

# **AI-Nahrain University**

## **College of Information Engineering**

### **Networks Engineering Program**

### **Study Plan and Course Description**

**2015**

# Study Plan

College of  
Information  
Engineering

Networks Engineering Program						
First Year – Semester I						
No.	Code	Subject	Hrs. Per week			Units
			Theo.	App.	Tut.	
1	UR111	English Language I	2	--	--	2
2	CR111	Computer Programming	2	3	0	3
3	CR112	Mathematics I	3	--	1	3
4	CR113	Logic Circuits	2	3	--	3
5	CR114	IT Fundamentals & Workshop	2	3	--	3
6	CR115	Physical Electronics	3	3	--	4
<b>Total</b>			<b>14</b>	<b>12</b>	<b>1</b>	<b>18</b>
			<b>27</b>			

Networks Engineering Program						
First Year – Semester II						
No.	Code	Subject	Hrs. Per week			Units
			Theo.	App.	Tut.	
1	UR121	English Language II	2	--	--	2
2	CR121	Object oriented Programming I (C++)	2	3	--	3
3	CR122	Mathematics II	4	--	1	4
4	CR123	Electrical Circuits	3	3	1	4
5	CR124	Engineering Drawing & CAD	1	3	-	2
6	NE121	Networks Fundamentals	2	2	--	3
<b>Total</b>			<b>14</b>	<b>11</b>	<b>2</b>	<b>18</b>
			<b>27</b>			

Networks Engineering Program						
Second Year – Semester I						
No.	Code	Subject	Hrs. Per week			Units
			Theo.	App.	Tut.	
1	UR211	Arabic Language	2	--	--	2
2	CR211	Object Oriented Programming II (Java)	2	3	--	3
3	CR212	Electronics	3	3	-	4
4	NE211	Computer Networks I	2	3	-	3
5	NE212	Web Programming	1	2	1	2
6	NE213	Engineering and Numerical Analysis	4	--	2	4
Total			14	11	3	18
			28			
Networks Engineering Program						
Second Year – Semester II						
No.	Code	Subject	Hrs. Per week			Units
			Theo.	App.	Tut.	
1	CR221	Digital Electronics	2	3	-	3
2	NE221	Signals & Systems	3	-	1	3
3	NE222	Fiber Optics & Transmission Lines	2	-	1	2
4	NE223	Information Theory and Coding	3	--	1	3
5	NE224	Computer Networks II	3	3	--	4
6	NE225	Networks Programming I	2	2	1	3
Total			15	8	4	18
			27			

Networks Engineering Program						
Third Year – Semester I						
No.	Code	Subject	Hrs. Per week			Units
			Theo.	App.	Tut.	
1	CR311	Communication Systems	3	3	1	4
2	CR312	Project Management	2	--	1	2
3	NE311	Storage Area Networks	3	--	-	3
4	NE312	Networks Programming II	2	2	--	3
5	NE313	Database (PHP, MY_SQL)	1	2	1	2
6	NE314	Computer Architecture & Microprocessors	3	3	--	4
Total			14	10	3	18
			27			
Networks Engineering Program						
Third Year – Semester II						
No.	Code	Subject	Hrs. Per week			Units
			Theo.	App.	Tut.	
1	UR321	Human Rights	1	--	--	1
2	CR321	Operating Systems	3	3	-	4
3	NE321	Networks Simulation	2	3	1	3
4	NE322	Data Communications	3	3	1	4
5	NE323	Software Engineering	3	--	--	3
6	NE324	Network Protocols & Services	2	3	--	3
Total			14	12	2	18
			28			

Networks Engineering Program						
Fourth Year – Semester I						
No.	Code	Subject	Hrs. Per week			Units
			Theo.	App.	Tut.	
1	UR411	Democracy	1	--	--	1
2	CR411	Digital Signal Processing	3	3	1	4
3	NE411	Project	--	4	--	2
4	NE412	Modern Networks Technologies	3	--	1	3
5	NE413	Selected Subject-1	3	2	-	4
6	NE414	Selected Subject-2	3	2	-	4
Total			13	11	2	18
			26			
Networks Engineering Program						
Fourth Year – Semester II						
No.	Code	Subject	Hrs. Per week			Units
			Theo.	App.	Tut.	
1	NE421	Project	--	4	--	2
2	NE422	Networks Management	2	--	1	2
3	NE423	Networks Design	2	--	1	2
4	NE424	Wireless Networks	3	3	--	4
5	NE425	Selected Subject-3	3	2	-	4
6	NE426	Selected Subject-4	3	2	-	4
Total			13	11	2	18
			26			

### Selected Subjects

No.	Code	Subject Title	Hrs			Units
			Th.	Prac.	Tut.	
Selected Subject-1		Queuing Theory and Systems	3	2	0	4
Selected Subject-2		Optical Networks	3	2	0	4
Selected Subject-3		Networks Security	3	2	0	4
Selected Subject-4		Automatic Control & Robotics	3	2	0	4
Selected Subject-5		WSN & Applications	3	2	0	4
Selected Subject-6		Optical Networking	3	2	0	4
Selected Subject-7		Mobile Networks	3	2	0	4
Selected Subject-8		Multimedia Networks	3	2	0	4
Selected Subject-9		New Generation Networks	3	2	0	4
Selected Subject-10		Artificial Intelligence	3	2	0	4

موزعة على الفصول الدراسية  
ومتطلبات الجامعة والكلية والقسم

**Networks Engineering Program**

Seq	Year	Semester	Hrs. Per Week			Total Hrs (Actual)		Total Units	
			Theo.	App.	Tut.	Per Week	Per Year	Per Sem.	Per Year
1	First	1 <sup>st</sup>	14	12	1	27	54	18	36
2		2 <sup>nd</sup>	14	11	2	27		18	
3	Second	1 <sup>st</sup>	14	11	3	28	55	18	36
4		2 <sup>nd</sup>	15	8	4	27		18	
5	Third	1 <sup>st</sup>	14	10	3	27	55	18	36
6		2 <sup>nd</sup>	14	12	2	28		18	
7	Fourth	1 <sup>st</sup>	13	11	2	26	52	18	36
8		2 <sup>nd</sup>	13	11	2	26		18	
Total (Four Years)							216	144	

Year/ Semester	University Requirements (UR)		College Requirements (CR)		Specialization (NE)		Total	
	Hrs/Week	Units	Hrs/Week	Units	Hrs/Week	Units	Hrs/Week	Units
1-1	2	2	25	16	-	-	27	18
1-2	2	2	21	13	4	3	27	18
2-1	2	2	17	11	9	5	28	18
2-2	-	-	5	3	22	15	27	18
3-1	-	-	16	10	11	8	27	18
3-2	1	1	6	4	21	13	28	18
4-1	1	1	7	4	18	13	26	18
4-2	-	-	-	-	26	18	26	18
<b>total</b>	<b>8x15=120</b>	<b>8</b>	<b>97x15=1455</b>	<b>61</b>	<b>111x15=1665</b>	<b>75</b>	<b>216x15=3240</b>	<b>144</b>

	%Hrs	%Units
University Requirements	3.7	5.5
College Requirements	44.9	42.36
Department Requirements	51.4	52.14

# Course Description

College of  
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Engineering





<b>Course Title</b>	English I	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	UR111	<b>Practical hours/w</b>	-
<b>Year</b>	First	<b>Tutorial hours/w</b>	-
<b>Semester</b>	First	<b>Units</b>	2

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	Introduction
2	The sentence : What is a sentence and what is not a sentence.
3	Parts of a sentence :subject ;types of subjects
4	Parts of a sentence :verb ;types of verbs :verb to be – ordinary verbs –modal verbs
5	types of verbs 2
6	Tenses: present v. past
7	The first exam
8	Parts of a sentence, the complement.
9	Types of a sentence ;simple sentence
10	Types of a sentence; complex sentence
11	Compound sentences
12	Practicing writing
13	The second exam
14	Practicing writing
15	Practicing writing
<b>Textbook</b>	Keith Boecker, P. Charles Brown, Oxford English for Computing, Oxford University press.  Prentice Hall, Writing &Practice Communication in Action, Pearson, Prentice Hall.
<b>References</b>	Longmann Preparation Course of the TOEFL test .the paper test  <a href="http://www.english for every one.com/">http://www.english for every one.com/</a>

<b>Course Title</b>	Computer Programming	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	CR111	<b>Practical hours/w</b>	3
<b>Year</b>	First	<b>Tutorial hours/w</b>	-
<b>Semester</b>	First	<b>Units</b>	3

**Course Description**

<b>Week No.</b>	<b>Topics</b>
1	Introduction to Computers and C++ Programming
2	Program Design: Algorithms, Pseudocode, Flowchart
3	Variable types, Boolean expression, arithmetic expression, reading & writing variables
4	Control statement :if statement & Switch statement
5	Repetition: For loop statement
6	Repetition: While ... statement & Do ... while statement
7	Functions
8	One Dimensional Array
9	Multidimensional Array
10	Array of Characters (String)
11	Vector
12	Pointers : Call by reference , addresses , types & array of pointes
13	Classes
14	Introduction to OOP
15	OOP structures
<b>Textbook</b>	Paul Deitel & Harvey Deitel, C++ How to Program, 8 <sup>th</sup> edition, Pearson, 2011
<b>References</b>	Lesley Anne Robertson, Computing concepts with C++ essentials, 5th Ed. 2007

<b>Subject :</b> Computer Programming lab	<b>Theoretical Hrs. per week:</b> 2
<b>Code:</b> CR111	<b>Applied Hrs. per week:</b> 3
<b>Class:</b> First	<b>Tutorial Hrs. per week:</b>
<b>Semester:</b> First	<b>Units:</b> 3

**Course Description**

<b>Week No.</b>	<b>Topics</b>
<b>1</b>	Introduction to C++ language with its tools & writing simple programs with
<b>2,3</b>	If statement
<b>4</b>	Switch control
<b>5,6</b>	For loop
<b>7</b>	While & do while
<b>8</b>	One dimensional array
<b>9</b>	Array of characters (string)
<b>10</b>	Two dimensional array
<b>11</b>	Function: Writing header, Body, & Prototype
<b>12</b>	Function Call
<b>13,14</b>	Pointers : Call by reference , addresses , types & array of pointers
<b>15</b>	Introduction to OOP

**Lecturer Name:****Signature:****Text books:**

1. Cay S. Horstmann, Computing Concepts with C++ Essentials, 3<sup>rd</sup> edition, John Wiley, 2003.
2. Lesley Anne Robertson, Computing concepts with C++ essentials, 5<sup>th</sup> Ed. 2007.

<b>Course Title</b>	Mathematics I	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	CR112	<b>Practical hours/w</b>	-
<b>Year</b>	First	<b>Tutorial hours/w</b>	1
<b>Semester</b>	First	<b>Units</b>	3
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>The Rate of Change of Function I:</b> Coordinates for the plane, Increments & distance, The slope of a straight line. Equations of a, straight line		
2	<b>The Rate of Change of Function II:</b> Functions & graphs, Slopes of quadratic & cubic curves, The slope of the curves $y=f(x)$ , Derivatives, Velocity & other rates of change		
3	<b>The Rate of Change of Function III:</b> Properties of limits, Infinity as a limit, Continuous functions.		
4	<b>Derivatives I:</b> Formal differentiation. Polynomial functions & their derivatives. Products, power, & quotients.		
5	<b>Derivatives II:</b> Implicit differentiation & fractional powers. Tangent line approximation. The chain rule & parametric equations. A brief review of trigonometry. Angles between curves.		
6	<b>Derivatives III:</b> Derivatives of trigonometric functions. Newton's method for approximating solutions of equations. Inverse functions & the Picard method.		
7	<b>Applications of Derivatives I:</b> Curves sketching. The sign of the first derivatives. Concavity & points. Asymptotes & symmetry. Maxima & minima. Theory. Maxima & minima. Problems		
8	<b>Applications of Derivatives II:</b> Related rates. Rolle's theorem. The mean value theorem. Indeterminate forms & l'Hopital rules. Extending the Mean Value Theorem to Taylor's formula		
9	<b>Integration I:</b> Indefinite integrals. Applications. Determining constants of integration. Integrals of trigonometric functions.		
10	<b>Integration II:</b> Definite integrals. The area under a curve. Calculating areas as limits. The fundamental theorems of integral calculus.		
11	<b>Integration III:</b> Integration by substitution Differentials. Rules for approximating definite integrals.		
12	<b>Applications of Definite Integrals I:</b> Area between two curves. Distance. Calculating volumes by slicing.		
13	<b>Applications of Definite Integrals II:</b> Length of plane curve. Area of a surface of revolution. Average value of a function.		
14	<b>Transcendental Functions I:</b> The inverse trigonometric functions. Derivatives of the inverse trigonometric functions. The natural logarithm & its derivatives.		
15	<b>Transcendental Functions II:</b> Properties of natural logarithm. The exponential function $e^x$ . The function $a^x$ & $a^u$ . The function $y=\log_a u$		
<b>Textbook</b>	<b>Text Book:</b> Thomas & Finney , Calculus & Analytic Geometry <b>Edition &amp; year public:</b> Pearson Education Inc, 11 <sup>th</sup> Ed 2008		
<b>References</b>			

<b>Course Title</b>	Logic Circuits	<b>Theoretical</b>	2
<b>Course Code</b>	CR113	<b>Practical hours/w</b>	3
<b>Year</b>	First	<b>Tutorial hours/w</b>	-
<b>Semester</b>	First	<b>Units</b>	3
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Digital systems: Decimal, binary, octal, hexadecimal number, number		
2	Boolean algebra and logic gate:		
3	Basic definitions, axiomatic definitions of Boolean algebra, Boolean		
4	Canonical and standard forms, Digital logic gate.		
5	Simplification of Boolean functions:		
6	Algebra manipulation, the map method, two, three, four, and five		
7	Product of sum simplification, NAND implementation, NOR		
8	Representation of signed numbers, r's complement, (r-1)'s complement.		
9	2's complement adder-subtractor, binary codes, code conversion,		
10	Design of digital devices: Decoder , BCD-to seven segment decoder.		
11	Encoder, priority encoder.		
12	Multiplexer: design of ( -4) multiplexer, design of ( -8) multiplexe		
13	DeMultiplexer: design of ( -4) demultiplexer, and ( -8) Demultiplexe		
14	Memory circuits: RAM, ROM, PROM, EPROM, and EEPROM.		
15	Programmable logic circuit: PLA, PAL, FPLA, and PAL.		
<b>Textbook</b>	Digital Design, M. Morris Mano & D. Michael, Prentice-Hall, 4 <sup>th</sup> Edition,		
<b>References</b>	Digital Fundamentals, Thomas L. Floyd, Prentice-Hall, 9 <sup>th</sup> Edition, 2006.		

<b>Course Title</b>	IT Fundamentals & Workshop	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	CR114	<b>Practical hours/w</b>	3
<b>Year</b>	First	<b>Tutorial hours/w</b>	0
<b>Semester</b>	First	<b>Units</b>	3

### Course Description - Theoretical

<b>Week No.</b>	<b>Topics</b>
<b>1</b>	<b>Computers:</b> Which computers are being used, How they are all different., Mainframes, Minis, PCs, Notebooks and Laptops, Tablets, PDAs and Pocket PCs, Cellular phones (GSMs), Other computing devices
<b>2</b>	<b>Networks</b> What a network is, What are the different types of networks, Their benefits, How to connect to them and use them.
<b>3</b>	<b>Parts of a Personal Computer</b> System Units and the parts inside, Motherboards, Microprocessor Chips, Power Supplies, Expansion Slots and Cards
<b>4</b>	<b>Understanding Memory</b> What memory does in a computer, How its size is measured , The difference between RAM and ROM, What is cache memory
<b>5</b>	<b>Input and Output Devices:</b> keyboard, mouse, microphone, scanners, digital cameras, Output devices like: Video cards, The Monitor, Speakers
<b>6</b>	<b>Storage Systems:</b> Hard Disks , Floppy Disks , CD Drives and DVD Drives
<b>7</b>	<b>Printers:</b> Dot Matrix printers, Ink jet and Bubble jet printers, Laser printers, Combination Printers, Plotters.
<b>8</b>	<b>Troubleshooting:</b> Make a computer faster when it only runs slowly, Install new hardware, What to do if hardware stops working, Computer maintenance
<b>9</b>	<b>Software Applications:</b> What an Operating System is, What software is, How software is developed, Which software programs are for specific tasks.
<b>10</b>	<b>Using the Computer:</b> Start a computer, Reboot or reset the computer, Start an application programme, Handle data files within an application program, Exit an application program, Shut down the computer correctly
<b>11</b>	<b>Computer Applications 1</b> Choosing An Application Program, & Software program that performs specific function.
<b>12</b>	<b>Computer Applications 2</b> Word Processing, & Spread Sheets
<b>13</b>	<b>Computer Applications 3</b> Presentations, Database Management, & Graphics
<b>14</b>	<b>Computer Applications 4</b> Multimedia, Electronic Mail, & Web Browsing
<b>15</b>	<b>Computer Applications 5</b> Utility Tools, Suites, & Specialized
<b>Textbook</b>	IC3 Certificate Books & Lecture
<b>References</b>	

<b>Course Title</b>	Physical Electronics	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	CR115	<b>Practical hours/w</b>	3
<b>Year</b>	First	<b>Tutorial hours/w</b>	
<b>Semester</b>	First	<b>Units</b>	4

### Course Description (Theory)

Week No.	Topics
1	Natures of atoms, energy levels, material types, and conductivity of conductors
2	Intrinsic semiconductors: current density and conductivity
3	extrinsic semiconductors( P ,N): current density and conductivity
4	Diode resistance (static, dynamic and average)
5	P-N junction construction , forward biasing and reverse biasing
6	Diode modeling, applications(logic gates)
7	Transition capacitance, diffusion capacitance
8	Rectifier (H.W.) and (F.W.)
9	Clipper and clamper circuits
10	Doublers and Tripler, Zener diode circuits
11	BJT construction and characteristic (i/p & o/p)
12	BJT configurations (CB, CE & CC), regions of operation
13	BJT biasing circuits ( fixed bias and emitter-stabilized bias)
14	BJT biasing circuits (voltage divider bias and voltage feedback bias)
15	BJT switching circuits (inverter operation)
<b>Textbook</b>	<b>Title:</b> Electron device & Circuit Theory <b>Author:</b> Robert Boylested <b>Publisher:</b> Prentice-Hall, 10th Ed., 2008
<b>References</b>	



<b>Course Title</b>	Physical Electronics (Lab)	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	CR115	<b>Practical hours/w</b>	3
<b>Year</b>	First	<b>Tutorial hours/w</b>	
<b>Semester</b>	First	<b>Units</b>	4
<b>Course Description (Practical)</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Intro to devices		
2	PN junction C/cs		
3	Zener diode C/cs		
4	Rectifier H.W.		
5	Rectifier F.W.		
6	Miscellaneous circuits		
7	Clipper		
8	Clamper		
9	Doubler		
10	Zener stabilizer		
11	Review		
12	BJT i/p		
13	BJT o/p		
14	BJT biasing		
15	BJT amplifier		
<b>Textbook</b>	<b>Title:</b> Electron device & Circuit Theory <b>Author:</b> Robert Boylested <b>Publisher:</b> Prentice-Hall, 10th Ed., 2008		
<b>References</b>			

<b>Course Title</b>	English II	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	UR121	<b>Practical hours/w</b>	-
<b>Year</b>	First	<b>Tutorial hours/w</b>	-
<b>Semester</b>	Second	<b>Units</b>	2
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	1.Sentences with multiple clauses ,coordinate connectors 2.Dates and time 3.essay writing ,essay topic		
2	1. Sentences with multiple clauses, adverb clauses connectors (time, cause, condition, etc.) 2.expressing yourself 3.writing skills: decode the topic		
3	1.Know when to use the past and the present , Use have and had correctly 2.common expressions 3.writing skills: develop supporting ideas		
4	1.Comparatives and superlatives 2.common expressions 3.Writing skills: Introductory paragraph		
5	1.Subject verb agreements 2.The processor 3.writing skills: Write unified supporting paragraphs		
6	The first Exam		
7	1.Use the correct tense with time expressions 2.operating system 3.Writing skills: write the concluding paragraph		
8	1.use of will and would 2.common expressions 3.writing skills: connect the supporting paragraph		
9	1.Recognize active and passive meanings 2.countable and uncountable nouns,Articles with singulars, distinguish specific and general ideas 3.Online services		
10	Second exam		
11	1.Distinguish make and d 2.writing practice 3.programming Languages: C language		
12	1.Distinguish like ,alike ,unlike ,and dislik 2.Comparing Software Package 3.writing practice		
13	1.Distinguish other, another, and other 2.Computer Networks 3.Writing practice		
14	Practice		
15	Practice		
<b>Textbook</b>	<ul style="list-style-type: none"> <li>Keith Boecker, P. Charles Brown, Oxford English for Computing, Oxford University press.</li> <li>Prentice Hall, Writing &amp;Practice Communication in Action, Pearson, Prentice Hall.</li> </ul>		
<b>References</b>	<ul style="list-style-type: none"> <li>Longmann Preparation Course of the TOEFL test .the paper test</li> <li><a href="http://www.english for every one.com/">http://www.english for every one.com/</a></li> </ul>		

<b>Course Title</b>	Object Oriented Programming I (C++)	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	CR121	<b>Practical hours/w</b>	3
<b>Year</b>	First	<b>Tutorial hours/w</b>	
<b>Semester</b>	Second	<b>Units</b>	3

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	Character array & String functions
2	2-Dim array & getline( ) function
3	Functions & Passing array to the functions
4	Overloaded functions
5	OOP Concept (object, class)
6	Private ,public ,and Member functions
7	Array within class
8	Array of object
9	Friendly functions
10	Constructor functions
11	Destructor function & This operator
12	Single & Multilevel Inheritance
13	Multiple Inheritance
14	Hierarchical inheritance
15	Hybrid Inheritance
<b>Textbook</b>	Object Oriented Programming in C++  Author: Robert Lafore  Edition &Year Public: Fourth Edition ,200
<b>References</b>	

<b>Subject:</b> Object Oriented Prog. I(C++) Lab	<b>Theoretical Hrs. Per week:</b> 2
<b>Code:</b> CR121	<b>Applied Hrs. per week :</b> 3
<b>Class :</b> First	<b>Tutorial Hrs. Per week :</b>
<b>Semester :</b> Second	<b>Units :</b> 3

### Course Description

Week No.	Topics
1	<b>Introduction</b>
2	member function
3	Array of object
4	Friendly functions
5	Copy constructor
6	<b>Quiz1</b>
7	Constructing 2-dim array
8	Overloaded constructor
9	single inheritance
10	<b>Mid exam</b>
11	Multilevel inheritance
12	Multiple inheritance
13	<b>Quiz2</b>
14	Hybrid inheritance
15	<b>Final exam</b>
<b>Lecturer Name:</b> <b>Hana rashied</b> <b>Signature:</b>	<b>Text book:</b> object oriented programming in c++ <b>Author:</b> Robert Lafore <b>Edition &amp; year published:</b> fourth edition ,2003

<b>Course Title</b>	Mathematics II	<b>Theoretical hours/w</b>	4
<b>Course Code</b>	CR122	<b>Practical hours/w</b>	-
<b>Year</b>	First	<b>Tutorial hours/w</b>	1
<b>Semester</b>	Second	<b>Units</b>	4
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>Integration Methods I</b> Basic integration formulas, Integration by parts.		
2	<b>Integration Methods II</b> Products & powers of trigonometric functions, Even powers of sines & cosines, Trigonometric substitutions in integrals.		
3	<b>Integration Methods III</b> Integrals involving $ax^2+bx+c$ , Partial fractions, $z=\tan(x/2)$ , Improper integrals.		
4	<b>Plane Analytic Geometry I</b> Conic sections, Equations from the distance formula, Circles.		
5	<b>Plane Analytic Geometry II</b> Parabolas. Ellipses, Hyperbolas. Quadratic curves.		
6	<b>Hyperbolic Functions</b> Definitions & identities, Derivatives & integrals, The inverse hyperbolic functions.		
7	<b>Polar Coordinates I</b> Polar coordinates, Graphs of polar equations.		
8	<b>Polar Coordinates II</b> Polar equations of conics & other functions, Integrals.		
9	<b>Sequences &amp; Infinite Series I</b> Sequences of numbers, Limits that arise frequently, Infinite series.		
10	<b>Sequences &amp; Infinite Series II</b> Tests of convergence of series with non-negative terms. Absolute convergence. Alternating series. Conditional convergence.		
11	<b>Power Series I</b> Power series for functions, Taylors's theorem with reminder: Sines, cosines, & $e^x$ .		
12	<b>Power Series II</b> Further computations, logarithms, arctangent and $\pi$ , Indeterminate forms, Convergence of power series. Integration, differentiation, Multiplication, & division.		
13	<b>Partial Derivatives</b> Functions of two or more variables, Limits & continuity, Partial derivatives.		
14	<b>Matrices &amp; Linear equations I</b> Introduction, Matrix addition & multiplication, Elementary row operations & row reduction		
15	<b>Matrices &amp; Linear equations II</b> Inverses, Determinants & Cramer's rule, Inverse of a matrix.		
<b>Textbook</b>	<b>Text Book:</b> Calculus & Analytic Geometry <b>Author:</b> Thomas & Finney <b>Edition &amp; year public:</b> Pearson Education Inc, 11 <sup>th</sup> Ed 2008		
<b>References</b>			

<b>Course Title</b>	Electrical Circuits	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	CR123	<b>Practical hours/w</b>	3
<b>Year</b>	First	<b>Tutorial hours/w</b>	1
<b>Semester</b>	Second	<b>Units</b>	4
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Fundamentals of DC circuits: circuit components, terms, types of sources, voltage & current dividers.		
2	Ohms law , dc power, maximum power transfer.		
3	Kirchhoff's laws: KCL , KVL.		
4	Applications of Ohms law, KVL, KCL.		
5	Superposition theorem, transposition theorem.		
6	Thevenins theorem , Norton's theorem , applications.		
7	Mesh analysis of Maxwell's equations		
8	Nodal method analysis.		
9	Ac circuits fundamentals: sinusoidal signal generation , time base, frequency, peak values, rms value & average values.		
10	Response of inductors in ac circuits, R-L circuit.		
11	Response of the capacitor in ac circuits , R-C circuit.		
12	The R-L-C circuit in series , series resonance .		
13	the R-L-C in parallel , parallel resonance, AC power & power factor.		
14	Application of circuit theories for ac circuits, Thevenin's theorem, and Norton's theorem.		
15	Application of mesh analysis & nodal method for ac circuit.		
<b>Textbook</b>	Introduction to circuit analysis Robert L. Boylested 12th Ed., 2010		
<b>References</b>			

<b>Subject :</b> Electrical Circuits Lab	<b>Theoretical Hrs. per week:</b> 3
<b>Code:</b> CR109	<b>Applied Hrs. per week:</b> 3
<b>Class:</b> First	<b>Tutorial Hrs. per week:</b> 1
<b>Semester:</b> Second	<b>Units :</b> 4

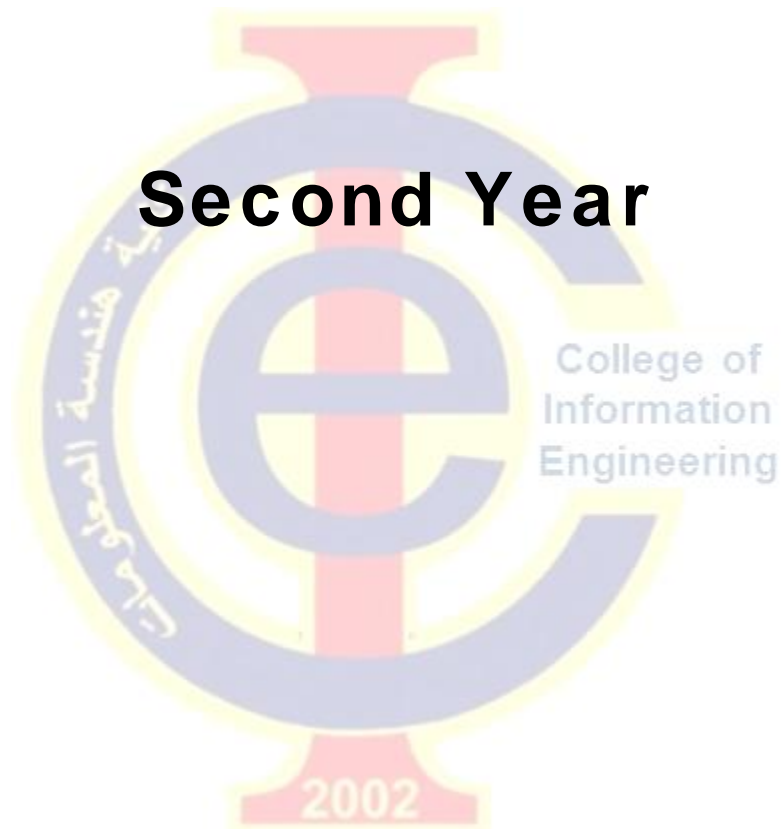
<b>Week</b>	<b>Topics</b>
1	Fundamentals of circuit lab& instruments , how to write the lab report.
2	Applying & proving Ohms law , dc power, maximum power transfer.
3	Applying & proving Kirchhoff's laws: kcl , kvl.
4	Composition Applications of ohms law, kvl,kcl.
5	Applying of Superposition theorem ,transposition theorem.
6	Applying & proving Thevenins theorem , Applying & proving Norton's theorem ,
7	Application of Mesh analysis of Maxwell's equations
8	Proving Nodal method analysis.
9	Ac circuits fundamentals: sinusoidal signal generation ,measuring & control of time
10	Application of Response of inductors in ac circuits, R-L circuit, effect of frequency for
11	Application of Response of the capacitor in ac circuits , R-C circuit capacitors
12	The R-L-C circuit in series , series resonance,application & measurements .
13	the R-L-C in parallel , parallel resonance, AC power & power factor.
14	Application of circuit theories for ac circuits , Theremins theorem, &Norton's
15	application of mesh analysis & nodal method for ac circuit.
<b>Signature:</b>	<b>Text book:</b> Introduction To Circuit Analysis
	<b>Author :</b> Robert L. Boylested
<b>Lecturer Name:</b>	<b>Edition &amp; Year public :</b> Merill publishing company 2010

<b>Course Title</b>	Eng. Drawing & CAD	<b>Theoretical hours/w</b>	1
<b>Course Code</b>	CR124	<b>Practical hours/w</b>	3
<b>Year</b>	First	<b>Tutorial hours/w</b>	-
<b>Semester</b>	Second	<b>Units</b>	2
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Engineering Drawing tools and Lines in engineering drawing and exercises		
2	The Engineering Line and exercises		
3	The Engineering operations and exercises		
4	Class work		
5	The projections theory and exercises		
6	Introduction to AutoCAD and explanation of Draw toolbar		
7	Draw toolbar and Modify toolbar and class work		
8	Modify toolbar and class work		
9	Blocks and class work		
10	Hatch and Table and Text and class work		
11	Layers and class work		
12	Dimensions and class work		
13	Mid-term exam		
14	The projections and class work		
15	Introduction to 3d Desig		
<b>Textbook</b>	1. Miriam Ochoa, Introducing AutoCAD 2008, Wiley, 2010 2. Exercises in machine drawing, S. Bogolyubov, 1982.		
<b>References</b>			



<b>Course Title</b>	<b>Networks Fundamentals</b>	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	<b>NE121</b>	<b>Practical hours/w</b>	2
<b>Year</b>	First	<b>Tutorial hours/w</b>	0
<b>Semester</b>	Second	<b>Units</b>	3
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>Network Basics I:</b> (Network +Protocol + STD) Definition + Standard Agencies+ IP addressing		
2	<b>Network Basics II</b> Advantages and Disadvantages of Networks		
3	<b>Networks Classification</b> Size (PAN, LAN, MAN & WAN) [ Def +Adv.+ Dis.]		
4	Connection (BUS, RING, MESH, ...) [ Def +Adv.+ Dis.]		
5	Transmission Media (Link)		
6	<b>Telephone networks Structure:</b> PSTN, ISDN, SONET, ATM		
7	<b>Structure of</b> (GSM, CDMA, LTE)		
8	<b>The Internet:</b> Intranet , Internet, Internet Service Provider		
9	<b>Internet Terminology</b> : OSI		
10	Network devices (REPEATER, HUB, SWITCH, ROUTER, GATEWAY, BRIDG, AP)		
11	<b>Web Browsing I</b> : What a Browser does? , web languages (PHP, HTML ...) , networks protocols(HTTP,FTP,SMP,...) , URL , DNS		
12	<b>Web Browsing II</b> : Search Engines and finding information. (e.g. google)		
13	<b>Web Browsing III</b> : e-Commerce web sites, Social Networking.		
14	<b>Email Fundamentals I</b> : What is Electronic Mail (email), Internal and external email, How an email address works <b>Email Fundamentals II</b> : The structure of an email message, Email options and attachments, Advantages and disadvantages of email		
15	<b>Ethical Behavior</b>		
<b>Textbook</b>	<b>Text book:</b> Data communications and networking <b>Author</b> : Forouzan <b>Edition &amp; Year of publication</b> : :3rd		
<b>References</b>			

# Second Year



<b>Course Title</b>	Object Oriented Programming II (Java)	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	CR211	<b>Practical hours/w</b>	3
<b>Year</b>	Second	<b>Tutorial hours/w</b>	0
<b>Semester</b>	First	<b>Units</b>	3

### Course Description

Week No.	Topics
1	Introduction what is java, why learn java, compiling & running first program
2	Java basics Statement & expression, Variables & data types, Comments, Number literals, Boolean literals, Character literals, String literals, Expression & operators
3	Conditional statements Logical operators, Bitwise operators, Operator precedence, Switch conditionals
4	Loops For loop, While & do while
5	Methods & Static Methods
6	Manipulation string
7	Working with objects
8	Inheritance & Polymorphism
9	Continues of Inheritance & Polymorphism
10	Exception Handling
11	Thread & Multithread
12	GUI (Graphical User Interface) components
13	Networking (Manipulating URLs)
14	Reading a File on a Web Server
15	Establishing a Simple Server Using Stream Sockets
<b>Textbook</b>	<b>Title:</b> java "How to program" <b>Author:</b> H.M. Deitel, <b>Edition &amp; year of publication :</b> Sixth edition ,2004
<b>References</b>	

<b>Course Title</b>	<b>Electronics</b>	<b>Theoretical hours/w</b>	<b>3</b>
<b>Course Code</b>	<b>CR212</b>	<b>Practical hours/w</b>	<b>3</b>
<b>Year</b>	<b>Second</b>	<b>Tutorial hours/w</b>	<b>0</b>
<b>Semester</b>	<b>First</b>	<b>Units</b>	<b>4</b>

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	Review of BJT : construction, current equation , configurations, biasing circuits.
2	BJT ac equivalent circuit (h-parameter)
3	BJT ac equivalent circuit( re-model)
4	Input equivalent impedance ,output equivalent impedance, voltage gain and current gain
5	FET: types, construction, current equations ,characteristic, configuration, biasing circuits and analysis
6	JFET : AC equivalent circuits and amplifiers
7	Frequency response of amplifiers
8	Multistage Direct coupled, and Capacitor coupled
9	Multistage transformer coupled
10	Feedback circuit C.S. C.SH
11	Feedback circuit V.S V.SH
12	OP-AMP and applications
13	Power amplifiers( class A, B)
14	Power amplifiers(class AB, C)
15	Oscillators (overview)
<b>Textbook</b>	<b>Title:</b> Electron Devices & Circuits <b>Author:</b> G. S. N. Raju <b>Edition &amp; Year of publication</b> I.K. Inter. publications, New Delhi, 20C
<b>References</b>	

<b>Course Title</b>	<b>Engineering and Numerical Analysis</b>	<b>Theoretical hours/w</b>	<b>4</b>
<b>Course Code</b>	NE213	<b>Practical hours/w</b>	<b>0</b>
<b>Year</b>	Second	<b>Tutorial hours/w</b>	<b>2</b>
<b>Semester</b>	First	<b>Units</b>	<b>4</b>

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	Introduction to numerical methods, absolute and relative errors, computer errors, review of Taylor series
2	Roots of equations, graphical methods, Bisection methods, Newton methods, Secant methods, system of nonlinear equations
3	System of linear equations, Gaussian elimination, Gauss – Jordan method
4	Methods of least squares, linear regression, multiple regression Interpolation Newton's Divided difference method, Lagrange interpolation
5	Numerical integration, Trapezoid rule, Simpson's rule Numerical differentiation, estimating derivatives, Richardson extrapolation
6	Linear Equations & Matrices Linear Systems, Matrices, Properties of Matrix Operations, Solution of Equations, The Inverse of Matrix.
7	Determinants, Definitions & Properties, Cofactor Expansion & Applications
8	Vectors & Vector Spaces ,vectors plane, n-vectors, cross product in R3 Vector Spaces & Subspaces, Linear Independence, Basis & Dimensions.
9	Linear independence, Basis & Dimensions The Rank of a Matrix & Applications, Orthogonal Basis in Rn
10	Linear Transformations & Matrices I Definition & Examples, The Kernel & Range of a Linear Transformation. The matrix of linear transformation, Applications.
11	Eigen values & Eigenvectors, Diagonalization of Symmetric matrices.
12	Ordinary Differential Equations (ODEs) I Basic concepts, Separable ODEs, modeling, Exact ODEs
13	Ordinary Differential Equations (ODEs) II, Integrating factors, linear ODEs, Bernoulli equations, Second-Order linear ODEs, Homogeneous with constant coefficients, nonhomogeneous linear ODEs of second order
14	Second-Order linear ODEs II Euler-Cauchy equations, Non-homogeneous ODEs.
15	Introduction to Fourier analysis, Fourier series, Fourier transform.
<b>Textbook</b>	Text Book : Numerical Methods for Engineers Author : Steven C. Chapra and Raymond P. Canal Edition & Year Puplic: 5th Editic
<b>References</b>	Text Book : Advanced Engineering Mathematics Author : Erwin Kreyszig Edition & Year of publication : 9th Edition 20

<b>Course Title</b>	<b>Computer Networks I</b>	<b>Theoretical hours/w</b>	<b>2</b>
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<b>Course Code</b>	NE211	<b>Practical hours/w</b>	3
<b>Year</b>	Second	<b>Tutorial hours/w</b>	0
<b>Semester</b>	First	<b>Units</b>	3
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>Introduction to Computer Networks I:</b> NETWORK TOPOLOGIES, THE ETHERNET LAN, IP (Internet Protocol) Addressing		
2	<b>Introduction to Computer Networks II:</b> 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	<b>Physical Layer Cabling:</b> 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 Example		
4	<b>Interconnecting the lans:</b> INTRODUCTION, THE OSI MODEL, THE NETWORK BRIDGE, THE NETWORK SWITCH, Hub-Switch Comparison, Managed Switches, Multilayer Switches.		
5	<b>Interconnecting the lans:</b> 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	<b>Tcp/ip: introduction,</b> the tcp/ip layers, the application layer, the transport layer, the internet layer.		
7	<b>Tcp/ip: introduction :</b> the network interface layer, number conversion, binary-decimal conversion, decimal-binary conversion, hexadecimal numbers, ipv4 addressing, private ip addresses, ip address assignment.		
8	<b>Tcp/ip: introduction:</b> subnet masks, cidr blocks, ipv6 addressing, analyzing computer networks—ftp data packets.		
9	<b>Introduction to Router Configuration :</b> 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	<b>Introduction to Router Configuration:.</b> 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	<b>Wide Area Networking:</b> INTRODUCTION, THE LINE CONNECTION, Data Channels, Point of Presence, T1 Framing, Line Coding Formats, FRAME RELAY, Establishing a Frame Relay Connection, Configu ing Frame Relay Point-to-Point on the Router Networking Challenge—Frame Relay, ATM, Establishing the ATM Connection, DIAL-IN ACCESS.		
12	<b>Wide Area Networking:</b> 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, I		
13	<b>Wireless Networking:</b> INTRODUCTION, THE IEEE 802.11 WIRELESS LAN STANDARD, 802.11 WIRELESS NETWORKING, Bluetooth wimax, RFID (Radio Frequency Identification), SECURING WIRELESS LANS,		
14	<b>Optical networking:</b> introduction, the nature of light, graded-index fiber single-mode fibers		
15	<b>Recap</b>		
<b>Textbook</b>	<b>Textbook: networking,</b> <b>Author : jeffery s. Beasley</b> <b>Edition/publisher : 2<sup>nd</sup> edition, prentice hall, 2008</b>		
<b>References</b>			

**Computer Networks I Lab  
Network Simulation Experiments**

<b>Week No.</b>	<b>Topics</b>
1	Small internetwork Design
2	Introduction to Wireless and DHCP
3	Basic configuration and network design Practices
4	remote access and maintaining security in switched network
5	HTTP and DNS servers
6	Basic Routing Configuration
7	Static Routing Configuration
8	Dynamic Routing ( OSPF )
9	Dynamic Routing ( EIGRP )
10	VLAN Configuration Part 1
11	VLAN Configuration Part 2
12	Access control lists
13	Putting it all together ( student activity )
14	Recap
15	Final Exam
<b>Textbook</b>	<b>Cisco ICND 1 guide , cisco press</b>
<b>References</b>	

<b>Course Title</b>	<b>Web Programming</b>	<b>Theoretical hours/w</b>	1
<b>Course Code</b>	NE212	<b>Practical hours/w</b>	2
<b>Year</b>	Second	<b>Tutorial hours/w</b>	1
<b>Semester</b>	First	<b>Units</b>	2
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>Introduction to HTML</b> : 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	<b>Lists &amp; Tables in HTML language</b> : Ordered list and unordered list, creating table, table attributes and features		
3	<b>Images &amp; Links</b> : Images , Combining paragraphs with table and images., insert Links, types of links, linked image,		
4	<b>Forms in HTML I</b> : Command buttons, Text fields and text areas, Checkboxes and radio buttons.		
5	<b>Forms in HTML II</b> : Select lists in Forms, combining Forms with images and tables,		
6	<b>HTML CSS</b> : Style CSS,CSS Syntax, Inline CSS, Internal CSS, External CSS		
7	<b>HTML Blocks</b> : html <Div> element , <Span> element		
8	<b>Client-Side Programming and Server-Side Programming</b> : Client-Side Programming and Server-Side Programming, JavaScript, What is JavaScript, What JavaScript can do?, What JavaScript can't do?, The Script Tag, JavaScript Statements, Script statement execute, JavaScript data types, Variables, Data type conversions		
9	<b>Arithmetic Operators</b> : Arithmetic operators, Comparison operators, Examples and solutions Control Structures (if statement, if-else statement), Loops (for loop), Functions, Function parameters		
10	<b>Variable scope in JavaScript</b> : Arrays, creating, assignment and accessing array data, Document object in arrays, Array methods,		
11	<b>Window and Document objects</b> : Window and Document objects, the window object, creating window, properties and methods: window.alert, window.prompt the document object, document.write, document.writeln		
12	<b>Math and Date</b> : Math functions and Date object creation, Date to string, parse Date, get Date, set Date.		
13	<b>The events I</b> : The event object, Event handler, Event properties, Window event-handler,		
14	<b>The events II</b> : layer event handler, mouse event handler, other event handlers		
15	<b>Images and dynamic HTML</b> : Images and dynamic HTML, the image object, interchanging images, prechaching images, creating image rollover,		
<b>Textbook</b>	<b>Text book-1</b> : The Complete Internet and World Wide Web Programming Training course <b>Author</b> : Harry M.Deitel, Paul J. Deitel, Tom Nieto <b>Edition &amp; Year of publication</b> : Prentice Hall PTR,2000		
<b>References</b>	<b>Textbook-2</b> : Java script : the definition Guide, <b>Author</b> :David Flanagan, O'Reilly Media <b>Edition &amp; Year of publication</b> :5 <sup>th</sup> edition , 200		



<b>Course Title</b>	Arabic Language	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	UR211	<b>Practical hours/w</b>	0
<b>Year</b>	Second	<b>Tutorial hours/w</b>	0
<b>Semester</b>	First	<b>Units</b>	2
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	الجملة الاسمية المبتدأ وانواعه ، الخبر وانواعه، نواسخ الابتداء ، كان واخواتها، ان واخواتها		
2	والملحق به، جمع المذكر السالم والملحق به		
3			
4	الجملة الفعلية		
5	الفعل المضارع، بناؤه واعرابه،		
6	الاسماء المنصوبة، المفعول به، المفعول المطلق، المفعول فيه، المفعول معه		
7			
8	قصيدة قديمة: المتنبي، ابن زيدون		
9	قصيدة حديثة: سامي مهدي		
10	القرآن الكريم سورة مريم		
11	الاملاء كتابة الهمزة المتوسطة والمتطرفة		
12	كتابة الضاد والطاء، كتابة التاء القصيرة والطويلة		
13	علامات الترقيم		
14	الاعطاء الشائعة في المكاتبات الرسمية ، كتابة العدد		
15	: قصيدة جاهلية: معلقة عمرو بن كلثوم التغلبي قصيدة عباسية: علي بن الجهم قصيدة حديثة: نزار قباني		
<b>Textbook</b>	محاضرات في اللغة العربية		
<b>References</b>			

<b>Course Title</b>	<b>Digital Electronics</b>	<b>Theoretical hours/w</b>	<b>2</b>
<b>Course Code</b>	CR222	<b>Practical hours/w</b>	<b>3</b>
<b>Year</b>	Second	<b>Tutorial hours/w</b>	<b>0</b>
<b>Semester</b>	Second	<b>Units</b>	<b>3</b>

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	Introduction to binary adder & subtractor, ROM, RAM.
2	Cell Arrays, memory expansion.
3	Flip-flop basic circuit, R-S FF, D-FF, J-K FF, T-FF, Edge-triggered FF.
4	Counters, Ripple counter, binary counters.
5	Synchronous counters, up-counter, down-counter. Up-down counter.
6	Excitation tables of flip-flops.
7	Design of random counters using RS FF.
8	Design of random counters using other types of FFs.
9	Registers.
10	Shift registers (SISO, SIPO, PIPO, PISO), and applications.
11	Design of clocked sequential circuits.
12	Analysis of clocked sequential circuits.
13	State tables.
14	State diagram.
15	State equations.
<b>Textbook</b>	Morris Mano & D. Michael <b>Edition &amp; Year of publication :</b> Prentice-Hall, 4th Edition, 2009
<b>References</b>	<b>Text book 2:</b> Digital Fundamentals <b>Author :</b> Thomas L. Floyd <b>Edition &amp; Year of publication :</b> Prentice-Hall, 9th Edition, 2006

<b>Course Title</b>	<b>Signal &amp; Systems</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	NE221	<b>Practical hours/w</b>	0
<b>Year</b>	Second	<b>Tutorial hours/w</b>	1
<b>Semester</b>	Second	<b>Units</b>	3
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>Introduction to signals &amp; systems;</b> Examples of some signals & systems. Why it is important to study signals and systems? <b>Classification of Signals;</b> Continuous & discrete time signals, Deterministic and random signals, Periodic and non-periodic signals, Even and Odd signals, Time & frequency domain representations. Test for periodicity of signals.		
2	<b>Elementary signals;</b> Sinusoidal, Complex exponential, Rectangular, Triangular, unit impulse, unit step, Damped sinusoidal. <b>Signal operations I;</b> Amplitude scaling, Amplitude shift, Multiplication, Addition/Subtraction, Integration and Differentiation of signals.		
3	<b>Signal operations II;</b> Time shifting, folding or reversing, Scaling of signals, Mixed operations. <b>Review of Fourier Series (Exp. Form), Fourier Transform Definition and Importance.</b>		
4	<b>Convolution;</b> Convolution integral, evaluation of convolution, Convolution of discrete time signals, Convolution of rectangular and other signals.		
5	<b>System properties &amp; Representations;</b> Linearity, Time invariance, Memory, Causality, Stability, Parallel and Cascade systems, Feedforward & Feedback systems, Recursive and nonrecursive systems.		
6	<b>LTI systems;</b> Impulse response and unit step response of LTI systems		
7	<b>Discrete Time system representation and properties.</b> <b>Differential equation representations of systems</b>		
8	<b>Examples of practical systems;</b> Ideal and practical Low pass filters, Integrator, Moving average system, Multipath communication channels. etc.		
9	<b>Laplace Transform I;</b> Definition of Laplace transform, Laplace Transform of some common signals, Properties of Laplace transform.		
10	<b>Laplace Transform II;</b> Inverse Laplace transform, Examples of some common signals. Describing systems and their properties in terms of Laplace Transforms.		
11	<b>Fourier Analysis I;</b> Properties of F.T.		
12	<b>Fourier Analysis II;</b> System transfer function in frequency domain. The convolution theorem in frequency domain. Applications of F.T & convolution in signal transmission.		
13	<b>Filtering of Signals;</b> Types of filters (LPF, HPF, BPF, & BSF). Ideal magnitude and phase responses. Butterworth, Chyepescheve, Elliptic filters. Representation and design of filters using Laplace transform.		
14	Design steps of filters. Design examples of LPF and HPF filters.		
15	Z-Transform for Discrete Time signals. Relation between Fourier, Laplace and Z-Transforms		
<b>Textbook</b>	<b>Text book-1:</b> Modern digital and analog communication systems <b>Author :</b> B.P. Lathi <b>Edition &amp; Year of publication :</b> 3 <sup>rd</sup> Edition/ 199		
<b>References</b>			

<b>Course Title</b>	<b>Fiber Optics &amp; Transmission Lines</b>	<b>Theoretical hours/w</b>	<b>2</b>
<b>Course Code</b>	NE222	<b>Practical hours/w</b>	<b>0</b>
<b>Year</b>	Second	<b>Tutorial hours/w</b>	<b>1</b>
<b>Semester</b>	Second	<b>Units</b>	<b>2</b>

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	Modeling of transmission lines using distributed parameters, T.L Equation, Input impedance.
2	Wave equation for the case of lossless TL and the distortionless case.
3	Study the effects of reflections in different line and load conditions
4	VSWR, Reflection Coefficients, Power, efficiency of T.L
5	Use of transmission line charts (Smith charts) to evaluate T.L. parameters
6	<b>Matching of T.L</b> Quarter-wave and stub tuners matching techniques,
7	<b>Matching of T.L</b> Design of matching elements using Smith chart
8	Reflection and transient response of T.L
9	Introduction to Optical Fibers, Advantages of Optical Systems
10	Snell's law, NA, Light travelling, frequencies and power issues.
11	Real cables
12	Connecting cables, connectors and couplers.
13	Sources, amplifiers and detectors
14	<b>Noise consideration</b>
15	<b>Coherent and WDM systems</b>
<b>Textbook</b>	<b>Text book:</b> Introduction to fiber Optics <b>Author :</b> John Crisp and Barry Elliott <b>Edition &amp; Year of publication :</b> Newnes An Imprint of Elsevier, 2005
<b>References</b>	<b>Text book 2:</b> Electromagnetic Engineering <b>Author :</b> William H. Hayt <b>Edition &amp; Year of publication :</b> 8 <sup>th</sup> Ed. McGraw Hill, 2011

<b>Course Title</b>	<b>Information Theory &amp; Coding</b>	<b>Theoretical hours/w</b>	<b>3</b>
<b>Course Code</b>	NE223	<b>Practical hours/w</b>	<b>0</b>
<b>Year</b>	Second	<b>Tutorial hours/w</b>	<b>1</b>
<b>Semester</b>	Second	<b>Units</b>	<b>3</b>
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Review of Sets Theory, Permutation and Combination. Frequency distribution; Raw Data, Frequency Distribution Histogram, Frequency Polygons, Relative Frequency Distribution.		
2	Cumulative Frequency Distribution, Ogives, Frequency Curve. The mean, median, mode, geometric mean, harmonic mean, RMS, mean square value, Measures of dispersion; the mean deviation, the standard deviation and variance. Relations between frequency distribution and mean, media, medium.		
3	Elementary prob. Theory, axioms of probability joint prob. Random Experiment, independent and mutually exclusive events. Conditional probability. The binary symmetric channel example. Total probability, repeated (Bernoulli) trials		
4	Moments for grouped data, moment about the origin and about the mean. Skewness and kurtosis. Applications of 1 <sup>st</sup> and 2 <sup>nd</sup> moments. Random variables. Discrete and Continuous Random variable. Prob. density function (pdf) and cumulative distribution function (cdf).		
5	The expectations of discrete and continuous random variables. Some important distributions; the uniform distribution, the binomial and Poisson distributions. The normal (Gaussian) distribution; the use of tables to calculate prob. for normal distribution. The definition of Q-Function and its applications		
6	Joint random variables; joint pdf, joint cdf, joint moments and expectations. Functions of random variables and their expectations. Summation of random variables, Transformation of random variables.		
7	Independent, Orthogonal & uncorrelated random variables The Chi-Square Test For Random Distribution Line Regression and Estimation Theory. Random processes. Types and properties, Stationary, ergodic, nonstationary. Expectations of random processes, Autocorrelation, Autocovariance		
8	Model of information transmission system. Common sense definition of information, logarithmic measure of information. Self information. Average information (entropy) of a discrete and continuous source, Maximum source entropy, source efficiency.		
9	Transition probability matrix of channel, Discrete noiseless and noisy channel models, uniform channel. Definition of mutual information & the average mutual information. Information transmission over symmetric channel, noiseless channel, Binary symmetric channel, Ternary symmetric channel		
10	Capacity of discrete channel, Channel capacity for noiseless channels, Channel efficiency and redundancy. Channel capacity for symmetric channels. Channel capacity for nonsymmetric channels, binary nonsymmetric channel.		
11	Mutual information of continuous channel, Capacity of continuous channels. Efficiency and redundancy of continuous channels. Gaussian and uniform channels. Sampling of continuous source, Sampling Theorem, Nyquist theorem for transmission over band limited continuous channel. Shannon-Hartly channel capacity theorem.		
12	Source encoding; fixed and variable length codes, prefix property, Average length of source code, Source code efficiency and redundancy. Shannon-Fano source coding. Huffman source coding, compact codes, source extension for source coding.		
13	Statistical compression techniques, Run-length coding, Dictionary based source coding, LZ methods. The channel coding, Main idea of error correction & detection codes, code rate (efficiency). Block and convolutional codes, Parity check codes, Binary repetition code, ASCII representation and other applications of channel coding.		
14	Linear block codes, Matrix representation of linear block codes, Hamming codes, syndrome decoding. Polynomial representation of block codes. GF (2 <sup>m</sup> ) field definition, Construction of finite field elements, mathematical operations in GF field, Generation of BCH codes using GF field.		
15	BCH code parameters for single error correction, Matrix representation of BCH code, Decoding steps of BCH codes, Circuit implementation of single error binary BCH codes.		
<b>Textbook</b>	Probability & Statistics for Engineers and Scientists, Walpole & Myers, 8 <sup>th</sup> , 2007, Pearson Prentice Hall		
<b>References</b>	<b>Text Book-2:</b> Essentials of Information Theory, <b>Author</b> : P.G. Farrell, 1 <sup>st</sup> , 2006, Prentice Hall		

<b>Course Title</b>	<b>Computer Networks II</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	NE224	<b>Practical hours/w</b>	3
<b>Year</b>	Second	<b>Tutorial hours/w</b>	0
<b>Semester</b>	First	<b>Units</b>	4
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>Routing Protocols- I</b> Static Routing, Dynamic Routing		
2	<b>Routing Protocols- I</b> RIP, IGRP, OSPF, EIGRP		
3	<b>Configuring Cisco Routers</b>		
4	<b>Configuring and Managing Campus Network –I</b> Core Layer, Access layer, distribution layer, Data flow, Load Balancing, DHCP, DNS, Network Management, Configuring SNMP, Switch VLAN configuration		
5	<b>Configuring and Managing Campus Network –II</b> Network Management, Configuring SNMP, Switch VLAN configuration		
6	<b>Voice over IP - I</b> THE BASICS OF VOICE OVER IP, VOICE OVER IP NETWORKS, Replacing an Existing PBX Tie Line, Upgrading Existing PBXs to Support IP Telephony, Switching to a Complete IP Telephony Solution		
7	<b>Voice over IP - II</b> QUALITY OF SERVICE, Jitter, Network Latency, Queuing, ANALYZING VoIP DATA PACKETS, Analyzing VoIP Telephone Call Data Packets		
8	<b>SONET I</b> Introduction, SONET Networks, SONET Transmission Rates, SONET Network architectures, SONET Framing, STS-1 Building Block, Synchronous Payload Envelope, SONET Virtual Tributaries		
9	<b>SONET II</b> SDH vs. SONET, SONET Equipment, SONET O-E-O Regenerator, SONET ADM Multiplexer, SONET Terminal Multiplexer, SONET Implementation Features,		
10	<b>The Network Server I</b> INTRODUCTION, Network Definitions, Network Types, Server Types, Adding the Network Server,		
11	<b>The Network Server I</b> INTRODUCTION, Network Definitions, Network Types, Server Types, Adding the Network Server.		
12	<b>Linux Networking</b> INTRODUCTION, LOGGING ON TO LINUX, Adding a User Account, LINUX FILE STRUCTURE AND FILE COMMANDS, Listing Files, Displaying File Contents, Directory Operations, File Operations, Permissions and Ownership		
13	<b>LINUX ADMINISTRATION COMMANDS</b> The <i>man</i> (manual) Command, The <i>ps</i> (processes) Command, The <i>su</i> (substitute user) Command, The <i>mount</i> Command, The <i>shutdown</i> Command, Linux Tips, ADDING APPLICATIONS TO LINUX, LINUX NETWORKING, Installing SSH,.		
14	<b>PSTN, Architecture and routing – I</b>		
15	<b>Recap</b>		
<b>Textbook</b>	<b>Textbook: Networking,</b> <b>Author : Jeffery S. Beasley</b> <b>Edition/Publisher : 2<sup>nd</sup> edition, Prentice Hall, 2008</b>		
<b>References</b>			

<b>Course Title</b>	Networks Programming I	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	NE2225	<b>Practical hours/w</b>	2
<b>Year</b>	Second	<b>Tutorial hours/w</b>	1
<b>Semester</b>	Second	<b>Units</b>	3

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	<b>Basic Concepts, Protocols and Terminology:</b> Clients, Servers and Peers, Ports and Sockets, The Internet and IP Addresses, Internet Services, URLs and DNS, TCP and UDP
2	<b>Starting Network Programming in Java:</b> The <i>InetAddress</i> Class
3	<b>TCP Sockets</b>
4	<b>Datagram (UDP) Sockets</b>
5	<b>Network Programming with GUIs</b>
6	<b>GUI(ing) the above examples</b>
7	<b>Ports scanning using java</b>
8	<b>File Handling, Serial Access Files</b>
9	<b>File Methods</b>
10	<b>Redirection of files, Command Line Parameters</b>
11	<b>Random Access Files</b>
12	<b>Serialization</b>
13	<b>File I/O with GUIs</b>
14	<b>Vectors</b>
15	<b>Vectors and Serialization</b>
<b>Textbook</b>	<b>Textbook:</b> An Introduction to Network Programming with Java <b>Author :</b> Jan Graba <b>Edition/Publisher :</b> second edition 201
<b>References</b>	





<b>Course Title</b>	Project Management	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	CR312	<b>Practical hours/w</b>	-
<b>Year</b>	Third	<b>Tutorial hours/w</b>	1
<b>Semester</b>	First	<b>Units</b>	2
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Introduction, Modern Project Management, project definition, project life cycle		
2	Organization strategy, goals and objectives, project portfolio management system		
3	Project classification, Project Selection, financial criteria, nonfinancial criteria, selection model		
4	Project management organization, organization, choosing the right structure		
5	Organization culture, culture characteristics, implication of culture on projects		
6	Defining the Project, project scope, priorities, work breakdown		
7	Integration WBD, coding the WBD, project communication plan		
8	Estimating a Project, quality of estimates, top-down versus bottom-up, time & cost		
9	Level of details, type of costs, refining estimates, creating database		
10	Developing project network, constructing network, activity-on-node (AON)		
11	Network Computation Process, Forward and Backward Pass Information, Level of Detail, Practical Considerations, Extended Network Techniques to Come Closer to Reality		
12	Resource Constraints, Classification of a Scheduling Problem, Resource, Allocation Methods, Computer Demonstration of Resource-Constrained Scheduling, Splitting Activities		
13	Benefits of Scheduling Resources, Assigning Project Work, Multiproject, Resource Schedules, Develop a Project Cost Baseline		
14	Rationale for Reducing Project Duration, Options for Accelerating Project Completion, Project Cost–Duration Graph		
15	Constructing a Project Cost–Duration Graph, Practical Considerations, What if Cost, Not Time, Is the Issue?		
<b>Textbook</b>	Clifford F. Gray, Erik W. Larson , Project Management: The Managerial Process, 5 <sup>th</sup> Ed., McGraw-Hill, 2011		
<b>References</b>			

<b>Course Title</b>	<b>Computer Architecture and Microprocessors</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	NE314	<b>Practical hours/w</b>	3
<b>Year</b>	Third	<b>Tutorial hours/w</b>	0
<b>Semester</b>	First	<b>Units</b>	4
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>Introduction:</b> organization and architecture, structure and function		
2	<b>Hardware architecture:</b> Register, RAM, Memory organization.		
3	<b>Hardware architecture:</b> Microprocessors, Computer bus, Bus skew, <b>Bus types:</b> Synchronous bus, Asynchronous bus		
4	<b>The CPU: Control unit,</b> Arithmetic and Logic Unit (ALU), CPU structure, <b>Basic CPU cycle:</b> Instruction fetch, Writing to memory, Arithmetic, Register file,		
5	<b>Hardware architecture :</b> I/O devices (UART), address decoder		
6	<b>Hardware architecture :</b> status registers, Memory expansion		
7	<b>Memory hierarchy:</b> Cache memory, secondary memory		
8	<b>I/O programming techniques:</b> polling, interrupts, Interrupts, [M68000]( Interrupt hardware, Interrupts vectors, Handler), <b>DMA</b>		
9	<b>The Motorola 68000 series:</b> PIN diagram, CPU timing, read cycle, write cycle asynchronous bus operation, VME bus, VME card format, Programmer's model, status register, Privilege States		
10	<b>Review of assembly language programming:</b> What is assembly language, Instructions, 68000 instruction formats, Example program listing, Assembly language, program structure		
11	<b>Review of assembly language programming:</b> Example instructions, Move instructions, Arithmetic instructions, Logical operations, Shift operations, Bit manipulation		
12	<b>Review of assembly language programming:</b> Program control, Conditional branches, Various instructions. <b>Addressing modes:</b> Immediate mode, Absolute mode, Register mode, Indirect mode, Register indirect with displacement, Auto-increment mode.		
13	<b>Examples:</b> Simple expression, General expressions, IF statement implementation in assembly, ASCII digits, About the ASCII code. <b>Code conversion:</b> Print a decimal digit, Print a hex digit,		
14	<b>Simple loop:</b> Print a string on the screen (Hello word), Implementing FOR LOOP, Simple subroutines,		
15	<b>Simple loop:</b> Arrays and Objects, Programming guidelines, Testing and debugging.		
<b>Textbook</b>	<b>Text Book-1:</b> Structured Computer Organization <b>Author :</b> A. Tanenbaum <b>Edition/Year/ Publisher :</b> Prentice Hall , 5 <sup>th</sup> E, 2006		
<b>References</b>	<b>Text Book-2:</b> 6800 Family assembly language <b>Author :</b> Clements, Alan, <b>Edition/Year/ Publisher :</b> PWS Pub. Co., 1994		

<b>Course Title</b>	<b>Communications Systems</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	CR311	<b>Practical hours/w</b>	3
<b>Year</b>	Third	<b>Tutorial hours/w</b>	1
<b>Semester</b>	First	<b>Units</b>	4
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>Elements of Communication systems, Frequency Plan and Applications</b> <b>Review of Signals &amp; Systems I:</b> Classification of Signals, Fourier Series & Line Spectrum, Signal and system bandwidths, single-tone and multi-tone signals.		
2	<b>Review of Signals &amp; Systems II:</b> Fourier Transform definition & properties, Modulation, Signal bandwidth, Linear Time Invariant System.		
3	<b>Review of Signals &amp; Systems III:</b> Ideal Filters, Power and Energy spectral density, Noise types in Communication Systems. Noise power calculation, Thermal noise, AWGN properties, Signal-to-Noise Ratio		
4	<b>Linear Modulation (Amplitude Modulation) I:</b> Double-Side-Band Suppressed Carrier (DSB-SC), Double-Side-Band with Large Carrier (DSB-LC). Single-Side-Band (SSB).		
5	<b>Linear Modulation II:</b> Quadrature Amplitude Modulation (QAM), The use of frequency Mixers in communication systems, Frequency Division Multiplexing		
6	<b>Carrier Recovery Circuits :</b> Signal Squaring, Coast's Loop, Phased Locked Loop <b>Radio Receiver : AM Super-heterodyne Receiver</b>		
7	<b>TV Signal,</b> Vestigial Side Band modulation <b>Angle Modulation I:</b> Frequency Modulation (FM), Phase Modulation (PM), Spectrum of Angle Modulated Wave.		
8	<b>Angle Modulation II:</b> Narrow & wideband, The Phased Locked Loop Principles & Applications, Generation & Reception of FM Signal.		
9	<b>Angle Modulation III:</b> FM stereophonic system, FM Standard Radio Receiver, Comparison of FM to AM signals (BW and S/N)		
10	<b>Sampling &amp; Pulse Modulations:</b> Sampling Theorem & Pulse Amplitude Modulation (PAM), Time Division Multiplexing, Pulse Width Modulation (PWM), Pulse Time Modulation. (PPM).		
11	<b>Pulse Code Modulation (PCM):</b> PCM for speech signals, Uniform and Non-uniform Quantizers, Differential PCM, Digital Multiplexing (E1 & T1 systems)		
12	<b>Delta Modulations (DM):</b> Linear Delta Modulation, DM with Double Integrations, Delta Sigma Modulation, Adaptive DM		
13	<b>Carrier Modulated Digital signals I:</b> Baseband and Passband Transmission, Amplitude Shift Keying (ASK), On-Off Keying (OOK), Phase Shift Keying (PSK), Differential PSK and QPSK		
14	<b>Carrier Modulated Digital signals II:</b> Frequency Shift Keying (FSK), Minimum Shift Keying (MSK) & Bandwidth Versus Transmission Rate Comparison of Different Signals.		
15	<b>Performance Measures of Analogue and Digital Communication Systems</b>		
Textbook	<b>Text book-1:</b> Modern digital and analog communication systems <b>Author :</b> B.P. Lathi <b>Edition &amp; Year of publication :</b> 3 <sup>rd</sup> Edition/ 199		
References			

<b>Course Title</b>	<b>Storage Area Networks</b>	<b>Theoretical hours/w</b>	<b>3</b>
<b>Course Code</b>	<b>NE311</b>	<b>Practical hours/w</b>	<b>0</b>
<b>Year</b>	Third	<b>Tutorial hours/w</b>	<b>0</b>
<b>Semester</b>	First	<b>Units</b>	<b>3</b>
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Storage Devices : hard disk drive , Hybrid drive , flash memory and SSD		
2	Storage Arrays: Architectural Principles , All-Flash Arrays, Deduplication , pros and cons.		
3	RAID: What Is RAID, RAID Groups, RAID Levels, and The Future of RAID.		
4	Fiber Channel SAN: Why FC SAN, SAN Topologies, Redundancy, FC SAN.		
5	iSCSI SAN : IP Network Considerations, iSCSI Names and Device Login Authentication		
6	Files, NAS, and Objects: NAS Protocols, NAS Arrays, Object Storage and NAS Performance		
7	Replication Technologies : Business Continuity, Replication , Local Snapshots		
8	Storage Virtualization: The SNIA Shared Storage Model, Host-Based Virtualization.		
9	Capacity Optimization Technologies: Thin Provisioning, Compression and Deduplication		
10	Backup and Recovery: Backup Architecture , Backup Methods, Backup Types and Archiving		
11	Storage Management: Capacity Management, Performance Management, Alerting		
12	The Wider Data Center Neighborhood: Data Center Design, Data Center Overview and cabling		
13	Converged Networking: Ethernet, Fiber Channel and Single Converged Data Center Network		
14	Cloud Storage: The Cloud Overview, Storage and the Cloud		
15	Recap		
<b>Textbook</b>	<b>Text Book-1:</b> Data Storage Networking - Real World Skills for the CompTIA Storage+ Certification and Beyond <b>Author :</b> Nigel Poulton <b>Edition/Year/ Publisher :</b> Sybex, 2014		
<b>References</b>			

<b>Course Title</b>	Networks Programming II	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	NE312	<b>Practical hours/w</b>	2
<b>Year</b>	Third	<b>Tutorial hours/w</b>	0
<b>Semester</b>	First	<b>Units</b>	3
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Multithreading and Multiplexing		
2	Thread Basics, Using Threads in Java, Extending the <i>Thread</i> Class		
3	Explicitly Implementing the <i>Runnable</i> Interface		
4	Multithreaded Servers		
5	Locks and Deadlock		
6	Synchronizing Threads		
7	Multi echo application		
8	Chat application using multi-threading (the client)		
9	Chat application using multi-threading (the server)		
10	Java Database Connectivity (JDBC) Creating an ODBC Data Source		
11	<i>Simple Database Access</i>		
12	Modifying the Database Contents		
13	Using a GUI to Access a Database		
14	Scrollable Result Sets in JDBC, Modifying Databases via Java Methods		
15	Dictionary Application Using Microsoft Access Database and Java		
Textbook	<b>Textbook:</b> An Introduction to Network Programming with Java <b>Author :</b> Jan Graba <b>Edition/Publisher :</b> second edition 2011		
References			

<b>Course Title</b>	Database (PHP, MY_SQL)	<b>Theoretical hours/w</b>	1
<b>Course Code</b>	NE313	<b>Practical hours/w</b>	2
<b>Year</b>	Third	<b>Tutorial hours/w</b>	1
<b>Semester</b>	First	<b>Units</b>	2

### Course Description

Week No.	Topics
1	<b>HTML review:</b> form handling
2	<b>Introduction:</b> Learning PHP & MySQL place in the world of development, Components of a PHP application, & requesting data from a webpage
3	<b>Exploring PHP :</b> form handling using PHP, getting variables, simple examples
4	<b>WAMP principles:</b> explaining the main differences between server side and client side scripting languages
5	<b>MySQL :</b> MySQL Database, Managing the Database, Using phpMyAdmin, Database Concepts, & Structured Query Language
6	<b>PHP &amp; MySQL interaction :</b> The Process, Querying the Database with PHP Functions
7	<b>PHP session</b>
8	<b>PHP cookie</b>
9	<b>PHP form validation</b>
10	<b>SQL injection</b>
11	<b>Application :</b> PHP Forum
12	<b>File using PHP:</b> using files to pass variables between pages
13	<b>Application :</b> Cars Fines
14	<b>Application :</b> Personal web site –Design and implementation
15	Introducing non-coded programs to design and implement web sites
<b>Textbook</b>	Textbook : Learning PHP and MySQL Author : Michele E. Davis and Jon A. Phillips Edition/Publisher/Year : 7th Ed., O'Reilly/2006
<b>References</b>	

<b>Course Title</b>	<b>Operating Systems</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	CR321	<b>Practical hours/w</b>	3
<b>Year</b>	Third	<b>Tutorial hours/w</b>	0
<b>Semester</b>	Second	<b>Units</b>	4
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Introduction to operating system(functions and types), User View, System View, Defining Operating Systems, System Goals, Mainframe Systems, Desktop Systems, Multiprocessor Systems, Distributed Systems, Real-Time Systems, Handheld Systems		
2	Operating-System Structures, Operating System Components, Operating-System Services		
3	Operating-System Structures System Calls, Operating System Structure, Virtual Machines, Java, system design & implementation		
4	Processes: Process Concept, Threads, Process Scheduling, Context Switch		
5	Processes, Operations on Processes, Cooperating Processes, Interprocess Communication, Communication in Client-Server Systems		
6	Threads, Overview, Multithreading Models, Threading Issues		
7	Cpu Scheduling, Basic Concepts, Scheduling Criteria, Scheduling Algorithms		
8	Cpu Scheduling, Thread Scheduling		
9	Process Synchronization, Background, The Critical-Section Problem, Synchronization Hardware, Semaphores, Deadlocks and Starvation, Classical Synchronization Problems Monitors, Atomic Transactions		
10	Deadlocks, System Model, Deadlock Characterization, Methods for Handling Deadlocks Deadlock Prevention		
11	Deadlocks, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock		
12	Memory Management, Background, Swapping, Contiguous-Memory Allocation		
13	Memory Management, Paging		
14	Memory Management, Segmentation, Segmentation with Paging		
15	Examination		
<b>Textbook</b>	Text book: Operating system concepts Author: Abraham Silberschatz, Peter B. Galvin , Greg Gagne Edition & year of publication : 8th edition, Addison -Wesely, 2008		
<b>References</b>			

<b>Course Title</b>	<b>Operating Systems</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	NE321	<b>Practical hours/w</b>	3
<b>Year</b>	Third	<b>Tutorial hours/w</b>	0
<b>Semester</b>	Second	<b>Units</b>	4
<b>Lab Experiments</b>			
<b>Week No.</b>	<b>Topics</b>		
1	PIC microcontrollers: History and features		
2	CCS C Compiler and PIC18F Development System PIC Architecture & Programming		
3	PIC I/O Port Programming, PIC Programming in C		
4	PIC18 Hardware Connection and ROM loader		
5	PIC18 Timers Programming, PIC18 Serial Port Programming		
6	Interrupt Programming		
7	LCD and Keypad Interface, External EEPROM and I2C		
8	USB and HID Class , ADC and DAC		
9	Sensor and other Applications , CCP and ECCP Programming		
10	Capture Mode Programming and Pulse Width Measurement C# RS232 Interface Programming		
11	C# GUI Plot Program		
12	Digital Oscilloscope, spectral Analyzer, and multimeter		
13	Impact of engineering solutions in a global, economic, environmental, and societal context		
14	Knowledge of contemporary issues		
15	Final Project		
<b>Textbook</b>	<b>Text book:</b> Microcontroller and Embedded systems – Using Assembly and C for PIC18 <b>Author :</b> Muhammad Ali Mazidi, Rolin D. McKinlay, and Danny Causey <b>Edition &amp; Year of publication :</b> Prentice Hall, 200		
<b>References</b>			



<b>Course Title</b>	<b>Network Simulation</b>	<b>Theoretical hours/w</b>	<b>2</b>
<b>Course Code</b>	<b>NE321</b>	<b>Practical hours/w</b>	<b>3</b>
<b>Year</b>	Third	<b>Tutorial hours/w</b>	<b>1</b>
<b>Semester</b>	Second	<b>Units</b>	<b>3</b>
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Basic Concepts: Network model definition,		
2	performance evaluation techniques		
3	development of system simulation		
4	Discrete event simulation		
5	schedule, simulation		
6	entities and events		
7	Monti Carlo simulation		
8	Monti Carlo algorithm and steps of simulation		
9	Network modeling		
10	Network simulation elements		
11	Poisson source of packets		
12	round robin in simulation		
13	Input output modeling		
14	output statistics		
15	Recap		
<b>Textbook</b>	<b>Text Book:</b> Network Modeling and Simulation: A practical perspective <b>Author :</b> Mohsen Guizani, <b>Edition/Year/ Publisher :</b> 1 <sup>st</sup> , John Wiley and Sons, 2010		
<b>References</b>			

<b>Course Title</b>	<b>Data Communications</b>	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	<b>NE322</b>	<b>Practical hours/w</b>	3
<b>Year</b>	Third	<b>Tutorial hours/w</b>	1
<b>Semester</b>	Second	<b>Units</b>	3

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	<b>Review of Signal Analysis &amp; Representation:</b> Fourier Transform, Autocorrelation , Power spectral density. <b>Transmission Format#1:</b> The derivation of Power Spectral Density (PSD) for digital Signals, PSD of some important line codes, Important Pulse Shaping & ISI reduction. (Polar, unipolar, RZ, NRZ...etc)
2	<b>Transmission Format#2</b> PSD of some important line codes. (Duobinary, Manchester code, ...etc) Important Pulse Shaping & ISI reduction (raised cosine pulse), comparison of different signals
3	<b>Baseband &amp; Passband Transmission of Signals, Review of Modulated digital Signals :</b> Amplitude Shift Keying (ASK), Phase Shift Keying (PSK), Differential PSK, Frequency Shift Keying (FSK) , Multilevel signal, Energy per element and energy per bit.
4	<b>Optimum (Matched Filter) Detection for Baseband Signals, Error rate performance of Baseband signals in AWGN :</b> Polar and Unipolar signals
5	<b>Error rate performance of Modulated carrier signals in AWGN I :</b> OOK, ASK, PSK
6	<b>Error rate performance of Modulated carrier signals in AWGN II :</b> FSK, MSK, CPFSK
7	<b>Efficient Modulation Techniques :</b> Multilevel Signals, QAM, Minimum shift Keying (MSK) & GMSK, Precoding for spectral shaping. <b>Comparison of Different Signals on the Basis of:</b> Error probability , $E_b/N_o$ , Bit Rate, BW
8	<b>Digital Multiplexing systems :</b> Time Division Multiplexing of PCM signal, E1 & T1 Multiplexi systems, Statistical & Intelligent Multiplexing, Digital Hierarchies of Multiplexing Systems. Non-equal bit rate multiplexing. Bit stuffing. Other multiplexing techniques (CDMA, SDM, PDM, WDM, DWDM)
9	<b>Switching Techniques:</b> Circuit, Message, Signal switching, Packet Switching, Virtual Circuit Switching. <b>Synchronous &amp; Asynchronous Data Transmission Systems, ARQ, FEC, CRC.</b>
10	<b>Selected Communication Topics I:</b> Transmultiplexers (TDM/FDM conversion), ISDN, ATM, DSL
11	<b>Selected Communication Topics II: Wireless Networks, UWB, WLL.</b>
12	<b>Selected Communication Topics III:</b> Satellites Communications, Cellular Mobile Systems
13	<b>Parallel &amp; Serial Data Transmission Systems, OFDM system Structure</b>
14	<b>Principles of Spread Spectrum Systems I:</b> Direct Sequence Spread Spectrum, Frequency Hopping
15	<b>Principles of Spread Spectrum Systems II:</b> Code Division Multiple Access, Main Applications of Spread Spectrum Signals
<b>Textbook</b>	<b>Text book-1:</b> Modern digital and analog communication systems <b>Author :</b> B.P. Lathi <b>Edition &amp; Year of publication :</b> 3 <sup>rd</sup> Edition/ 199
<b>References</b>	<b>Text book-2:</b> Data & Computer Communications <b>Author :</b> William Stallng <b>Edition &amp; Year of publication :</b> 5 <sup>th</sup> , 2003, Prentice Hall

<b>Course Title</b>	Software Engineering	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	NE323	<b>Practical hours/w</b>	0
<b>Year</b>	Third	<b>Tutorial hours/w</b>	1
<b>Semester</b>	Second	<b>Units</b>	3

### Course Description

Week No.	Topics
1	Introduction to Software Engineering
2	Software Life Cycles
3	Spiral & Market-Driven Modules
4	Techniques of Software Engineering
5	Cost Estimation
6	Project Management
7	Software Project Estimations
8	Project Scheduling
9	Requirements Engineering
10	Software Architectures
11	Software Requirements
12	Delivery & Installation of Software
13	Software Documentation
14	Software Testing & Integration
15	Software maintenance
<b>Textbook</b>	<b>Text book 1:</b> Introduction Software Engineering <b>Author:</b> Ronald J. Leach <b>Edition &amp; year public:</b> CRC-Press
<b>References</b>	<b>Text book 2:</b> Software Engineering <b>Author:</b> Ian Sommerville <b>Edition &amp; year public:</b> 9 <sup>th</sup> Ed. Addison Wesley 2010

<b>Course Title</b>	Network Protocols & Services	<b>Theoretical hours/w</b>	2
<b>Course Code</b>	NE324	<b>Practical hours/w</b>	3
<b>Year</b>	Third	<b>Tutorial hours/w</b>	0
<b>Semester</b>	Second	<b>Units</b>	3
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>OSI model:</b> (Application layer, presentation layer, session layer, transport layer, network layer, datalink layer. Physical layer) basics.		
2	<b>Transport layer protocols:</b> Multiplexing and Demultiplexing, The TCP Connection, TCP Segment Structure,		
3	<b>Transport layer protocols (continued):</b> Sequence Numbers and Acknowledgment Numbers, example of TCP connection in details.		
4	<b>UDP (user datagram protocol):</b> structure, checksum, example.		
5	<b>Network Application Architectures:</b> client-server architecture, P2P architecture		
6	<b>Hypertext Transfer Protocol:</b> The Web and HTTP, Overview of HTTP, HTTP Message Format		
7	<b>File Transfer Protocol:</b> FTP Commands and Replies		
8	<b>Domain name system (DNS):</b> Services Provided by DNS, DNS anatomy, DNS Records and Messages		
9	<b>Network layer components:</b> IP (Internet Protocol), IP Datagram Fragmentation		
10	<b>Internet Control Message Protocol (ICMP):</b> ICMP Messages		
11	<b>Link layer:</b> Services Provided by the Link Layer, Multiple Access Links and Protocols, Taking-turns protocols		
12	<b>Address Resolution Protocol (ARP)</b>		
13	<b>Address Resolution Protocol (ARP) (continued) :</b> Sending a Datagram off the Subnet		
14	<b>Ethernet:</b> Ethernet Frame Structure		
15	<b>Example of flow of data throw the whole 7 layers</b>		
<b>Textbook</b>	<b>Textbook : Computer.Networking.A.Top-Down.Approach.</b> <b>Author :</b> James F. Kurose, Keith W. ross <b>Edition/Publisher/year :</b> 6 <sup>th</sup> edition /Pearson 201 <b>Edition/Year/ Publisher :</b> 1 <sup>st</sup> , John Wiley and Sons, 2010		
<b>References</b>			

<b>Course Title</b>	<b>Human Rights</b>	<b>Theoretical hours/w</b>	<b>1</b>
<b>Course Code</b>	<b>UR321</b>	<b>Practical hours/w</b>	<b>0</b>
<b>Year</b>	<b>Third</b>	<b>Tutorial hours/w</b>	<b>0</b>
<b>Semester</b>	<b>Second</b>	<b>Units</b>	<b>1</b>
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>حقوق الانسان في الحضارات القديمة:</b> حقوق الانسان في الحضارات اليونانية والمصرية		
2	حقوق الانسان في حضارات العراق القديمة		
3	<b>حقوق الانسان في الشرائع والاديان السماوية:</b> في الديانة اليهودية والمسيحية،		
4			
5	<b>مصادر حقوق الانسان:</b> المصادر الدولية ، المصادر الوطنية ،		
6	دستور جمهورية العراق		
7	<b>ضمانات حقوق الانسان:</b> على الصعيد الداخلي، على الصعيد الدولي،		
8			
9	<b>دور المنظمات الاقليمية في حماية حقوق الانسان:</b> اتفاقية الاوربية، الاتفاقية الامريكية،		
10	الميثاق الافريقي، الميثاق العربي		
11	<b>مستقبل حقوق الانسان:</b> التقدم التكنولوجي واثره على الحقوق والحريات،		
12			
13	<b>نشأة وتطور حقوق الطفل:</b> مدلول الطفل، التطور التاريخي لحقوق الطفل، لدى الامم والحضارات، لدى الديانة المسيحية		
14	<b>حقوق الطفل في الاسلام</b>		
15	<b>حقوق الطفل في الاتفاقية الدولية لعام ١٩٨٩</b>		
<b>Textbook</b>	<b>المصدر:</b> حقوق الانسان والطفل والديمقراطية : أ.د. ماهر صالح علاوي الجبوري وآخرون <b>الناشر وسنة الطبع:</b> وزارة التعليم العالي والبحث العلمي- جامعة تكريت،		
<b>References</b>			

# Fourth Year

<b>Course Title</b>	Digital Signal Processing	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	CR411	<b>Practical hours/w</b>	3
<b>Year</b>	Fourth	<b>Tutorial hours/w</b>	1
<b>Semester</b>	First	<b>Units</b>	4

### Course Description

Week No.	Topics
1	<b>Analog –to-digital and digital-to-analog conversions</b> Sampling of analog signals, The sampling theorem, Quantization and conversion, Digital-to-analog conversion, Analog-to-digital conversion, Basic element of digital signal processing.
2	<b>Signals, Systems and signal processing</b> Advantages of digital over analog signal processing, Continuous–time sinusoidal signals, Discrete – time sinusoidal signals, Classification of Signals (Power/Energy Signals, Periodic/Non-periodic Digital Signals. . . . .etc)
3	<b>Analysis of discrete signals and systems</b> Representation of Systems by difference equation and block diagram, System properties, Test for Linear Time Invariant (LTI) systems, Up & Down sampling.
4	<b>Discrete-time systems</b> Input/output description of systems, Block diagram representation of discrete-time systems, Correlation of discrete-time signals, Properties of correlation.
5	<b>Convolution and Deconvolution of discrete time systems</b> Methods to derive the impulse response of discrete time systems, Determination of system O/P using convolution, Calculation of System Impulse response using deconvolution.
6	<b>Frequency Analysis of Digital Systems</b> Fourier Transform of DT system (DTFT), I/p – O/p relation using DTFT.
7	<b>Time domain to frequency domain conversion</b> Discrete-Fourier transform, Time & Frequency Resolution, Fast-Fourier transform
8	<b>Other Transformation &amp; their applications</b> Discrete Cosine Transform, Walsh Transform, Multi-resolution Analysis
9	<b>The Z-transform</b> Direct Z-transform, Inverse Z-transform, and Properties of the Z-transform.
10	<b>Analogue Filtering versus Digital filtering</b> Types of filters, Properties in Time and Frequency domain for Digital filters
11	<b>FIR Filters</b> Design Procedure Using Window Method, Window types, Realization Remarks
12	<b>IIR filters</b> Steps Butterworth & Chypechev Design Methods, Comparison of FIR to IIR
13	<b>Design Examples</b> Using Digital & Analog Specifications, Realization Using Bilinear Z-transformation
14	<b>Conversion From Prototype LPF to Others Filters</b> LPF to LPF conversion, LPF to HPF conversion, LPF to BPF conversion
15	<b>Adaptive Digital Filters</b> Adaptation Methods, main Applications, Notes on some DSP Commercial Chips
<b>Textbook</b>	<b>Title :</b> Digital Signal Processing fundamentals ; <b>Author:</b> Vigay K. Madiseti <b>Edition &amp; Year public :</b> 2 <sup>nd</sup> Ed., CRC press, 2010
<b>References</b>	<b>Title :</b> Digital Signal Processing <b>Author:</b> Monson H. Hayes <b>Edition &amp; Year :</b> 1 <sup>st</sup> Ed., 1995 , Schaum's Outline Series.

<b>Course Title</b>	<b>Modern Networks Technologies</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	NE412	<b>Practical hours/w</b>	0
<b>Year</b>	Fourth	<b>Tutorial hours/w</b>	1
<b>Semester</b>	First	<b>Units</b>	3

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	<b>Review of Data Communications</b> Comparison of digital modulation, Bandwidth efficient modulation, ISI & Channel equalization, Forward error correction.
2	<b>OFDM System I</b> Elements of OFDM system, Comparison with single carrier system, Main advantages, Performance in real channel environments,
3	<b>OFDM System II</b> Cyclic prefix and Equalization, Applications in WLAN standards, Required signal processing efforts, Design consideration and limitations
4	<b>Advanced Coding Techniques I</b> BCH code, Reed-Solomon Code, Convolutional Codes (structure and applications in network standards)
5	<b>Advanced Coding Techniques II</b> New trends in Coding for networks, Erasure channel coding, Rateless codes, Networks Coding.
6	<b>Satellite Systems I</b> Architecture, types, application, Link equation, space loss, noise ....etc
7	<b>Satellite Systems II</b> Space craft, Transponders, Modulation, Multiple Access Techniques.
8	<b>Cellular Packet-Switched Architecture I</b> The wireless data services (cellular digital packet data, advanced radio data information systems)
9	<b>Cellular Packet-Switched Architecture II</b> Trunk interface unit, wireless terminal interface, Base station Interface unit, Cellular controller interface unit.
10	<b>Digital Subscriber Line Technology I</b> The plain old telephone networks, The local loop, Spectrum of digital subscriber loop (DSL), Channel characteristics, Main DSL system elements.
11	<b>Digital Subscriber Line Technology II</b> Modulation techniques in DSL, Types and features of DSL systems, DSL based networks
12	<b>Diversity Techniques</b>
13	<b>Optical Networks I</b> Wavelength-Division Multiplexed (WDM), System Components, WDM system design, Trunk Capacity.
14	<b>Optical Networks II</b> WDM networking and Reconfigurable Optical transport layer, DWDM Technology
15	<b>Optical Networks III</b> Wireless optical networks
<b>Textbook</b>	<b>Textbook-1:</b> The communications Handbook <b>Author :</b> Jerry D. Gibson <b>Edition/Publisher :</b> 2 <sup>nd</sup> /2002/CRC Press <b>Textbook-2:</b> The wireless communications, principles and practices <b>Author :</b> Rappaport <b>Edition/Publisher :</b> 1 <sup>st</sup> / 2002 /Prentice Hall
<b>References</b>	<b>Text book-3:</b> Introduction to Telecommunication Networks Engineering <b>Author :</b> T. Anttalainen <b>Edition &amp; Year public :</b> 2 <sup>nd</sup> / 2003/Artech House



<b>Course Title</b>	Democracy	<b>Theoretical hours/w</b>	1
<b>Course Code</b>	UR411	<b>Practical hours/w</b>	0
<b>Year</b>	Fourth	<b>Tutorial hours/w</b>	0
<b>Semester</b>	First	<b>Units</b>	1

### Course Description

Week No.	Topics
1	مفهوم الديمقراطية: جذور مفهوم الديمقراطية وتطوره
2	تعريف الديمقراطية
3	الديمقراطية العالمية والخصوصية
4	اشكال الديمقراطية الديمقراطية المباشرة
5	الديمقراطية شبه المباشرة
6	الديمقراطية التمثيلية (النيابية)
7	المجلس النيابي
8	الآلية النظام التمثيلي (النيابي) : الانتخاب مفهوم الانتخاب وتكليفه القانوني
9	هيئة الناخبين
10	تنظيم عملية الانتخاب، الدوائر الانتخابية، القوائم الانتخابية
11	المرشحون، الحملة الانتخابية، التصويت
12	نظم الانتخابات الانتخاب المباشر وغير المباشر ، الانتخاب الفردي والانتخاب بالقائمة
13	نظام الاغلبية، نظام تمثيل المصالح،
14	نظام التصويت الاختياري والتصويت الاجباري،
15	نظام التصويت السري والتصويت العلني
<b>Textbook</b>	المصدر: حقوق الانسان والطفل والديمقراطية : أ.د. ماهر صالح علاوي الجبوري وآخرون الناشر وسنة الطبع: وزارة التعليم العالي والبحث العلمي- جامعة تكريت،
<b>References</b>	

<b>Course Title</b>	<b>Networks Management</b>	<b>Theoretical hours/w</b>	<b>2</b>
<b>Course Code</b>	<b>NE422</b>	<b>Practical hours/w</b>	<b>0</b>
<b>Year</b>	Fourth	<b>Tutorial hours/w</b>	<b>1</b>
<b>Semester</b>	First	<b>Units</b>	<b>2</b>
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	<b>Introduction to Network Management:</b> Goals, organization, functions and components		
2	<b>Basic Foundations:</b> Standards, Models, and Language		
3	<b>Abstract Syntax Notation One (ASN.1) and Basic Encoding Rules (BER)</b>		
4	<b>Simple Network Management Protocol (SNMP):</b> Description and message format (Quiz time)		
5	<b>SNMPv1:</b> Organization, information Models, communication and functional Models		
6	<b>SNMPv2 (Test 1 time)</b>		
7	<b>SNMPv3</b>		
8	<b>Remote Network Monitoring (RMON):</b> Components, benefits, mib, group and functions		
9	<b>Network Management Tools and Systems:</b> system utilities for management, measurement of network statistics and mib engineering		
10	<b>Network Management Applications:</b> Configuration, fault, performance, security and accounting		
11	<b>Web-based management (Test2 time)</b>		
12	<b>WiFi Management</b>		
13	<b>Security Management</b>		
14	<b>Introduction to Network Management:</b> Goals, organization, functions and components		
15	<b>Basic Foundations:</b> Standards, Models, and Language		
<b>Textbook</b>	<b>Text Book-1: Network Management: Principles and Practice</b> <b>Author: Mani Subramanian</b> <b>Edition/Year/ Publisher: 2<sup>nd</sup> , 2010, Pearson</b>		
<b>References</b>			

<b>Course Title</b>	<b>Network Design</b>	<b>Theoretical hours/w</b>	<b>2</b>
<b>Course Code</b>	<b>NE423</b>	<b>Practical hours/w</b>	<b>0</b>
<b>Year</b>	Fourth	<b>Tutorial hours/w</b>	<b>1</b>
<b>Semester</b>	First	<b>Units</b>	<b>2</b>
<b>Course Description</b>			
<b>Week No.</b>	<b>Topics</b>		
1	Network Design Methodology		
2	Network Structure Models		
3	LAN and WAN Design		
4	Enterprise LAN Design		
5	Data Center Design		
6	Wireless LAN Design		
7	WAN Technologies		
8	WAN Design		
9	Internet Protocol and Routing Protocols		
10	Routing Protocol Characteristics		
11	OSPF, BGP, Route Manipulation, and IP Multicast		
12	Network Management Protocols		
13	Managing Security		
14	Voice and Video application Design		
15	Comprehensive Scenarios		
<b>Textbook</b>	<b>Text Book-1:</b> top-down-network-design <b>Author :</b> Priscilla Oppenhiemer <b>Edition/Year/ Publisher :</b> 3rd-edition / Sybex / 2014		
<b>References</b>			

<b>Course Title</b>	<b>Wireless Networks</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	<b>NE424</b>	<b>Practical hours/w</b>	3
<b>Year</b>	Fourth	<b>Tutorial hours/w</b>	0
<b>Semester</b>	First	<b>Units</b>	4

**Course Description**

<b>Week No.</b>	<b>Topics</b>
1	Introduction to Antennas and Propagations: Antennas, Propagation Modes, Line of Site Transmission
2	Fading in wireless and Mobile Environments
3	Review on Spread Spectrum Techniques
4	Review on Satellite communications
5	Cellular Wireless Networks: Principles, 1 <sup>st</sup> generation, <sup>nd</sup> generation, <sup>rd</sup> generation <sup>th</sup> generation
6	Wireless LAN technology: Infrared LANS, SS LANS, Narrowband Microwave LANS
7	IEEE802.11 Standard: Protocol, architecture services
8	IEEE802.11 Standard: MAC and Physical layer
9	IEEE802.5 Standard I Bluetooth radio specifications, baseband specifications, Link Manager Protocol
10	IEEE802.5 Standard II Link Manager Protocol, Bluetooth new standards
11	Mobile IP and WAP - I
12	Mobile IP and WAP – II
13	IEEE802.15 Standard
14	IEEE802.16 Standard: Wi_MAX and wireless broadband standard
15	Advances in Wireless Networks (LTE, LTE-A)
<b>Textbook</b>	<b>Text Book-1:</b> top-down-network-design <b>Author :</b> Priscilla Oppenhiemer <b>Edition/Year/ Publisher :</b> 3rd-edition / Sybex / 2014
<b>References</b>	<b>Textbook:</b> Wireless Communications and Networks <b>Author:</b> William Stallings <b>Edition/Publisher/Year:</b> 2 <sup>nd</sup> edition/ Person, 2005

# Elective Courses



<b>Course Title</b>	<b>Artificial Intelligence</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	<b>Selective subject</b>	<b>Practical hours/w</b>	2
<b>Year</b>	Fourth	<b>Tutorial hours/w</b>	0
<b>Semester</b>		<b>Units</b>	4

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	<b>Artificial Intelligence: History &amp; Applications</b> From Eden to ENIAC, human artifice, overview of AI applications
2	<b>Predicate Calculus</b> Propositional calculus, predicate calculus,
3	Inference rules, using inference rules to produce predicate expressions, applications
4	<b>Introduction to Prolog</b>
5	<b>State space search</b> Graph theory, strategies for state space,
6	Using state space to represent reasoning with predicate calculus
7	<b>Heuristic search</b> Hill climbing, Best first search, admissibility, monotonicity& informedness
8	A & A* algorithm, Using heuristics in games, complexity issues
9	<b>Control System (Production Systems)</b> Recursion-based search, production system
10	Blackboard architecture for problem solving
11	<b>Artificial Neural Networks (ANN)</b> Biological inspiration, Artificial neuron model, neural networks architecture
12	Transfer functions, learning types, Learning algorithms
13	<b>Genetic Algorithms</b> Introduction, genetic algorithm processes, coding, fitness function
14	Reproduction, crossover, mutation, convergence
15	<b>Review</b>
<b>Textbook</b>	<b>Text Book-1:</b> Artificial Intelligence, structures and strategies for complex problem solving, <b>Author :</b> George F. Luger <b>Edition/Year/ Publisher :</b> 6 <sup>th</sup> Edition, 2009
<b>References</b>	<b>Text Book-2:</b> Artificial Intelligence, <b>Author :</b> Stuart Russell & Peter Norvig <b>Edition/Year/ Publisher :</b> 3 <sup>rd</sup> Ed., pearson, 2010.

<b>Course Title</b>	<b>Optical Networks</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	<b>Selective subject</b>	<b>Practical hours/w</b>	2
<b>Year</b>	Fourth	<b>Tutorial hours/w</b>	0
<b>Semester</b>		<b>Units</b>	4

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	<b>Introduction to Optical Networking:</b> Advantages of optical networks, Role of the optical networking, WDM as a foundation of optical networking, Interfaces to optical layer ( SONET/SDH).
2	<b>Enabling Technologies for Optical Networks I:</b> Light transmission in optical fibers, Signal impairments along the transmission link, Optical transmitters and modulators.
3	<b>Enabling Technologies for Optical Networks II:</b> Optical receiver, Optical amplifiers, Optical switching elements.
4	<b>Optical Network Elements I:</b> Optical terminal, Optical-electrical-optical architecture, Optical bypass, Wavelength converters.
5	<b>Optical Network Elements II:</b> Optical add/drop multiplexer (OADM), Reconfigurable optical add/drop Multiplexer. O-E-O Optical Switch.
6	<b>Optical Multiplexing Techniques I:</b> Wavelength division multiplexing (WDM), Optical time division Multiplexing, , Optical code division multiplexing.
7	<b>Optical Multiplexing Techniques II:</b> Optical orthogonal division multiplexing (OFDM), Space division multiplexing and optical MIMO concepts
8	<b>Optical Switching:</b> Optical circuit switching, Optical packet switching, optical burst switching
9	<b>Optical Networks Design I:</b> Core optical networks, Metro optical networks, Multilayer network structures.
10	<b>Optical Network Design II:</b> Optical multicasting and traffic grooming and protection, Wavelength routing and assignment.
11	<b>Access Optical Networks:</b> Passive optical network (PON), Ethernet PON (EPON), WDM-EPON.
12	<b>Routing Algorithms for Optical Networks</b>
13	<b>Optical Fault Management in Survivable Optical Networks :</b> Survivable network planning framework, GMPLS-based recovery in transport networks .
14	<b>Advanced Implemented Optical networks:</b> Architectures and Standards.
15	<b>Advanced Optical Networks Proposed in the Literature for Future Applications</b>
<b>Textbook</b>	<p><b>Text Book-1:</b> Optical Network Design and Planning-  <b>Author :</b> Jane M. Simmons  <b>Edition/Year/Publisher :</b> 2nd, 2014, Springer.</p> <p><b>Text Book-2:</b> Internet Optical Infrastructure- Issues on Monitoring and Failure Restoration  <b>Authors :</b> Janos Tapolcai , Pin-Han Ho, Peter Babarczy, and Lajos Rónyai  <b>Edition/Year/ Publisher :</b> 1st, 2015, Springer.</p>
<b>References</b>	<p><b>Text Book-3:</b> Optical Networks: A Practical Perspective  <b>Authors :</b> Rajiv Ramaswami, Kumar N. Sivarajan and Galen H. Sasaki  <b>Edition/Year/ Publisher :</b> 3rd, 2010, Elsevier.</p>

<b>Course Title</b>	<b>Queuing Theory and Systems</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	<b>Selective subject</b>	<b>Practical hours/w</b>	2
<b>Year</b>	Fourth	<b>Tutorial hours/w</b>	0
<b>Semester</b>		<b>Units</b>	4

### Course Description

<b>Week No.</b>	<b>Topics</b>
1	<b>Introduction:</b> Examples on queuing systems, Random variables and distribution functions, Discrete and Continuous
2	<b>Markov chains:</b> Definitions, Discrete time Markov chains, Transition probability, Chapman-Kolmogorov equation, Transition probability matrix and Transient analysis
3	<b>Classification of states</b>
4	<b>Steady state analysis</b>
5	<b>Continuous time Markov chains: Transient rate matrix</b>
6	<b>Birth-death chains: Pure death chains and Pure birth chains (Test1 time)</b>
7	<b>Queuing systems:</b> Kendall Notation, Performance measures and Little's Law
8	<b>M/M/1 Queue analysis and performance measures</b>
9	<b>M/M/m and M/M/1/k (Test2 time)</b>
10	<b>M/M/<math>\infty</math>, M/M/m/m and M/M/k/n (Erlang B and C formulae)</b>
11	<b>M/G/1 Queue</b>
12	<b>Open queuing networks</b>
13	<b>Closed queuing networks (Test3 time)</b>
14	<b>Introduction:</b> Examples on queuing systems, Random variables and distribution functions, Discrete and Continuous
15	<b>Markov chains:</b> Definitions, Discrete time Markov chains, Transition probability, Chapman-Kolmogorov equation, Transition probability matrix and Transient analysis
<b>Textbook</b>	<b>Text Book-1:</b> Probability, Markov Chains, Queues, and Simulation <b>Author:</b> William J. Stewart <b>Edition/Year/ Publisher:</b> 2009, Princeton University Press <b>Text Book-2:</b> Introduction to Discrete Event Systems <b>Author:</b> C. G. Cassandras <b>Edition/Year/ Publisher:</b> 2 <sup>nd</sup> edition, 2008, Springer
<b>References</b>	



<b>Course Title</b>	<b>WSN &amp; Applications</b>	<b>Theoretical hours/w</b>	3
<b>Course Code</b>	<b>Selective subject</b>	<b>Practical hours/w</b>	2
<b>Year</b>	Fourth	<b>Tutorial hours/w</b>	0
<b>Semester</b>		<b>Units</b>	4

**Course Description**

<b>Week No.</b>	<b>Topics</b>
1	Sensor Node Architecture
2	Sensor-Level Energy Management
3	Wireless Transmission
4	Sensor Network Architecture
5	Medium Access Arbitration
6	MAC Protocols for Sensor Networks
7	Network Bootstrapping and Clustering
8	Node Localization Techniques
9	Data Routing
10	Coverage and Placement Strategies
11	Tolerance of Nodes Failure
12	Embedded Operating Systems: Operating Systems for Wireless Sensor Networks –Examples of Operating Systems – TinyOS – Mate – MagnetOS –
13	Introduction to Tiny OS – NesC – Interfaces and Modules- Configurations and Wiring - Generic Components -Programming in Tiny OS using NesC, Emulator TOSSIM.
14	Underwater Sensor Networks; WSN Security Challenges and QoS Issues
15	WSN Applications: Building Automation - Medical Applications - Highway Monitoring - Military Applications - Nanoscopic Sensor Applications.
<b>Textbook</b>	Text Book-1: Protocols and Architectures for Wireless Sensor Networks Author : Holger Karl, and Andreas Willig, Edition/Year/ Publisher : John Wiley & Son, 2005. Text Book-2: Wireless Sensor Networks Author : Cauligi S. Raghavendra, Krishna Sivalingam, Taieb M. Znati, Edition/Year/ Publisher : Springer, 200.
<b>References</b>	