Shannon diagram 2-2 Self information 2-3 Entropy 2-4 Source entropy, maximum source entropy, source entropy rate, joint entropy, conditional entropy and marginal entropy. 2-5 Trans information 2-6 Channel 2-7 Symmetric channel, discrete memory less channel and binary erasure channel. 2-8 Channel capacity
e	Mid-course Exam
11-15	3- Source Coding 3.1 Sampling theorem , coding efficiency and redundancy 3.2 Type of source coding 3.3 Shannon code, Shannon fano code and Huffman code. . .
Text book : [1] Elements of Information Theory, 2 nd , ed, Homas M. Cover & Joy A. Thomas. [2] Digital Communication, John G Proakis. [3] Probability Random Variables and Random Signal, Principles Peebles, 4 th ed.	



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NE-415 – **Network Protocols**
Syllabus

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Subject : Network Protocols	Theoretical Hrs. per week: 4
Code : NE-415	Applied Hrs. per week : 2
Year : Fourth	Tutorial Hrs. per week : 1
Semester: First	Total Hrs. per week : 7

Objective of the course

At the completion of the course the student will be able to: Explain the basics of current computer networking protocols. Write simple programs for network communication.

Week No.	Topics
1	Network Models and Network Architectures, Protocol Design Issues, Transmission and Multiplexing
2	Design and Analysis of Link Level Protocols Protocol Functionality, Layering and Framework (SP3)
3	LAN Design, Architectures and Protocols (802.xx) LAN Implementation, Ethernet Switching
4	Internet Protocol (IP) Design, Internet Addressing IETF and the Internet Standards Process
5	WAN Protocols and Network Architecture IP Protocol Implementation, VLANs
6	Internetworking and Routing
7	Transport Layer Protocol Design TCP/UDP Analysis and Implementation
8	Application Protocols: Email, FTP, Telnet and HTTP
9	Network Security –I
10	Network Security –II Wireless Networks
11	Broadband Network Design Issues Internet Backbone Network Architecture
12	IP Telephony and Internet Video H.323 and SIP
13	Network Management Functions and Protocols Network Quality of Service (QoS)
14	Network Models and Network Architectures, Protocol Design Issues, Transmission and Multiplexing
15	Design and Analysis of Link Level Protocols Protocol Functionality, Layering and Framework (SP3)
Text book: Internetworking with TCP/IP Author : Douglas E. Comer Edition & Year public : 1 st Prentice Hall, 2000	



College of engineering
Network Engineering department
NE-416 – **Queuing Theory & Systems**
Syllabus

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Subject : Queuing Theory & Systems	Theoretical Hrs. per week: 2
Code : NE-416	Applied Hrs. per week : 0
Year : Fourth	Tutorial Hrs. per week : 1
Semester: First	Total Hrs. per week : 3

Objective of the course

This course aims to prepare students with a good mathematical background in order to formally analyze the performance of various designs in computer systems and networks. Being able to analyze a design before it is physically implemented, or even after the implemented system starts its operation, has been proved to be an important ability for system designers. As computer systems and networks can be modeled as queuing systems, queuing theory serves as the key for performance analysis work.

Week No.	Topics
1	Introduction to IP traffic, TCP/IP architecture model, Aspect of IP modeling, Quality of Service
2	Classical Traffic Theory – I Kendall notations, Kolmogorov Equation, transition process, Markov system M/M/n
3	Classical Traffic Theory – II Transition process, Markov system M/M/n
4	Special traffic models, Loss system M/M/∞
5	Renewal Processes
6	General Poisson Arrival and Serving Systems M/G/n
7	General Serving Systems GI/G/n
8	Network Models, Jackson's Network, Riemann Solvers
9	Mathematical Modeling of IP-based Traffic , Scale-free Traffic Observation, Self-Similar Processes,
10	Models for Time Sensitive Traffic
11	Fractional Levy Motion in IP-based Network Traffic
12	Performance of IP: Waiting Queues and Optimization - I
13	Classical Traffic Theory – I Kendall notations, Kolmogorov Equation, transition process, Markov system M/M/n
14	Queuing in Multifractal Traffic – I
15	Queuing in Multifractal Traffic - II

Text book: Internetworking with TCP/IP

Author : Douglas E. Comer

Edition & Year public : 1st Prentice Hall, 2000



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NE-421– Soft Computing
Syllabus

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Subject : Soft Computing II	Theoretical Hrs. per week: 2
Code : NE-421	Applied Hrs. per week : 0
Year : Fourth	Tutorial Hrs. per week : 1
Semester: Second	Total Hrs. per week : 3

Course objectives

The objectives of this course are to:

- Study the concepts and algorithms involved in evolutionary computation (Genetic algorithm and Genetic Programming) and fuzzy logic.
- Apply genetic algorithms to provide solutions to real world problems.
- Identify crisp and fuzzy sets theories.
- Introduce fuzzy systems and its applications.
- Apply Fuzzy rules in the design process of various fuzzy systems.
- Describe soft computing techniques and their roles in building intelligent machines.

Week No.	Topics
1	Soft Computing Core Components – A Review
2	Genetic Algorithms (GA) concept and algorithm
3	Chromosome encoding and selection techniques
4	GA operators and their types
5	Applied Examples using GA
6	Genetic Programming
7	Concepts of fuzzy logic
8	Mid-Course Exam
9	Basic elements of fuzzy system
10	Universe of discourse, and crisp and fuzzy sets definitions
11	Types of fuzzy membership functions
12	Fuzzy Relations
13	Fuzzy Projections and decompositions
14	Fuzzy Rules and Algorithm
15	Case studies and applications

Textbooks:

- 1- J. Fodor and R. Fuller (Eds.). Advances in Soft Computing, Intelligent Robotics and Control. Springer, 2014
- 2- F. O. Karray and C. W. Silva. Soft Computing and Intelligent Systems Design: Theory, Tools and Applications. 1st Edition Addison-Wesley, 2004.
- 3- Alan Casey, Soft Computing: Developments, Methods and Applications, Nova Science Publishers, Inc.; UK ed. edition (15 June 2016), ISBN-13: 978-1634851336.



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NE-422 – **Mobile Communication**
Syllabus

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Subject : Mobile Communication	Theoretical Hrs. per week: 2
Code : NE-422	Applied Hrs. per week : 0
Year : Fourth	Tutorial Hrs. per week : 0
Semester: Second	Total Hrs. per week : 2

Course objectives

The primary objectives of this course are to:

- Understand the fundamentals of wireless communications.
- Define the types of cellular systems and cellular wireless networks.
- Identify the requirements and limitations of 2G, 2.5G and 3G wireless mobile communication.
- Design the architecture of various wireless telecommunication systems.
- Analyze (TDMA/FDMA/CDMA) system according to the complexity, installation cost, speed of transmission, channel properties etc.

Week No.	Topics
1	Analog Communication Systems – A review
2	Digital Communication Systems – A review
3	Wireless Transmission: Signals and antennas types
4	Wireless Transmission: Signals propagation and multiplexing techniques
5	Cellular Systems
6	Types and characteristics of cellular systems handoff
7	Cellular Wireless Networks
8	Mid-Course Exam
9	GSM-architecture (2G)
10	Mobility management and handover security
11	GSM and SMS
12	VoIP service for Mobile Networks
13	GPRS (2.5G) Architecture and procedures
14	UMTS (3G) system architecture and UMTS radio
15	UTRA Network (UTRAN)
Textbook: Schiller, Mobile Communication, 2003	



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NE-423 – **Wireless sensor networks**
Syllabus

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Subject : Wireless sensor networks	Theoretical Hrs. per week: 2
Code : NE-423	Applied Hrs. per week : 0
Year : Fourth	Tutorial Hrs. per week : 1
Semester: Second	Total Hrs. per week : 3

Course objectives

The primary objectives of this course are to:

- Obtain a broad understanding of the technologies and applications for the emerging and exciting domain of wireless sensor networks,
- Get in-depth hands-on experience in designing and developing a real operational embedded network system, and
- Design and develop foundational systems software, sensor-actuator-controller algorithms and network protocols.

Week No.	Topics
1	Introduction : WSN and Applications
2	The FireFly platform, LAB
3	Sensor Platforms and Tools
4	Sensors, physical Layer 1 LAB
5	Physical Layer-2, Medium Access Control
6	Routing, Clock Synchronization
7	Power Management, Sensor Operating Systems
8	Mid-Course Exam
9	Security
10	Topology Control
11	Programming abstractions.
12	Data Dissemination
13	Storage
14	Mobility and Distributed Control
15	Sensor Network Simulation
Textbook: Edgar H. Callaway Jr. and Edgar H. Callaway, “Wireless Sensor Networks: Architectures and Protocols”, Auerbach, ISBN 0849318238, 360 pages, 2003	



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NE-424 – **Network Security**
Syllabus

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قسم الشبكات

Subject : Network Security	Theoretical Hrs. per week: 2
Code : NE-424	Applied Hrs. per week : 0
Year : Fourth	Tutorial Hrs. per week : 1
Semester: Second	Total Hrs. per week : 3

Course objectives

1. Understand security concepts, Ethics in Network Security. 2. Understand security threats, and the security services and mechanisms to counter them. 3. Comprehend and apply relevant cryptographic techniques 4. Comprehend security services and mechanisms in the network protocol stack 5. Comprehend and apply authentication services and mechanisms 6. Comprehend and apply relevant protocol like SSL, SSH etc. 7. Comprehend and apply email security services and mechanisms 8. Comprehend and apply web security services and mechanisms 9. Comprehend computer and network access control

Week No.	Topics
1	Introduction: computer security, network security, internet security, the OSI security architecture, security attacks, Security Services, Mechanisms, Model for network security.
2	Authentication Applications, Kerberos, Kerberos Realms, X.509 Authentication Service, X.509 Certificates
3	public key infrastructure, CA Hierarchy, Certificate Revocation, Certificate Extensions
4	Electronic Mail Security, Pretty Good Privacy (PGP), PGP Operation, and Compression,
5	PGP Session Keys, PGP Key Rings, S/MIME (Secure/Multipurpose Internet Mail Extensions), S/MIME Certificate Processing, Certificate Authorities
6	IP security, IPSec, IPSec Architecture, Authentication Header (AH), Encapsulating Security Payload (ESP)
7	combining security associations, Key management, Oakley, ISAKMP,
8	Mid-Course Exam
9	Web security, SSL Architecture, SSL Record Protocol, SSL Handshake Protocol, TLS (Transport Layer Security), Secure Electronic Transactions (SET), Payment Gateway Authorization
10	Intrusion, intrusion techniques, intrusion detection, rule based intrusion detection, distributed intrusion detection
11	password management, honey pots, managing passwords.
12	Malicious software, types, structure,
13	E-mail viruses, virus countermeasures, antivirus technology, denial of service.
14	Firewall, design principles, packet filters, stateful packet filters, gateway, proxy, bastion host, configuration, trusted systems.
15	Reference model, IT security evaluating.
Text book1: Cryptography and Network Security; Principles and Practice Author : William Stallings. Edition & Year published : 5 th Edition, 2010 Textbook2: Cryptography and Network Security , 2008	



College of engineering
Network Engineering department
NE-425– **Network Management**
Syllabus

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قسم الشبكات

Subject : Networks Management	Theoretical Hrs. per week: 2
Code : NE-425	Applied Hrs. per week : 0
Year : Fourth	Tutorial Hrs. per week : 1
Semester: Second	Total Hrs. per week : 3

Objective of the course:

Given the ever growing difficulty of managing networks it is important for individuals interested in network administration to obtain the ability to develop tools that can assist with common network management tasks, or extend upon existing management solutions to meet organizational needs not being adequately addressed. The primary purpose of this course is to provide students with fundamental network management principles, and to teach them introductory programming techniques for use with solving common network management problems.

Week No.	Topics
1	Introduction : Introduction to Network Management, Documenting the network, & Managing Network Users.
2	Active Directory 1 : Creating New Users, Setting Users Properties, resetting User Passwords, Enabling & Disabling User accounts
3	Active Directory 2 : Deleting Users, Working with Groups, Creating a Logon Script.
4	Network Storage : Permissions, Shares, & File server role
5	Network Storage : Bottleneck definition, Common Network Bottlenecks, Tuning the Network for the most Compulsive way.
6	Network Performance Monitoring : Monitoring Network Performance, Creating Performance logs, & Performance tips.
7	Solving Network Problems : Network Connection checking, error messages, & event logging.
8	Mid-Course Exam
9	Data Backup 1 : Data Backup, Tapes & tape drives, Backup Software, & Types of Backup. Data Backup 1 : Local & Network Backups, Backup Security
10	Securing Network : Security Approaches, Physical Security, Securing User accounts.
11	Network Hardening I : Firewall types, Built in firewall in OS, & Virus Protection.
12	Network Hardening II : Virus Protection.
13	Network Mistakes : Important files deletion, Safe Server Backup, Wireless AP.
14	Networking with Linux : Linus Distributions, installation, GNOME, User Accounts Management, User Configuration.
15	Networking with MAC : Macintosh Network,
Textbook: Network Management: Concepts and Practice, A Hands-On Approach, J. Richard Burke, Prentice Hall, May 2003, ISBN-13: 978-0130329509	



College of Engineering
Network engineering department
NE-426 – **Digital Communication**
Syllabus

الجامعة العراقية
كلية الهندسة
قسم الشبكات

Subject : Digital communication	Theoretical Hrs. per week: 2
Code : NE-426	Applied Hrs. per week : 0
Year : Fourth	Tutorial Hrs. per week : 1
Semester: Second	Total Hrs. per week : 3

Objective of the course

The content of "Digital Communication Systems" represents the basic knowledge necessary for sampling, encoding, transmitting, receiving, decoding and conversion of digital information using today's digital communication technologies.

Week No.	Topics
1	Introduction, preliminaries, complex baseband representation
2	Random processes, linear modulation, differential modulation
3	Gaussian basics, hypothesis testing
4	Signal space concepts
5	Optimal detection, performance analysis
6	Performance analysis, link budget analysis
7	Receiver requirements, parameter estimation
8	Mid-course Exam
9	Non-coherent communication, performance analysis
10	Channel capacity, Shannon theory
11	Channel capacity, optimization
12	Introduction to coding, block codes, convolutional codes
13	Viterbi decoding, performance analysis
14	Industry lecture, TBA [Handouts]
15	Course summary and recap.

Textbook : Digital Communications, by John G. Proakis and Salehi, McGraw-Hill Book Company, 4th Edition, or 5th Edition.