Al-Nahrain University

College of Information Engineering

Systems Engineering Program

Study Plan and Course Description

2015

Study Plan

Systems Engineering						
First Year – Semester I						
No.	**Course Code**	**Subject**	**Hrs. Per week**			**Units**
			Theo.	**App.**	**Tut.**	
1	UR111	English Language I	2	--	--	2
2	CR111	Computer Programming	2	3	--	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
Total			**14**	**12**	**1**	**18**
			27			

Systems Engineering						
First Year – Semester II						
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	Eng. Drawing & CAD	1	2	-	2
6	SE121	Introduction to Systems Engineering	2	2	1	3
Total			**14**	**10**	**3**	**18**
			27			

Systems Engineering						
Second Year – Semester I						
No.	**Course 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	SE211	Instrumentation & Measurements	2	2	1	3
5	SE212	Information Systems	3	--	0	3
6	SE213	Engineering Analysis	4	--	2	4
Total			**16**	**8**	**3**	**19**
			27			

Systems Engineering						
Second Year – Semester II						
1	CR221	Digital Electronics	2	3	--	3
2	SE221	Numerical Analysis	2	2	1	3
3	SE222	Fundamentals of Control Engineering	2	3	1	3
4	SE223	Engineering Statistics	3	--	--	3
5	SE224	Computer Architecture	3	--	1	3
6	SE225	Computer Networks	2	2	--	3
Total			**14**	**10**	**3**	**18**
			27			

Systems Engineering						
Third Year – Semester I						
No.	**Course 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	SE311	Microprocessors & Interfacing	3	3	--	4
4	SE312	Systems Engineering Analysis & Design	3	--	--	3
5	SE313	Control Engineering	3	3	--	4
6	SE314	Operations Research	2	--	1	2
Total			**16**	**9**	**3**	**19**
			28			

Systems Engineering						
Third Year – Semester II						
1	UR321	Human Rights	1	--	--	1
2	CR321	Operating Systems	3	2	1	4
3	SE321	Microcontrollers	3	3	--	4
4	SE322	Security Engineering	2	2	1	3
5	SE323	Intelligent Systems	3	--	1	3
6	SE324	Digital Control	2	3	1	3
Total			**14**	**10**	**4**	**18**
			28			

Systems Engineering						
Fourth Year – Semester I						
No.	**Course Code**	**Subject**	**Hrs. Per week**			**Units**
			Theo.	**App.**	**Tut.**	
1	UR411	Democracy	1	--	--	1
2	CR411	Digital Signal Processing	3	3	1	4
3	SE411	Project	--	4	--	2
4	SE412	Real time & Embedded Systems	2	2	1	3
5	SE413	Elective I	3	2	--	4
6	SE414	Elective II	3	2	--	4
Total			**12**	**13**	**2**	**18**
			27			

Systems Engineering						
Fourth Year – Semester II						
1	SE411	Project (continued from st Semester)	--	4	--	2
2	SE421	Robotics	3	3	--	4
3	SE422	System Modeling & Simulation	2	2	1	3
4	SE423	Systems Reliability	3	--	-	3
5	SE424	Elective III	3	--	1	3
6	SE425	Elective IV	3	2	--	4
Total			**14**	**11**	**2**	**19**
			27			

Hours and Units Summery

Systems Engineering									
Seq.	Year	Semester	Hrs. Per Week			Total Hrs (Actual)		Total Units	
			Theo.	App.	Tut.	Per Week	Per Year	Per Sem.	Per Year
1	First	1st	14	12	1	27	810	18	36
2		2nd	14	10	3	27		18	
3	Second	1st	16	8	3	27	810	19	37
4		2nd	14	10	3	27		18	
5	Third	1st	16	9	3	28	840	19	37
6		2nd	14	10	4	28		18	
7	Fourth	1st	١٢	١٣	2	27	810	18	37
8		2nd	14	11	2	27		19	
Total (Four Years)							3270 Hrs	147 Units	

Year/ Semester	University Requirements (UR)		College Requirements (CR)		Specialization (SE)		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	20	13	5	3	27	18
2-1	2	2	11	7	14	10	27	19
2-2	-	-	5	3	22	15	27	18
3-1	-	-	10	6	18	13	28	19
3-2	1	1	6	4	21	13	28	18
4-1	1	1	7	4	19	13	27	18
4-2	-	-	-	-	27	19	27	19
total	**8x15=120**	**8**	**84x15=1260**	**53**	**126x15=1890**	**86**	**218x15=3270**	**147**

	%Hrs	%Units
University Requirements	120/3270 = 3.67 %	8/147 = 5.44%
College Requirements	1260/3270= 38.53%	53/147 = 36.05%
Department Requirements	1890/3270= 57.80%	86/147 = 58.50%

Selective Courses:

1. Hardware Programming.
2. Distributed Control Systems (SCADA).
3. Wireless Sensor Networks.
4. Nonlinear Control.
5. Queuing Systems.
6. Hybrid Systems.
7. Programmable Logic Controllers.
8. Advanced Operating Systems.
9. Human-Machine Interface.
10. Decision and Risk Analysis.
11. Optimization.

Course Description

First Year

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

Course Description

Week No.	Topics
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
Textbook	Keith Boecker, P. Charles Brown, Oxford English for Computing, Oxford University press. Prentice Hall, Writing &Practice Communication in Action, Pearson, Prentice Hall.
References	Longmann Preparation Course of the TOEFL test .the paper test http://www.english for every one.com/

Course Title	English II	Theoretical hours/w	2
Course Code	UR121	Practical hours/w	-
Year	First	Tutorial hours/w	-
Semester	Second	Units	2

Course Description

Week No.	Topics
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 skill connect the supporting paragraphs
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 practi 3.programming Languages: C language
12	1.Distinguisl like ,alike ,unlike ,and dislike 2.Comparing Software Package 3.writing practice
13	1.Distinguish othe another, and others 2.Computer Networks 3.Writing practi
14	Practice
15	Practice
Textbook	• Keith Boecker, P. Charles Brown, Oxford English for Computing, Oxford University press. • Prentice Hall, Writing &Practice Communication in Action, Pearson, Prentice Hall.
References	• Longmann Preparation Course of the TOEFL test .the paper test • http://www.english for every one.com/

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

Course Description

Week No.	Topics
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
Textbook	Paul Deitel & Harvey Deitel, C++ How to Program, 8th edition, Pearson, 201 .
References	Lesley Anne Robertson, Computing concepts with C++ essentials, 5th Ed. 20(

Course Title	Mathematics I	Theoretical hours/w	3
Course Code	CR112	Practical hours/w	-
Year	First	Tutorial hours/w	1
Semester	First	Units	3

Course Description

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

Course Title	Logic Circuits	Theoretical hours/w	2
Course Code	CR113	Practical hours/w	3
Year	First	Tutorial hours/w	-
Semester	First	Units	3

Course Description

Week No.	Topics
1	Digital systems: Decimal, binary, octal, hexadecimal number, number based conversion, binary codes, binary logic, logic level.
2	Boolean algebra and logic gate:
3	Basic definitions, axiomatic definitions of Boolean algebra, Boolean function.
4	Canonical and standard forms, Digital logic gate.
5	Simplification of Boolean functions:
6	Algebra manipulation, the map method, two, three, four, and five variable maps.
7	Product of sum simplification, NAND implementation, NOR implementation, don't care conditions.
8	Representation of signed numbers, r's complement, (r-1)'s complement.
9	2's complement adder-subtractor, binary codes, code conversion, analysis procedure of 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) multiplexer.
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.
Textbook	Digital Design, M. Morris Mano & D. Michael, Prentice-Hall, 4th Edition, 2009.
References	Digital Fundamentals, Thomas L. Floyd, Prentice-Hall, 9th Edition, 2006.

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

Course Description - Theoretical

Week No.	Topics
1	**Computers:** 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
2	**Networks** What a network is, What are the different types of networks, Their benefits, How to connect to them and use them.
3	**Parts of a Personal Computer** System Units and the parts inside, Motherboards, Microprocessor Chips, Power Supplies, Expansion Slots and Cards
4	**Understanding Memory** What memory does in a computer, How its size is measured , The difference between RAM and ROM, What is cache memory
5	**Input and Output Devices:** keyboard, mouse, microphone, scanners, digital cameras, Output devices like: Video cards, The Monitor, Speakers
6	**Storage Systems:** Hard Disks , Floppy Disks , CD Drives and DVD Drives
7	**Printers:** Dot Matrix printers, Ink jet and Bubble jet printers, Laser printers, Combination Printers, Plotters.
8	**Troubleshooting:** Make a computer faster when it only runs slowly, Install new hardware, What to do if hardware stops working, Computer maintenance
9	**Software Applications:** What an Operating System is, What software is, How software is developed, Which software programs are for specific tasks.
10	**Using the Computer:** 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
11	**Computer Applications 1** Choosing An Application Program, & Software program that performs specific function.
12	**Computer Applications 2** Word Processing, & Spread Sheets
13	**Computer Applications 3** Presentations, Database Management, & Graphics
14	**Computer Applications 4** Multimedia, Electronic Mail, & Web Browsing
15	**Computer Applications 5** Utility Tools, Suites, & Specialized
Textbook	IC3 Certificate Books & Lectur
References	

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

Course Description - Practical

Week No.	Topics
1,2	Computer Hardware Component, Motherboards, Memory Processor
3	IDE, AGP, PCI, Monitors, Power Supply
4	Hard Disk, Optical Disk CD And DVD
5,6	Printers, scanners, Data show, UPS
7	PC Hardware Component Assembling
8,9,10	Operating System Installation, Windows, Linux
11,12	Network configuration and demonstration (LAN, Wireless, Broad band, DSL, Modems)
13	Laptop Components
14,15	Trouble Shooting
16	Final Exam
Textbook	**The Principle Of Computer Hardware** **Author : Alan Clement** **Edition & Year Public: Oxford University Press 2006**
References	

Course Title	Physical Electronics	Theoretical hours/w	3
Course Code	CR115	Practical hours/w	3
Year	First	Tutorial hours/w	
Semester	First	Units	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)
Textbook	**Title:** Electron device & Circuit Theory **Author:** Robert Boylested **Publisher:** Prentice-Hall, 10th Ed., 2008
References	

Course Title	Physical Electronics (Lab)	Theoretical hours/w	3
Course Code	CR115	Practical hours/w	3
Year	First	Tutorial hours/w	
Semester	First	Units	4

Course Description (Practical)

Week No.	Topics
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
Textbook	**Title:** Electron device & Circuit Theory **Author:** Robert Boylested **Publisher:** Prentice-Hall, 10th Ed., 2008
References	

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

Course Description

Week No.	Topics
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
Textbook	Object Oriented Programming in C++ Author: Robert Lafore Edition &Year Public:Fourth Edition ,2C
References	

Course Title	Mathematics II	Theoretical hours/w	4
Course Code	CR122	Practical hours/w	-
Year	First	Tutorial hours/w	1
Semester	Second	Units	4

Course Description

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

Course Title	Electrical Circuits	Theoretical hours/w	3
Course Code	CR123	Practical hours/w	3
Year	First	Tutorial hours/w	1
Semester	Second	Units	4

Course Description

Week No.	Topics
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.
Textbook	Introduction to circuit analysis Robert L. Boylested 12th Ed., 2010
References	

Course Title	Eng. Drawing & CAD	Theoretical hours/w	1
Course Code	CR124	Practical hours/w	2
Year	First	Tutorial hours/w	-
Semester	Second	Units	2

Course Description

Week No.	Topics
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
Textbook	1. Miriam Ochoa, Introducing AutoCAD 2008, Wiley, 2010 2. Exercises in machine drawing, S. Bogolyubov, 1982.
References	

Course Title	Introduction to Systems Engineering	Theoretical hours/w	2
Course Code	SE121	Practical hours/w	2
Year	First	Tutorial hours/w	1
Semester	Second	Units	3

Course Description

Week No.	Topics
1	What Is Systems Engineering?, Origins Of Systems Engineering, Examples Of Systems Requiring Systems Engineering
2	Systems Engineering As A Profession, Systems Engineer Career Development Model, The Power Of Systems Engineering
3	Systems Engineering Landscape, Perspectives Of Systems Engineering
4	Systems Domains, Systems Engineering Fields
5	Systems Engineering Approaches, Systems Engineering Activities And Products
6	The System Development Process
7	System Life Cycle
8	The Systems Engineering Method, Testing Throughout System Development
9	Organization Of Systems Engineering
10	Needs Analysis, Originating A New System
11	Operations Analysis, Functional Analysis, Feasibility Definition
12	Implementing The System Building Blocks
13	Component Design, Design Validation
14	Integrating, Testing, And Evaluating The Total System
15	Systems Engineering Management
Textbook	**Title:** Systems Engineering Principles and Practice **Author:** Alexander Kossiakoff & William Sweet **Publisher& Year:** John Wiley, 2011
References	

Second Year

Course Title	Arabic language	Theoretical hours/w	2
Course Code	UR211	Practical hours/w	-
Year	Second	Tutorial hours/w	-
Semester	First	Units	2

Course Description

Week No.	Topics
1	الجملة الاسمية المبتدأ وانواعه ، الخبر وانواعه، نواسخ الابتداء ، كان واخواتها، ان واخواتها
2	المثنى والملحق به، جمع المذكر السالم والملحق به
3	جمع المؤنث السالم، الاسماء الخمسة
4	الجملة الفعلية بناء الفعل الماضي، بناء فعل الامر
5	الفعل المضارع، بناؤه واعرابه،
6	الاسماء المنصوبه، المفعول به، المفعول المطلق، المغعول فيه، المفعول معه
7	معاني حروف الجر
8	**للشعر** قصيدة قديمة: المتنبي، ابن زيدون
9	قصيدة حديثة: سامي مهدي
10	القرآن الكريم سورة مريم
11	**الاملاء** كتابة الهمزة المتوسطة والمتطرفة
12	كتابة الضاد والظاء، كتابة التاء القصيرة والطويلة
13	علامات الترقيم
14	الاخطاء الشائعة في المكاتبات الرسمية ، كتابة العدد
15	**للشعر** : قصيدة جاهلية: معلقة عمرو بن كلثوم التغلبي قصيدة عباسية: علي بن الجهم قصيدة حديثة: نزار قباني
Textbook	**المصدر:** محاضرات في اللغة العربية
References	

Course Title	Object Oriented Programming (Java)	Theoretical hours/w	2
Course Code	CR211	Practical hours/w	3
Year	Second	Tutorial hours/w	-
Semester	First	Units	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
Textbook	**Title:** java "How to program" **Author:** H.M.Deitel, **Edition &year publication** : Sixth edition ,200
References	

Course Title	Electronics	Theoretical hours/w	3
Course Code	CR212	Practical hours/w	3
Year	Second	Tutorial hours/w	-
Semester	First	Units	4

Course Description

Week No.	Topics
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)
Textbook	**Title:** Electron Devices & Circuits **Author:** G. S. N. Raju **Publisher:** I.K. Inter. publications, New Delhi, 200
References	

Course Title	Instrumentation and Measurements	Theoretical hours/w	2
Course Code	SE211	Practical hours/w	2
Year	Second	Tutorial hours/w	1
Semester	First	Units	3

Course Description

Week No.	Topics
1	International system of units, electrical standard, time and frequency standard, IEEE standards.
2	Definitions, accuracy, precision, resolution, composition of measuring system, errors.
3	Types of data, Gaussian distribution, mean, median, standard deviation, probability of errors.
4	Instruments for measuring basic electrical parameters, electromechanical instruments.
5	Instruments for measuring basic electrical parameters, electric instruments.
6	DC and AC bridges: basic electrical parameters measurement, frequency measurement.
7	Oscilloscopes: CRT deflection, probes and functions.
8	Oscilloscopes: measuring techniques, types.
9	Transducers: position, pressure, velocity, acceleration.
10	Transducers: position, force, torque, temperature, photosensitive transducers.
11	Data recording instruments: chart recorders, magnetic recorders, graphic plotters, data loggers.
12	Noise: limits to sensitivity, accuracy & speed in analog and digital systems, S/N enhancement.
13	Computer-based instrumentation and Measurement: Basic concepts, instrument integration.
14	Computer-based instrumentation and Measurement: instrumentation bus (IEEE-488, GPIB buses)
15	Computer-based instrumentation and Measurement: Software instrumental control, output data processing methods (least squares fitting).
Textbook	**Text Book :** **Author :** **Edition & Year Public:**
References	

Course Title	Information Systems	Theoretical hours/w	3
Course Code	SE212	Practical hours/w	-
Year	Second	Tutorial hours/w	-
Semester	First	Units	3

Course Description

Week No.	Topics
1	Principles of Information Systems: Introduction, Information Systems in Organizations, Systems &Application Software, Organizing Data & Information,
2	Telecommunications and Networks, Internet, Intranets, and Extranets, Transaction Processing and Enterprise Resource Planning Systems, Information and Decision Support Systems.
3	Specialized Business Information Systems (AI, Expert Systems, Virtual Reality & Other Specialized Systems), Systems Investigation & Analysis, Systems Design, Implementation, Maintenance & Review, Security, Privacy, and Ethical Issues in Information Systems and the Internet
4	Information systems & organizational design: Organizational Structure and IT, Organizing for E-Commerce, IT, Organizational Structure, and Organizational Environment, Antecedents for Organizational Change
5	IT and Organizational Design, Organizational Change through Flexible IT, Managing Knowledge—Exploiting IT Potential, Integrating IT in an Organizational Environment,
6	Managing Rapid IT Change in Organizations, "Customer-Oriented" Organizational Design—The Role of IT, Involving the User in IT, Organizational Structure and IT—Global Scenarios,
7	Information Retrieval: Overview of information discovery, Text based information retrieval, Vector methods, Inverted files, Text processing methods, String processing.
8	Control and Accounting Information Systems, Information Systems Controls and System Reliability, Auditing Computer-based Information Systems
9	The Revenue Cycle, The Expenditure Cycle, The Production Cycle, The Human Resources Management and Payroll Cycle, General Ledger.
10	Management as a control system - Database Management Systems - Concepts - Data Models - Database Design - MIS & Client Server Architecture.
11	MIS as a support to management - Organization structure and Theory –Basic Model and Organization structure - Organizational Behavior.
12	System analysis and design –Need for system Analysis - System Analysis of existing System - New Requirement - System Development Model - Structured Systems Analysis and Design
13	Control and Accounting Information Systems, Information Systems Controls and System Reliability, Auditing Computer-based Information Systems
14	Internet and Web based Information System
15	Electronic Commerce
Textbook	• Management Information Systems Author : K. C. Landon and J. P. Laudon, Edition & Year public : Prentice Hall, 12th Ed, 2012
References	• Mining the Web: Analysis of Hypertext and Semi Structured Data. Author : Morgan K. Chakrabarti Edition & Year public : 2003 • Principles of Information Systems, Author : Ralph Stair. • Edition & Year public : 6th Edition, 200

Course Title	Engineering Analysis	Theoretical hours/w	4
Course Code	SE213	Practical hours/w	-
Year	Second	Tutorial hours/w	2
Semester	First	Units	4

Course Description

Week No.	Topics
1	Linear Equations & Matrices I Linear System, Matrices, Properties of Matrix Operations, Solution of Equations, The Inverse of Matrix.
2	Linear Equations & Matrices II Solution of Equations, The Inverse of Matrix.
3	Determinants Definitions & Properties, Cofactor Expansion & Applications.
4	Vectors & Vector Spaces I Vectors in the Plane, n-Vectors, Cross Product in R3
5	Vectors & Vector Spaces II Vector Spaces & Subspaces, Linear Independence, Basis & Dimensions.
6	Vectors & Vector Spaces II The Rank of a Matrix & Applications, Orthogonal Basis in Rn.
7	Linear Transformations & Matrices I Definition & Examples, The Kernal & Range of a Linear Transformation.
8	Linear Transformations & Matrices I The Matrix of a Linear Transformation, Applications.
9	Eigen values & Eigenvectors. Diagonalization, Diagonalization of Symmetric Matrices.
10	Ordinary Differential Equations (ODEs) I Basic Concepts, Separable ODEs. Modeling, Exact ODEs.
11	Ordinary Differential Equations (ODEs) II Integrating Factors, Linear ODEs. Bernoulli Equations.
12	Second-Order linear ODEs I Homogeneous Linear ODEs of Second Order, Homogeneous Linear ODEs with Constant Coefficients.
13	Second-Order linear ODEs II Euler-Cauchy Equations, Non-homogeneous ODEs.
14	Fourier Analysis I Orthogonal Expansion of Signals, Basic definition of Fourier series, Trigonometric & exponential Fourier series.
15	Fourier Analysis II Fourier Integral & Transform, Properties and Applications
Textbook	**Text Book :** Advanced Engineering Mathematics **Author :** Erwin Kreyszig **Edition & Year Public:** 9th Edition 200
References	

Course Title	Digital Electronics	Theoretical hours/w	2
Course Code	CR221	Practical hours/w	3
Year	Second	Tutorial hours/w	-
Semester	Second	Units	3

Course Description

Week No.	Topics
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.
Textbook	Digital Design, M. Morris Mano & D. Michael, Prentice-Hall, 4th Edition, 200
References	Digital Fundamentals, Thomas L. Floyd, Prentice-Hall, 9th Edition, 2006

Course Title	Numerical Analysis	Theoretical hours/w	2
Course Code	SE221	Practical hours/w	2
Year	Second	Tutorial hours/w	1
Semester	Second	Units	3

Course Description

Week No.	Topics
1	**Introduction to numerical methods I** Absolute and relative errors, Rounding and chopping, Computer errors in representing numbers.
2	**Introduction to numerical methods II** Review of Taylor series and some useful mathematical relations
3	**Roots of Equations** I Graphical Methods, Bisection method, Newton method
4	**Roots of Equations** II Secant method, Systems of nonlinear equations
5	**Systems of Linear Equations I** Gaussian elimination, Gaussian elimination with scaled partial pivoting and Tri-diagonal systems.
6	**Systems of Linear Equations II** Gauss-Jordan method
7	**Methods of Least Squares** Linear Regression, Polynomial Regression, Multiple Linear Regression
8	**Interpolation** Newton's Divided Difference method, Lagrange interpolation, Inverse Interpolation
9	**Numerical Integration I** Trapezoid rule, Simpson's Rules
10	**Numerical Integration II** Romberg algorithm
11	**Numerical Differentiation I** Estimating derivatives
12	**Numerical Differentiation II** Richardson Extrapolation
13	**Ordinary Differential Equations I** Euler's method, Improvements of Euler's method, Runge-Kutta methods,
14	**Ordinary Differential Equations II** Methods for systems of equations, Adaptive RK Methods, Multistep Methods, Boundary value problems
15	**Useful Applications of Numerical Analysis**
Textbook	**Text Book :** Numerical Methods for Engineers **Author :** Steven C. Chapra and Raymond P. Canal **Edition & Year Public:** 5th Edition
References	

Course Title	Fundamentals of Control Engineering	Theoretical hours/w	2
Course Code	SE222	Practical hours/w	3
Year	Second	Tutorial hours/w	1
Semester	Second	Units	3

Course Description

Week No.	Topics
1	**Introduction to control systems** - Open loop control system - Closed loop control system - Design of control systems
2	**Mathematical Background and Modeling of Dynamic Systems**
3	**Laplace Transform** - Inverse Laplace Transformation
4	**The Transfer Function of Linear Systems**
5	**State Space and State variable Models**
6-7	**Mathematical Modeling of Electrical Systems and Mechanical Systems** - Electrical Systems - Mechanical Systems
8-9	**Mathematical Modeling of Fluid Systems and Thermal Systems** - Liquid-Level Systems - Pneumatic Systems - Hydraulic Systems - Thermal Systems
10	**Block Diagram Reduction**
11-12	**Transient and Steady State response analysis** - Test Input Signals - Performance of a First-Order System - Performance of a Second-Order System - The S-plane Root Location and the Transient Response - Sensitivity of Control systems to parameter Variations - Disturbance Signals in Feedback Control System Steady State Error
13-14	**The Stability of Linear Control Systems** - The Concept of Stability - The Routh-Hurwitz Stability Criterion - The Relative Stability of Feedback Control Systems - The Stability of State Variable Systems
15	**Introduction to control system Analysis & Design using Root Locus method and Frequency Response method**
Textbook	**Text Book : Modern Control Engineering** **Author : Katsuhiko Ogata** **Edition & Year Public:** 5th Edition 2010**, Prentice Hall**
References	Modern control systems Author: Richard C. Dorf, Robert H. Bishop Edition & Year Public: 12th Edition 2011, **Prentice Hall**

Course Title	Engineering Statistics	Theoretical hours/w	3
Course Code	SE223	Practical hours/w	-
Year	Second	Tutorial hours/w	-
Semester	Second	Units	3

Course Description

Week No.	Topics
1	The Role Of Statistics In Engineering
2	Probability Models And Axioms
3	Discrete Random Variables And Distributions
4	Binomial Distribution, Introduction To Hypothesis Testing
5	Continuous Random Variables, Probability Density Function, Cumulative Distribution Function
6	Continuous Distribution, Normal Distribution, Gamma Distribution, Weibull Distribution
7	Sampling Distributions, Central Limit Theorem, T-Distribution And Inference About Means
8	T-Distribution And Inference About Means, Multivariate Distributions, Simple Linear Regression
9	Functions Of Random Variables
10	Random Samples, Statistics And The Central Limit Theorem,
11	Bernoulli Process
12	Poisson Process
13	Bayesian Statistical Inference
14	Markov Chains
15	Statistical Process Control
Textbook	**Title**: Engineering Statistics **Author**: Douglas C. Montgomery, **Publisher & Year**: Wiley, 5th edition 201
References	

Course Title	Computer Architecture	Theoretical hours/w	3
Course Code	SE224	Practical hours/w	-
Year	Second	Tutorial hours/w	1
Semester	Second	Units	3

Course Description

Week No.	Topics
1	Introduction: organization and architecture structure and function.
2	Computer evaluation and performance : history of computer , designing for performance Pentium and power PC evolution
3	Computer function and interconnection (I) :computer components , computer functions
4	Computer function and interconnection (II): interconnection structure, bus interconnection, PCI.
5	Cache memory: computer memory system, cache memory principles, elements of cache design.
6	Internal memory: semiconductor main memory, error correction, DRAM organization.
7	Input / Output(I) : external devices , I/O modules , programmed I/O.
8	Input / Output(II) : DMA , I/O channel and processors
9	Computer architecture: arithmetic and logic unit , integer arithmetic floating point representation , floating point arithmetic
10	Instruction-Level Parallelism and Superscalar Processors Overview, Design Issues, Pentium 4
11	Instruction sets: machine instruction, type of operands, data type, and operations addressing modes, instruction formats.
12	Reduced Instruction Set Computers (RISCs), Instruction Execution Characteristics The Use of a Large Register File, Compiler-Based Register Optimization reduced Instruction Set Architecture, RISC Pipelining MIPS R4000, SPARC, The RISC versus CISC Controversy,
13	CPU structure: processor organization , register organization CPU function : instruction cycle , instruction pipelining
14	Parallel Organization, Parallel Processing, The Use of Multiple Processors, Symmetric Multiprocessors, Cache Coherence and the MESI Protocol, Clusters,
15	Multicore Computers, Hardware Performance Issues, Software Performance Issues, Multicore Organization, Case study Pentium and power PC processor.
Textbook	**Text book:** Computer Organization and Architecture: Designing for Performance, **Author :** William Stallings **Edition & Year public :** 8/E ,Prentice- Hall,2009
References	

Course Title	Computer Networks	Theoretical hours/w	2
Course Code	SE225	Practical hours/w	3
Year	Second	Tutorial hours/w	-
Semester	Second	Units	3

Course Description

Week No.	Topics – theory
1	**Introduction to Computer Networks I:** Why use networks?, Types of networks: Peer to peer, Client /Server, LANs, MANs, WANs, Elements common to client/server networks.
2	**Introduction to Computer Networks II:** How networks are used, File and print services, Access services, Communication services, Internet services, Management services.
3	**Networking standards and the OSI Model:** Networking standard organizations, OSI model.
4	**Applying the OSI model:** Communication between two systems, frame specifications, IEEE networking specifications
5	**Introduction to TCP/IP :** Characteristics of TCP/IP, Layers of TCP/IP
6	**TCP/IP Core protocols:**. TCP, UDP, IP
7	**IP v4 Addressing**: Binary and dotted decimal notation, Subnet mask. Assigning IP addresses
8	**Topologies:** Simple physical topology, Logical topologies, Hybrid physical topology, Backbone networks, Switching: circuit switching and message switching, packet switching, MPLS
9	**Ethernet Standards :** CSMA/CD, Ethernet Standards for copper cable, Ethernet Standards for fiber optic cable, 1 -Gigabit fiber optic standard
10	**Network Hardware I:** NICs, repeaters and hubs, bridges
11	**Network Hardware II**: switches, Routers and Gateways
12	**WANs I:** WAN essentials, WAN topologies, PSTN:
13	**WANs II** : X.25 and frame relay, ISDN, T-carriers, DSL
14	**Wireless Networking I:** The wireless spectrum, Characteristics of wireless transmission, WLAN architecture
15	**Wireless Networking II:** 802.11 WLANs, Configuring wireless connectivit devices
Textbook	**Title:** Network+ Guide to Networks **Author :** Tamara Dean **Edition/Publisher :** 5th Edition, Cengage Learning, 201
References	

Course Title	Computer Networks – Lab	Theoretical hours/w	2
Course Code	SE225	Practical hours/w	3
Year	Second	Tutorial hours/w	-
Semester	Second	Units	3

Course Description

Week No.	Topics – Lab
1	Peer to Peer Network
2	Configure IP Addresses
3	Assign IP Subnet Addresses
4	Client-Server Network
5	Network Topologies (Bus, Star, Mesh, Ring)
6	Design Stop-and-Wait & Go-back-N protocol.
7	Design of Sliding Window Protocol
8	Build A Client for Time Protocol
9	Build A Simple File Transfer Service.
10	Local Area Network: Ethernet, NIC & Configuration
11	Switch Configuration
12	Router Configuration
13	Implement an IP Router
14	Compare a Throughput of a Hub and Switch
15	Wireless Network: Installation and Configuration
Textbook	**Title:** Network+ Guide to Networks **Author :** Tamara Dean **Edition/Publisher :** 5th Edition, Cengage Learning, 2010
References	

Third Year

Course Title	Communication Systems	Theoretical hours/w	3
Course Code	CR311	Practical hours/w	3
Year	Third	Tutorial hours/w	1
Semester	First	Units	4

Course Description

Week No.	Topics
1	**Elements of Communication systems** **Review of Signals & Systems I:** Classification of Signals, Fourier Series, Line Spectrum, Signal and system bandwidths, single-tone and multi-tone signals.
2	**Signals & Systems II:** Fourier Transform, Modulation Property, Signal bandwidth, Linear Time Invariant System.
3	**Signals & Systems III:** Ideal Filters, Power and Energy spectral density, Noise in Communication Systems. Signal-to-Noise Ratio
4	**Linear Modulation (Amplitude Modulation) I:** Double-Side-Band Suppressed Carrier (DSB-SC), Double-Side-Band with Large Carrier (DSB-LC).
5	**Linear Modulation (Amplitude Modulation) II:** Single-Side-Band (SSB), Vestigial Side Band, Quadrature Amplitude Modulation (QAM)
6	**Linear Modulation (Amplitude Modulation) III:** Effects of noise and Interference on AM signals, The use of frequency Mixers in communication systems, Frequency Division Multiplexing.
7	**Carrier Recovery Circuits :** Signal Squaring, Coast's Loop, Phased Locked Loop **AM Super-heterodyne Receiver**
8	**Angle Modulation I:** Frequency Modulation (FM), Phase Modulation (PM), Spectrum of Angle Modulated Wave.
9	**Angle Modulation II:** Narrow & wideband Case, The Phased Locked Loop Principles & Applications, Generation & Reception of FM Signal.
10	**Angle Modulation III:** FM stereophonic system, FM Standard Radio Receiver, Comparison of FM to AM signals (BW and S/N)
11	**Sampling & Pulse Modulations:** Sampling Theorem, Shannon Theorem, Pulse Amplitude Modulation (PAM), Time Division Multiplexing, Pulse Width Modulation (PWM), Pulse Position Modulation. (PPM).
12	**Pulse Code Modulation (PCM):** PCM for speech signals, Uniform and Non-uniform Quantizers, Differential PCM, PCM-TDM, Digital Multiplexing (E1 & T1 system
13	**Delta Modulations (DM):** Linear Delta Modulation, DM with Double Integrations, Delta Sigma Modulation, Adaptive DM **Carrier Modulated Digital Signals I:** Baseband and Passband Transmission, Amplitude Shift Keying (ASK), On-Off Keying (OOK), Phase Shift Keying (PSK)
14	**Carrier Modulated Digital Signals II:** Differential PSK and QPSK, Frequency Shift Keying (FSK), Minimum Shift Keying (MSK) & Bandwidth Versus Transmission Rate Comparison of Different Signals.
15	**Carrier Modulated Digital Signals III:** Pulse Shaping Transmission Formats, Optimum Detection of Baseband Digital Signals (Polar, Unipolar), Matched Filter Detection of Modulated Digital Signals.
Textbook	**Text book:** Modern digital and analog communication systems **Author :** B.P. Lathi **Edition & Year public :** 4nd Edition, 200
References	

Course Title	Project Management	Theoretical hours/w	2
Course Code	CR312	Practical hours/w	-
Year	Third	Tutorial hours/w	1
Semester	First	Units	2

Course Description

Week No.	Topics
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?
Textbook	Clifford F. Gray, Erik W. Larson , Project Management: The Managerial Process, 5th Ed., McGraw-Hill, 2011
References	

Course Title	Microprocessors and Interfacing	Theoretical hours/w	3
Course Code	SE311	Practical hours/w	3
Year	Third	Tutorial hours/w	--
Semester	First	Units	4

Course Description

Week No.	Topics
1	Computer Components, Computer Function
2	Interconnection Structures, Bus Interconnection, Point-To-Point Interconnect, PCI Express
3	Computer Memory System Overview
4	Cache Memory Principles, Elements of Cache Design
5	Internal Memory, Semiconductor Main Memory
6	Error Correction, Advanced Dram Organization
7	External Memory, Magnetic Disk, Raid, Optical Memory
8	Input/ Output, External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access
9	Introduction to Microprocessors and Microcomputers.
10	Software Architecture of the 8088 and 8086 Microprocessor
11	8088/8086 Programming—Integer Instructions and Computations
12	8088/8086 Programming—Control Flow Instructions and Program Structures.
13	The 8088 and 8086 Microprocessors and Their Memory and Input/ Output Interfaces
14	Input/ Output Interface Circuits and LSI Peripheral Devices.
15	Interrupt Interface of the 8088 and 8086 Microprocessors
Textbook	**Title (1):** Computer Organization and Architecture **Author:** William Stallings **Publisher& Year:** 2013 Pearson **Title(2):** The 8088 and 8086 Microprocessors **Author:** Walter A. Triebel **Publisher& Year:** Pearson, 4th Ed.2002
References	

Course Title	Systems Engineering Analysis & Design	Theoretical hours/w	3
Course Code	SE312	Practical hours/w	-
Year	Third	Tutorial hours/w	-
Semester	First	Units	3

Course Description

Week No.	Topics
1	System Design And Analysis Concepts
2	The Systems Analyst And Information Systems Development
3	The Systems Development Life Cycle
4	Project Identification And Initiation, Feasibility Analysis
5	Project Selection, Creating The Project Plan, Managing And Controlling The Project
6	The Analysis Phase, Requirements Determination, Requirements Elicitation Techniques
7	Joint Application Development (Jad)
8	Requirements Analysis Strategies, Activity-Based Costing, Informal Benchmarking, Outcome Analysis
9	Technology Analysis, Activity Elimination, Comparing Analysis Strategies
10	Use Cases, Alternative Use Case Formats, Use Cases And The Functional Requirements, Use Cases And Testing
11	Process Modeling, Data Flow Diagrams, Creating Data Flow Diagrams
12	Data Modeling, The Entity Relationship Diagram
13	Transition From Requirements To Design, System Acquisition Strategies
14	Elements Of An Architecture Design, Creating An Architecture Design, Hardware And Software Specification
15	Moving From Logical To Physical Process Models, Designing Programs
Textbook	**Title:** System Analysis And Design **Author:** Alan Dennis **Publisher & Year:** John Wiley & Sons, 2012
References	

Course Title	Control Engineering	Theoretical hours/w	3
Course Code	SE313	Practical hours/w	3
Year	Third	Tutorial hours/w	-
Semester	First	Units	4

Course Description

Week No.	Topics
1	Introduction to Control Systems Analysis and Design by the Root-Locus Method
2	Root locus plots
3	Root Locus Approach to Control System Design
4	Lead compensation, Lag Compensation-Lag-Lead Compensation
5	Introduction to Control Systems Analysis and Design by the Frequency-Response Method
6	Bode Diagrams , Polar Plots
7	Log Magnitude – verses Phase Plot
8	Control System design by frequency response Approach
9	Stability Analysis and Nyquist Stability Criterion
10	Design of PID Controllers, Ziegler-Nichols Rules for Tuning PID Controllers
11	Design of PID Controllers with Frequency Response Approach
12	Design of PID Controllers with Computational Optimization Approach
13	Control Systems Analysis in State Space
13	State-Space Representations in Canonical Form
14	Laplace Transform Approach to the Solution of State Equations
15	Controllability and Observability
Textbook	Katsuhiko Ogata, "Modern Control Engineering" , 5th edition, 2009.
References	1-Dorf and Bishop, "Modern Control Systems" 2-FranKlin "Feedback Control of Dynamic Systems" 3-Norman S. Nise, "Control System Engineering"

Course Title	Operations Research	Theoretical hours/w	2
Course Code	SE314	Practical hours/w	-
Year	Third	Tutorial hours/w	1
Semester	First	Units	2

Course Description

Week No.	Topics
1-3	UNIT I INTRODUCTION Formulation and Graphical Solutions, Solution of Maximization Model, Solution of Minimization Model, Simplex method, Degeneracy, Unbounded Solution, Infeasible Solution
4-6	UNIT II ADVANCED LINEAR PROGRAMMING BIG-M method, Two-Phase method, Special cases in the Simplex method, Transportation and Assignment Problems, Revised Simplex Method, Duality in Linear Programming Problems, Dual Simplex method, Bounded variable technique
7-9	UNIT III SENSITIVITY ANALYSIS Sensitivity Analysis or Post Optimality Analysis-Changes in the Right hand side, Objective function, Changes affecting feasibility, Changes affecting optimality.
10-12	UNIT IV INTEGER PROGRAMMING Knapsack Problem, Cutting plane algorithm, Branch and bound algorithm, Mixed integer programming, travelling salesperson problem.
13-15	UNIT V CASE STUDIES AND TOOLS Case Studies: Investment problem, Production Planning and Inventory Control, Manpower planning, Solving LP problems using TORA / LINDO/ LINGO.
Textbook	1. Hamdy A Taha, "Operations Research An Introduction", Prentice Hall, Eighth Edition, 2007.
References	1. J.K.Sharma, "Operations Research Theory and applications" Macmillan, 4th Edition,2009. 2. Harvey M.Wagner, " Principles of Operations Research with applications to Managerial Decisions", PHI Leraning Private Limited, 2nd Edition,2009

Course Title	Human Rights	Theoretical hours/w	1
Course Code	UR321	Practical hours/w	-
Year	Third	Tutorial hours/w	-
Semester	Second	Units	1

Course Description

Week No.	Topics
1	**حقوق الانسان في الحضارات القديمة:** حقوق الانسان في الحضارات اليونانية والمصرية
2	حقوق الانسان في حضارات العراق القديمة
3	**حقوق الانسان في الشرائع والاديان السماوية:** في الديانة اليهودية والمسيحية،
4	في الاسلام
5	**مصادر حقوق الانسان:** المصادر الدولية ، المصادر الوطنية ،
6	دستور جمهورية العراق
7	**ضمانات حقوق الانسان:** على الصعيد الداخلي، على الصعيد الدولي،
8	في الاسلام
9	**دور المنظمات الاقليمية في حماية حقوق الانسان:** اتفاقية الاوربية، الاتفاقية الامريكية،
10	الميثاق الافريقي، الميثاق العربي
11	**مستقبل حقوق الانسان:** التقدم التكنولوجي واثره على الحقوق والحريات،
12	العولمة وحقوق الانسان
13	**نشاة وتطور حقوق الطفل:** مدلول الطفل، التطور التاريخي لحقوق الطفل، لدى الامم والحضارات، لدى الديانة المسيحية
14	**حقوق الطفل في الاسلام**
15	**حقوق الطفل في الاتفاقية الدولية لعام ١٩٨٩**
Textbook	**المصدر:** حقوق الانسان والطفل والديمقراطية **المؤلف:** أ. د. ماهر صالح علاوي الجبوري واخرون **الناشر وسنة الطبع:** وزارة التعليم العالي والبحث العلمي– جامعة تكريت، ٢٠٠٩
References	

Course Title	Operating Systems	Theoretical hours/w	3
Course Code	CR321	Practical hours/w	2
Year	Third	Tutorial hours/w	1
Semester	Second	Lab.s	4

Course Description

Week No.	Topics
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
Textbook	Text book: Operating system concepts Author: Abraham Silberschatz, Peter B. Galvin , Greg Gagne Edition & year public: 8th edition, Addis -Wesely, 2008
References	

Course Title	Microcontrollers	Theoretical hours/w	3
Course Code	SE321	Practical hours/w	3
Year	Third	Tutorial hours/w	-
Semester	Second	Units	4

Course Description

Week No.	Topics
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 millimeter
13	Impact of engineering solutions in a global, economic, environmental, and societal context
14	Knowledge of contemporary issues
15	Final Project
Textbook	The PIC Microcontroller and Embedded systems – Using Assembly and C for PIC18," Muhammad Ali Mazidi, Rolin D. McKinlay, and Danny Causey, Prentice Hall, 2007
References	

Course Title	Security Engineering	Theoretical hours/w	2
Course Code	SE322	Practical hours/w	2
Year	Third	Tutorial hours/w	1
Semester	Second	Units	3

Course Description

Week No.	Topics
1	Introduction, Security Engineering Frame work
2	Security Model, multilevel security, security policy, information flow control
3	Introduction to Cryptography, Block Ciphers, Stream Ciphers, DES
4	SP-Networks, AES, Modes of Operation, Hash Functions
5	Public Key Cryptography
6	Multilateral security , Chinese wall, BMA model, threat model
7	Inference control, theory of inference control, audit base control
8	Physical protection, threats, threat model, mechanical and electronic locks
9	Alarms, sensors, attacks on communications
10	Monitoring and Metering, utility metering, taco graphs
11	What goes wrong, tampering, high-tech attacks, system level problem
12	Security printing and seals, models, techniques, Systemic Vulnerabilities, Evaluation Methodology
13	Biometrics, handwritten signature, face recognition, fingerprints, Iris codes, voice recognition, other systems
14	Vulnerabilities in Network Protocols, Trojans, Viruses, Worms and Rootkits, Countermeasures
15	Defence Against Network Attack, Filtering, Intrusion Detection, Encryption
Textbook	Ross Anderson, Security Engineering, 2nd Ed., Willey, 2008
References	

Course Title	Intelligent Systems	Theoretical hours/w	3
Course Code	SE323	Practical hours/w	-
Year	Third	Tutorial hours/w	1
Semester	Second	Units	3

Course Description

Week No.	Topics
1	**Introduction** Why Soft Computing? Some Examples and cases in Industry
2	**The Operation of Fuzzy set** Standard Operations of Fuzzy Set ,Fuzzy Complement, Fuzzy Union, Fuzzy Intersection, Other Operations in Fuzzy Set,T- norms and T- conforms
3	**Fuzzy Relations and Composition** Crisp Relation, Fuzzy Relation, Extension of Fuzzy Set, Membership Functions
4	**Fuzzy Rules and Fuzzy Reasoning** Composition of Rules, Fuzzy Rules and Implication
5	**Fuzzy Inference Systems**
6	**Fuzzy Control and Fuzzy Expert Systems** Fuzzy Logic Controller, Fuzzification Interface Component, Knowledge Base Component , Inference (Decision Making Logic), Defuzzification
7	Design Procedure of Fuzzy Logic Controller Application Example of FLC Design, Fuzzy Expert Systems
8	**Neural Networks** Introduction, Biological neuron, terminology, models of neuron, neuron components, ANN architecture, ANN topology
9	Perceptron, perceptron convergence, delta rule learning algorithm
10-11	Types of ANN, single layer, multilayer, feed forward, back propagation algorithm, Feedback neural networks
12	Radial basis networks, K-mean clustering, recursive least square
13	Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures
14	Advances in Neural Networks
Textbook	1-First Course on Fuzzy Theory and Applications by Kwang H. Lee, 200 2-Simon Haykin, Neural Networks And learning machines, 3rd Ed., Person, 2009.
References	1- Fuzzy Logic with Engineering Applications by J. Ross, 201(2- Introduction to fuzzy sets, fuzzy logic, and fuzzy control systems by Chen, G. (Guanrong), 2001. 3- B. Yegnanarayana, Artificial Neural Networks, Prentice-Hall, 2006.

Course Title	Digital Control	Theoretical hours/w	2
Course Code	SE324	Practical hours/w	3
Year	Third	Tutorial hours/w	1
Semester	Second	Units	3

Course Description

Week No.	Topics
1	Introduction (Chapter 1)
2-3	Review of Continuous Control (Chapter 2)
4	Introduction to Digital Control. (Chapter 3) Digitization Effect of Sampling
5	**Discrete-Systems Analysis.** (Chapter 4) Linear Difference Equations, Discrete Transfer Function Z-Transform
6	Block Diagrams and State Variable Description
7	Relation of Transfer Function to Impulse Response **MID EXAM1**
8	**Signal Analysis and Dynamic Response** (Chapter 4) The Unit Pulse, The Unit Step, Exponential, General Sinusoid Step Response
9	**Discrete Equivalents**. (Chapter 6) Design via Numerical Integration Zero Pole Matching
10	Hold Equivalents
11	**Design using Transform Techniques**. (Chapter 7) System Specifications Design by emulation.
12	Discrete Equivalent Controllers
13	**MID EXAM2**
14	**Design Using State-Space Methods** (Chapter 8) Control Law Design
15	Pole Placement
Textbook	**Digital Control of Dynamic Systems** by Franklin, Powel, and Workman. 3rd edition, 1998, Addiso -Wesley Publisher
References	**Modern Digital Control Systems** by Raymond **Discrete Time Control Systems** by Ogata

Fourth Year

Course Title	Democracy	Theoretical hours/w	1
Course Code	UR411	Practical hours/w	-
Year	Fourth	Tutorial hours/w	-
Semester	First	Units	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	**الية النظام التمثيلي (النيابي) : الانتخاب** مفهوم الانتخاب وتكييفه 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
Textbook	**المصدر:** حقوق الانسان والطفل والديمقراطية **المؤلف:** أ. د. ماهر صالح علاوي الجبوري واخرون **الناشر وسنة الطبع:** وزارة التعليم العالي والبحث العلمي– جامعة تكريت، ٢٠٠٩
References	

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

Course Description

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

Course Title	Real- Time & Embedded Systems	Theoretical hours/w	2
Course Code	SE412	Practical hours/w	2
Year	Fourth	Tutorial hours/w	1
Semester	First	Units	3

Course Description

Week No.	Topics
1	The Real-Time And Embedded Systems Environment
2	Processor Technology, Memory Technology, Design Technology
3	Functional Requirements, Temporal Requirements, Dependability Requirements
4	Classification Of Real-Time Systems
5	Hard Real-Time System Versus Soft Real-Time System, Fail-Safe Versus Fail-Operation
6	Guaranteed-Response Versus Best-Effort, Resource-Adequate Versus Resource-Inadequate, Event-Triggered Versus Time-Triggered
7	Embedded Real-Time Systems, Plant Automation Systems
8	Global Time, Time Measurement, Time Measurement
9	Internal Clock Synchronization, External Clock Synchronization
10	Real-Time Model, Component State
11	The Message Concept, Component Interfaces
12	Heterogeneous Embedded Systems
13	Multicore Embedded System Design
14	Resource Allocation Models
15	Optimization For Real Time And Embedded Systems
Textbook	**Title:** Real-Time Systems: Design Principles for Distributed Embedded Applications **Author:** John A. Stankovic **Publisher& Year:** Springer,
References	**Title:** Real-Time Embedded Systems: Optimization, Synthesis, and Networking **Author:** Meikang Qiu& Jiayin Li **Publisher& Year:** CRC Press, 2011

Course Title	Robotics	Theoretical hours/w	3
Course Code	SE421	Practical hours/w	3
Year	Fourth	Tutorial hours/w	-
Semester	Second	Units	4

Course Description

Week No.	Topics
1	Introduction Defining robotics Brief History .
2	Basic Imaging for Robotics. Coordinate Transformations
3	Sensing Sensors.
4	Mobile Platforms
5	Path Planning.
6	Inertial Navigation
7	Manipulators. Direct Kinematics.
8	Effectors and Actuators
9-10	Dynamics. Inverse Kinematics
11	Drives and Control Systems
12	Probabilistic Robotics
13	Behavior-based control + MID EXAM2
14-15	Multi-Robot systems
Textbook	**Introduction to robotics by J. J. Craig , Third ed, Prentice Hall, 2005.**
References	- Robotic Explorations: An Introduction to Engineering Through Design by F. Martin - *The Robotics Primer* by Maja J. Mataric, MIT press, 2007.

Course Title	System Modeling & Simulation	Theoretical hours/w	2
Course Code	SE422	Practical hours/w	2
Year	Fourth	Tutorial hours/w	1
Semester	Second	Units	3

Course Description

Week No.	Topics
1	Course Introduction
2	Decisions, Analysis, Modeling, & Simulation
3	M&S in the System Life Cycle, Simulation Development, Simulation Architecture, Simulation Integration, & MATLAB Functions
4	Combat (Damage/Attrition) Models
5	Modeling/Simulating Decision Making: Agents and AI
6	Modeling & Simulating Sensors and Detection
7	Queuing Models
8	Mid-term exam
9	VV&A & Design of Experiments
10	Distributed SW Simulations, Comm. Protocols, & HLA
11	HWIL Testing, AD/DA Conversion, & Multiframing
12	Managing Simulation Development
13	Project Presentations
14-15	Special Topics & Course Review
Textbook	• Hahn, Brian and Valentine, Daniel, Essential MATLAB for Scientists and Engineers, 3rd Ed., Elsevier, Oxford, 2007. • Ledin, Jim, Simulation Engineering: Building Better Embedded Systems Faster, CMP Books, Lawrence, Kansas, 2001.
References	

Course Title	Systems Reliability	Theoretical hours/w	3
Course Code	SE423	Practical hours/w	--
Year	Fourth	Tutorial hours/w	--
Semester	Second	Units	3

Course Description

Week No.	Topics
1	Failure Models
2	Time To Failure, Reliability Function, Failure Rate Function, Mean Time To Failure, Mean Residual Life
3	Functional Analysis, Failures And Failure Classification
4	Failure Modes, Effects, And Criticality Analysis
5	Fault Tree Analysis, Cause And Effect Diagrams
6	Event Tree Analysis, Reliability Block Diagrams, System Structure Analysis
7	System Reliability, Non-Repairable Systems
8	Quantitative Fault Tree Analysis, Exact System Reliability, Redundancy
9	Birnbaum's Measure, Improvement Potential
10	Risk Achievement Worth, Risk Reduction Worth,Ccriticality Importance, Fussell-Vesely's Measure
11	Modeling Of Dependent Failures
12	Reliability Of Maintained Systems
13	Availability, System Availability Assessment
14	Reliability Of Safety Systems
15	Safety Instrumented Systems, Probability Of Failure On Demand, Safety Unavailability
Textbook	**Title:** System Reliability Theory **Author:** Marvin Rausand **Publisher& Year:** JOHN WILEY, 2004
References	**Title:** Reliability of Safety-Critical Systems **Author:** Marvin Rausand **Publisher& Year:** WILEY, 2014

Elective Courses

Course Title	Hardware Programming	Theoretical hours/w	3
Course Code	SEE401	Practical hours/w	2
Year	Fourth	Tutorial hours/w	-
Semester		Units	4

Course Description

Week No.	Topics
1	Introduction and review of instruction set and assembly language programming
2	instruction execution cycle and timing
3	Memory devices, SRAM, DRAM, flash , memory,
4	SDRAM controller
5	Buses, access arbitration and timing
6	Interrupts and DMA
7	Timers and counters
8	
9	Serial communication: UART, SPI, and I2
10	Parallel I/O interface
11	signal handshaking
12	Keyboards and LCD
13	A/D-D/A converters
14	Project
15	Project
Textbook	CFPRM, ColdFire Family Programmer's Reference Manual, MCF52259 ColdFire Integrated Microcontroller Reference Manual.
References	CodeWarrior Development Studio for Microcontrollers V10.x Targeting Manua CodeWarrior Development Studio for Microcontrollers V10.x Getting Starte Guide

Course Title	Power Electronics	Theoretical hours/w	3
Course Code	SEE402	Practical hours/w	----
Year	Fourth	Tutorial hours/w	---
Semester	-	Units	3

Course Description

Week No.	Topics
1	Power transistors and UJTs, thyristors, GTO's, construction, basic operations and characteristics
2	LASCR, triacs, diacs, and MOSFETs, construction, basic operations and characteristics, trigger and snubber circuits, series and parallel operation of SCRs.
3	Static Power Converters; Controlled rectifier circuits, single and polyphase inverter operation
4	Static Power Converters; dual converter, four quadrant operation
5	Static Power Converters;, harmonics and power factor considerations, ideal and practical operation.
6	DC Choppers; Basic processes, step down and step up choppers
7	DC Choppers; principles of operation of chopper commutation.
8	Inverters; Forced commutation inverters, classification of inverters, single and three phase current and voltage sources
9	Inverters; square and stepped waveforms, PWM inverters
10	AC-AC Converters; Single and three phase AC regulators, cyclo -converters
11	AC-AC Converters; single to single phase output, three phase to three phase output
12	Industrial Applications; General applications
13	Industrial Applications; DC motor control, transportation
14	Industrial Applications; thyristor-controlled reactors and capacitors
15	DC Drives
Textbook	Power Electronics, by: C. W. Lander, McGraw-Hill Pub.
References	

Course Title	Nonlinear control	Theoretical hours/w	3
Course Code	SEE403	Practical hours/w	2
Year	Fourth	Tutorial hours/w	-
Semester		Units	4

Course Description

Week No.	Topics
1	L1: Introduction. Typical nonlinear problems and phenomena. Model:
2	L2: Simulation in Simulink. Linearization. Stabilit
3	L3: Phase-plane analysis. Classification of singular points. Stability of periodic solutions.
4	L4: Lyapunov methods.
5	L5: Stability theory. Small gain theorem. Circle criteria. Passivity.
6	L6: Describing function analysi:
7	L7: Saturation and antiwindup. Friction.
8	L8: Compensation for bac -lash and Quantization. Deadzone-compensation for an air throttle in a car (describing function analysis)
9	MID EXAM1
10	L9: Exact linearization and Lyapunc -based design
11	L10: Optimal control: The Maximum principle, examples. Pendulum swing-up
12	L11: Optimal control (cont'd
13	L12: High-gain design methods --- Sliding modes. Optimal control of pendulum on a cart.
14	MID EXAM1
15	L13: Internal model control. Model predictive control. Nonlinear observers Gain scheduling.
Textbook	**Nonlinear Systems by Khalil, H. K. , 3rd ed, 2002, Prentice Hall**
References	Control of Nonlinear Dynamic Systems: Theory and Applications By J. K. Hedrick and A. Girard, 2010.

Course Title	Advanced Operating Systems	Theoretical hours/w	3
Course Code	SEE404	Practical hours/w	2
Year	Fourth	Tutorial hours/w	
Semester	-	Units	4

Course Description (Theory)

Week No.	Topics
1	**Threads:** Multithreading Models, Thread Functionality, User-Level and Kernel-Level Threads, Thread Libraries
2	**Process Synchronization:** The Critical-Section Problem, Synchronization Hardware, Semaphores, Deadlocks and Starvation, Classical Synchronization Problems, Monitors, Atomic Transactions
3	**Deadlocks:** Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock
4	**Virtual Memory:** Demand Paging, Copy on Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files
5	**File-System Interface:** File Concept, Access Methods, Directory Structure, File-System Mounting, File Sharing
6	**File-System Implementation:** File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance
7	**Distributed System Structures:** Types of Distributed Operating, Communication Structure, Design Issues, Communication Protocols, Robustness
8	**Distributed File Systems:** Naming and Transparency, Remote File Access, Stateful Versus Stateless, Service, File Replication
9	**Distributed Coordination:** Event Ordering, Mutual Exclusion, Atomicity, Concurrency Control, Deadlock Handling, Election Algorithms
10	**Real-Time Systems:** Overview, System Characteristics, Features of Real-Time Kernels, Implementing Real-Time Operating Systems, Real-Time CPU Scheduling
11	**UNIX Operating System:** HISTORY OF UNIX (UNICS, MINIX, Linux), UNIX Goals, Interfaces to UNIX, The UNIX Shell, UNIX Utility Programs, Kernel Structure
12	**Processes IN UNIX:** Process Management System Calls in UNIX, Thread Management System Calls, Threads in UNIX, Threads in Linux, Scheduling in UNIX, Scheduling in Linux, Booting UNIX
13	**Memory Management In UNIX:** Memory Management System Calls in UNIX, Implementation of Memory Management in UNIX, Paging in UNIX, The Page Replacement Algorithm, Memory Management in Linux
14	**Input/Output System Calls in UNIX:** Implementation of Input/output in UNIX, Streams, THE UNIX File System, The Linux File System, The Network File System, NFS Architecture, NFS Protocols
15	**Security In UNIX:** Fundamental Concepts, Security System Calls in Linux, Implementation of Security
Textbook	**Text book I:** Modern Operating Systems, Author : Andrew S. Tanenbaum, Edition & year of public. : 3rd, 2007, Publisher: Prentice Hall
References	**Text book II:** Operating System Concepts, Abraham Silberschatz, Peter B. Galvin & Greg Gagne, Edition & year of public. : 6th , 2008, Publisher: Wiley

Course Title	Advanced Operating Systems Lab	Theoretical hours/w	3
Course Code	SEE404	Practical hours/w	2
Year	Fourth	Tutorial hours/w	
Semester	-	Units	4

Course Description (Practical)

Week No.	Topics
1	Thread scheduling
2	Implement the Producer – Consumer problem using semaphores
3	Simulation of deadlock Detection: Circular Wait
4	Implement virtual memory management schemes
5	Simulation of Page replacement Algorithms
6	Implement File Allocation Methods
7	Remote Procedure Call
8	Remote Method Invocation
9	Implement Network File System
10	Real-time System Performance
11	Inter process communication in Unix
12	Implement Process Management in Unix
13	Write programs using the I/O system calls of UNIX operating system
14	Implement Unix-Based File Managemet
15	Access control in Unix
Textbook	***Text book I : System Programming with C and Unix,*** *Author : Adam Hoover* *Edition & Year public : st, 2009* *Publisher: Addison Wesley*
References	***Text book II:*** *Operating System Concepts* *Author : Abraham Silberschatz, Peter B. Galvin & Greg Gagne* *Edition & year of public. : 6th , 200* *Publisher: Wiley*

Course Title	Wireless Sensor Networks	Theoretical hours/w	3
Course Code	SEE405	Practical hours/w	-
Year	Fourth	Tutorial hours/w	1
Semester	-	Units	3

Course Description (Theory)

Week No.	Topics
1	Introduction to Wireless Sensor Networks (WSNs).
2	Applications of wireless sensor networks
3	Network architecture
4	Hardware
5	Physical layer
6	Medium Access Control (MAC) layer
7	Mid-term exam
8	Routing in WSNs
9	Localization techniques.
10	WSNs transport protocol and reliability
11	Middleware
12	Data aggregation techniques
13	WSNs coverage
14	Wireless Multimedia Sensor Networks (WMSNs)
15	WSNs project
Textbook	Wireless Sensor Networks - An Information Processing Approach, Zhao, Guibas, Morgan Kaufmann, 2004 Wireless Sensor Networks, A Systems Perspective , Bulusu and Jha, Artech House, 2005
References	Ad Hoc Wireless Networks, Architectures and Protocols, Murthy and Manoj Pearson/Prenticie Hall, 200

Course Title	Machine-Human Interface	Theoretical hours/w	3
Course Code	SEE406	Practical hours/w	-
Year	Fourth	Tutorial hours/w	1
Semester		Units	3

Course Description

Week No.	Topics
1	Usability Of Interactive Systems
2	Specifying An HMI: Guidelines, Principles, And Theories
3	Development Processes, Organizational Design To Support Usability, Development Methodologies
4	Evaluating Interface Designs, Acceptance Tests
5	Direct Manipulation And Virtual Environments, 3d Interfaces
6	Task-Related Menu Organization, Single Menus, Combinations Of Multiple Menus
7	Data Entry With Menus: Form Fill-In, Dialog Boxes And Alternatives
8	Command-Organization Functionality, Strategies, And Structure
9	Information Search, Searching In Textual Documents And Database Querying
10	Multimedia Document Searches, Advanced Filtering And Search Interface
11	Improving An Existing HMI
12	Integrating Heterogeneous HMIs
13	Continuous, Batch, Discrete And Hybrid Applications
14	User Documentation And Online Help
15	Quality Of Service, Models Of Response Time Impacts
Textbook	**Title:** Designing The User Interface: Strategies For Effective Human-Computer Interaction **Author:** Ben Shneiderman & Catherine Plaisant **Publisher& Year:** Addison-Wesley, 2009
References	**Title:** Human-Machine Interface Design For Process Control Applications **Author:** Jean-Yves Fiset **Publisher& Year:** ISA, 2008

Course Title	Decision & Risk Analysis	Theoretical hours/w	3
Course Code	SEE407	Practical hours/w	--
Year	Fourth	Tutorial hours/w	1
Semester		Units	3

Course Description

Week No.	Topics
1	The Basics Of Risk Analysis& Decision Making
2	Uncertainty: Types, Quantity Uncertainty, Decision Making Under Uncertainty
3	Sources Of Uncertainty Under Empirical Quantities
4	Risk Estimation, Risk Evaluation
5	Risk Control, Risk Monitoring
6	Risk Management, Models
7	Risk Assessment Activities
8	Risk Characterization, Likelihood Assessment
9	Risk Assessment Models & Methods
10	Internal Risk Communication
11	External Risk Communication
12	Problem Identification For Risk Management
13	Problem And Opportunity Identification Techniques
14	Qualitative Risk Assessment
15	Risk Matrix, Risk Qulititative Risk Assessment Models
Textbook	**Title:** Principles of Risk Analysis: Decision Making Under Uncertainty **Author:** Charles Yoe **Publisher & Year:** CRC Press, 2011
References	