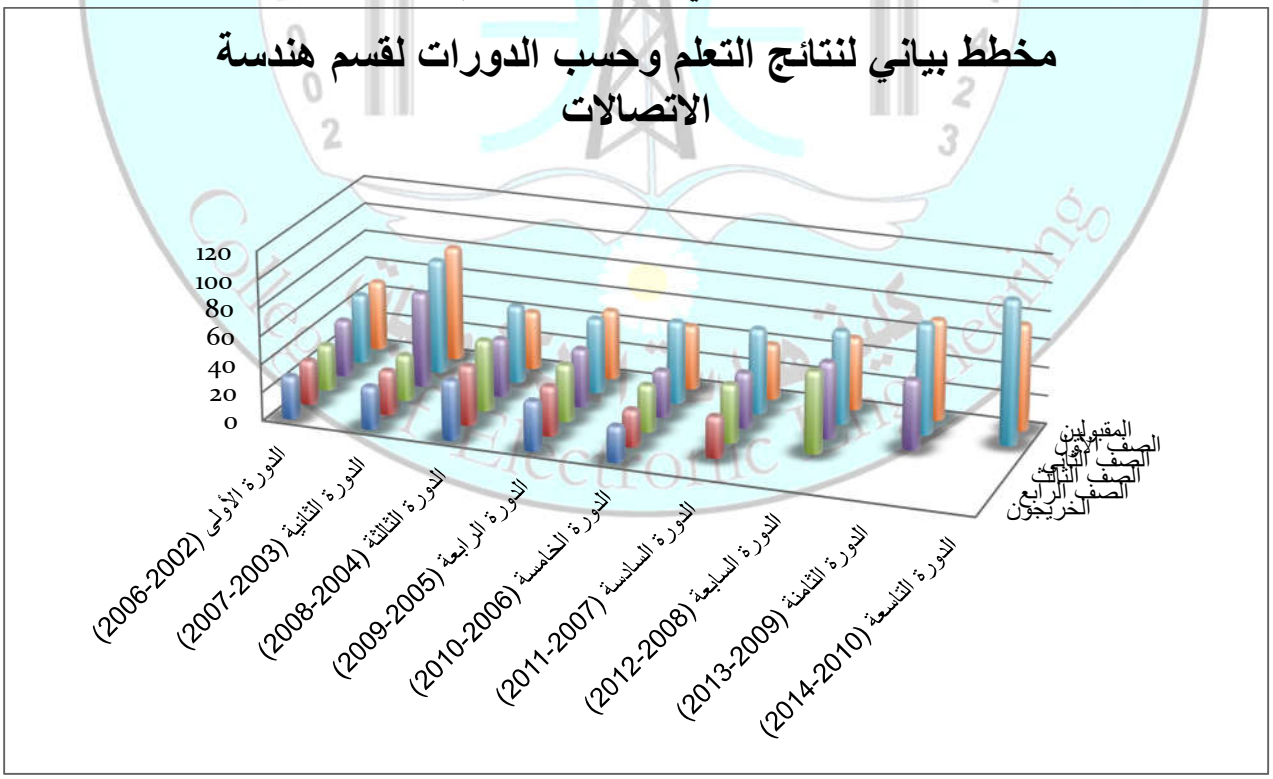
قسم هندسة الاتصالات

جدول (١) أعداد الطلبة لقسم هندسة الاتصالات

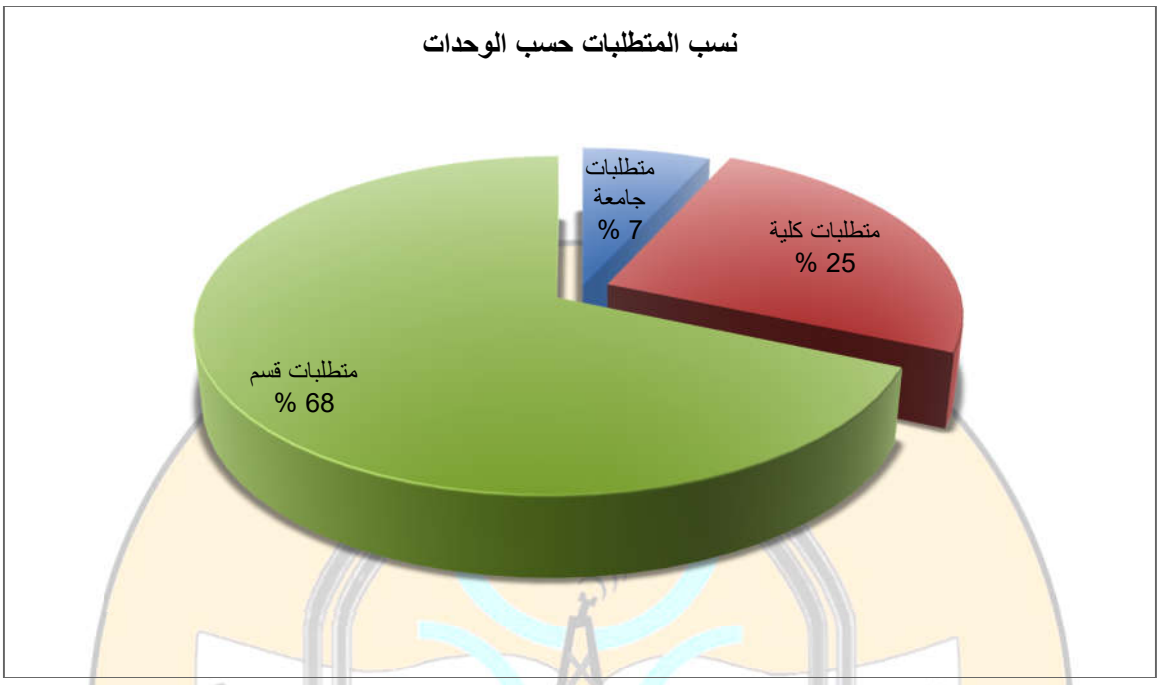
ت	السنة الدراسية	أعدد الطلبة					
		المقبولين	الصف الأول	الصف الثاني	الصف الثالث	الصف الرابع	الخريجين
1	٢٠٠٢-٢٠٠٣	49	49	-	-	-	-
٢	٢٠٠٣-٢٠٠٤	81	81	40	-	-	-
٣	٢٠٠٤-٢٠٠٥	41	55	67	32	-	-
٤	٢٠٠٥-٢٠٠٦	49	53	41	51	31	30
٥	٢٠٠٦-٢٠٠٧	45	58	41	50	46	46
٦	٢٠٠٧-٢٠٠٨	39	60	33	40	42	42
٧	٢٠٠٨-٢٠٠٩	51	66	39	33	35	31
٨	٢٠٠٩-٢٠١٠	71	78	54	41	26	24
٩	٢٠١٠-٢٠١١	75	102	49	58	29	

شكل (١) مخطط بياني بأعداد طلبة قسم هندسة الاتصالات

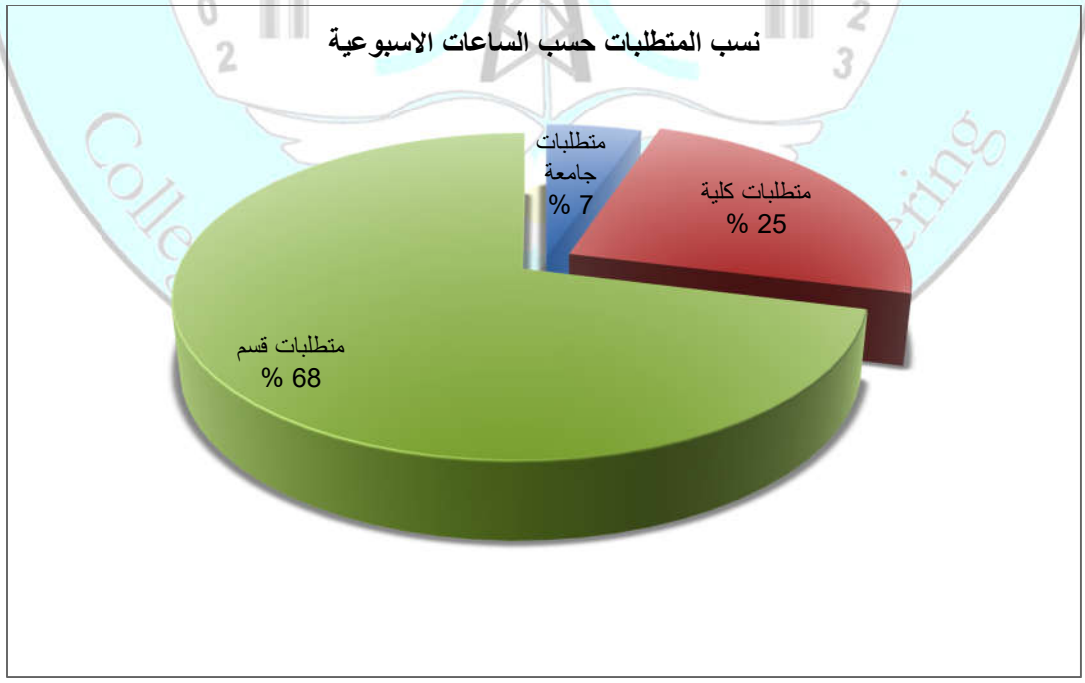


Communication Engineering Department جدول (٢)								
Year	Code	Subject	Requirement					
			University		College		Dep./Pro	
			Unit	Hour	Unit	Hour	Unit	Hour
First	CE1101	Computer Programming-I	6	4				
	CE1102	Humanitarian subject	4	2				
	CE1201	Basics of Electrical Engineering			6	4		
	CE1202	Physical Electronics			4	3		
	CE1203	Mathematics			6	4		
	CE1204	Engineering Drawing			2	3		
	CE1301	Digital Techniques					4	3
	CE1302	Principle of Mechanical Engineering					4	3
	CE1303	Laboratory					2	3
Second	CE2201	Engineering Analysis			6	4		
	CE2202	Industrial management			4	2		
	CE2301	Communication Principles					4	3
	CE2302	Electronics					4	3
	CE2303	Computer Programming –II					6	4
	CE2304	Electromagnetic Fields					4	3
	CE2305	Signals & Systems					6	4
	CE2306	Digital Design					4	3
	CE2307	Laboratory					2	3
Third	CE3201	Digital Signal Processing			4	3		
	CE3301	Microwave Engineering					4	3
	CE3302	Electronic Communication					4	3
	CE3303	Digital Communication					4	3
	CE3304	Microprocessor					4	3
	CE3305	Electronic Instrumentation					4	3
	CE3306	Control Engineering					6	4
	CE3307	Laboratory					4	6
Fourth	CE4201	Engineering Project			4	4		
	CE4301	Communication Systems					4	3
	CE4302	Antennas & Propagation					6	4
	CE4303	Secure Communication					4	2
	CE4304	Satellite Communications					4	3
	CE4305	Optical Communications					4	3
	CE4306	Data Transmission & Computer Network					4	3
	CE4307	Laboratory					4	6
	Total		10	6	36	27	100	81

شكل (٢-أ) نسب متطلبات المقررات الدراسية حسب الوحدات



شكل (٢-ب) نسب متطلبات المقررات الدراسية حسب الساعات الاسبوعية



جدول (٣) علاقة أهداف القسم مع متطلبات ABET

قسم هندسة الاتصالات أهداف القسم	متطلبات برامج الكليات الهندسية											متطلبات الكليات الهندسية لبرامج الكهرباء والإلكترونيك			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
تخريج مهندسين أكفاء بتخصص هندسة الاتصالات لهم القدرة على تمييز, تحليل, وإيجاد الحلول المناسبة للمشاكل التطبيقية والتعامل مع التقنيات الحديثة بمهارة عالية	√	√			√						√	√	√	√	√
تخريج مهندسين لهم القدرة على التفاعل والعمل مع أشخاص متخصصين, أصحاب القرار, وأناس آخرين والتفاعل معهم في مجال العمل ومزاولة المهنة بأسلوب مهني محترف				√		√				√					
إعداد خريجين مؤهلين للانخراط في برامج الدراسات العليا داخل القطر وخارجه والعمل في المراكز البحثية			√				√	√	√	√	√	√	√	√	√
تخريج مهندسين لهم القدرة على مزاولة العمل المهني بتخصص هندسة الاتصالات وبأسلوب أخلاقي وبشكل محترف.	√	√	√	√	√						√	√	√	√	√
المشاركة الفعالة في نهضة وتقدم المجتمع من خلال إقامة الندوات والمؤتمرات والتعليم المستمر في مجال وتخصصات هندسة الاتصالات واعتماد منهج التحسين المستمر لجميع الفعاليات والأنشطة.				√	√	√	√	√	√	√					

Communication Engineering Deparatement								
Undergraduate First Class								
Code	Subject	Hours/Week						Units
		First Term			Second Term			
		Th	Pr.	Tut	Th	Pr	Tut	
CE1201	Basics of Electrical Engineering	3	.	1	3	.	1	6
CE1202	Physical Electronics	2	.	1	2	.	1	4
CE1203	Mathematics	3	.	1	3	.	1	6
CE1301	Digital Techniques	2	.	1	2	.	1	4
CE1101	Computer Programming-I	2	2	.	2	2	.	6
CE1204	Engineering Drawing	.	3	.	.	3	.	2
CE1302	Principle of Mechanical Engineering	2	.	1	2	.	1	4
CE1303	Laboratory	.	3	.	.	3	.	2
CE1102	Humanitarian subject	2	.	.	2	.	.	4
Total		16	8	5	16	8	5	38
		29			29			

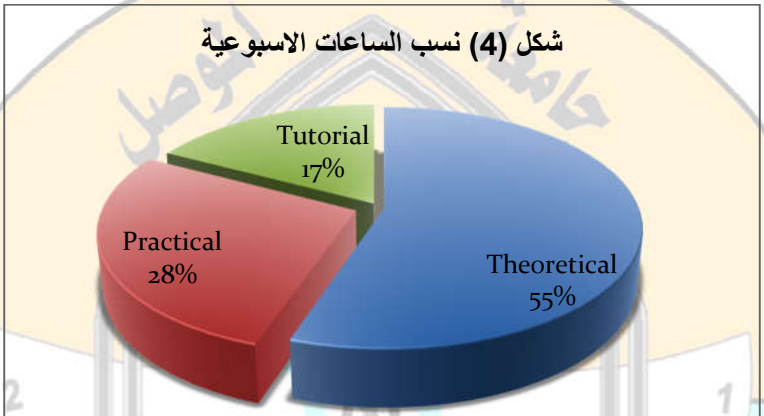
جدول (٤) المقررات الدراسية للصف الأول

Total Theoretical : 16 Hour/Week

Total Practical : 8 Hour/Week

Total Tutorial : 5 Hour/Week

Total Units : 38



شكل (4) نسب الساعات الاسبوعية

جدول (٥) المقررات الدراسية للصف الثاني

Communication Engineering Deparatement								
Undergraduate Second Class								
Code	Subject	Hours/Week						Units
		First Term			Second Term			
		Th	Pr.	Tut	Th	Pr	Tut	
CE2301	Communication Principles	2	.	1	2	.	1	4
CE2302	Electronics	2	.	1	2	.	1	4
CE2303	Computer Programming –II	2	2	.	2	2	.	٦
CE2304	Electromagnetic Fields	2	.	1	2	.	1	4
CE2305	Signals & Systems	2	2	.	2	2	.	٦
CE2306	Digital Design	2	.	1	2	.	1	4
CE2201	Engineering Analysis	3	.	1	3	.	1	6
CE2307	Laboratory	.	3	.	.	3	.	2
CE2202	Humanitarian subject	2	.	.	2	.	.	4
Total		17	7	5	17	7	5	40
		29			29			

Total

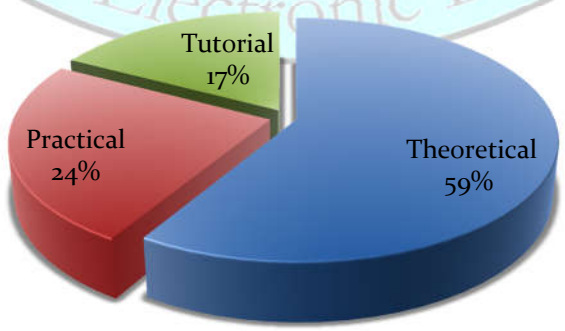
Theoretical : 17 Hour/Week

Total Practical : 7 Hour/Week

Total Tutorial : 5 Hour/Week

Total Units : 40

شكل (5) نسب الساعات الاسبوعية



جدول (٦) المقررات الدراسية للصف الثالث

Communication Engineering Deparatement								
Undergraduate Third Class								
Code	Subject	Hours/Week						Units
		First Term			Second Term			
		Th	Pr.	Tut	Th	Pr	Tut	
CE3301	Microwave Engineering	2	.	1	2	.	1	4
CE3302	Electronic Communication	2	.	1	2	.	1	4
CE3303	Digital Communication	2	.	1	2	.	1	4
CE3304	Microprocessor	2	.	1	2	.	1	4
CE3201	Digital Signal Processing	2	.	1	2	.	1	4
CE3305	Electronic Instrumentation	2	.	١	2	.	١	4
CE3306	Control Engineering	3	.	1	3	.	1	6
CE3307	Laboratory	.	6	.	.	6	.	4
Total		15	6	7	15	6	7	34
		28			28			

Total

Theoretical : 15 Hour/Week

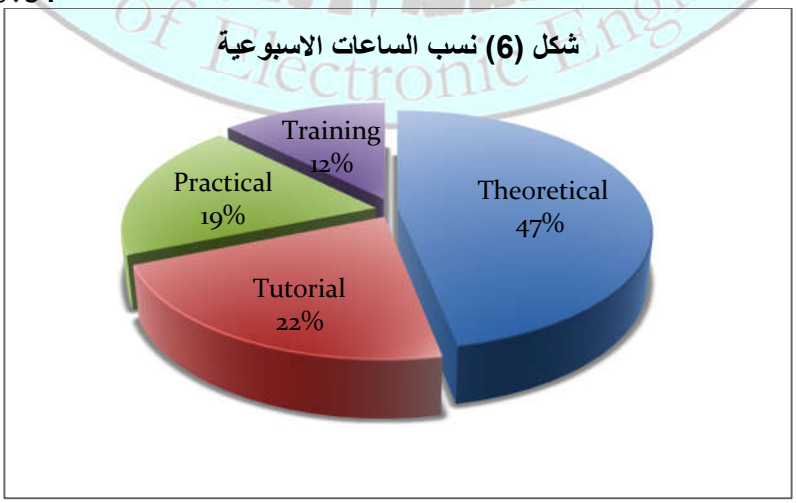
Total Practical : 6 Hour/Week

Total Summer Training 4 Hour/Week

Total Tutorial : 7 Hour/Week

Total Units : 34

شكل (6) نسب الساعات الاسبوعية



جدول (٧) المقررات الدراسية للصف الرابع

Communication Engineering Deparatement								
Undergraduate Fourth Class								
Code	Subject	Hours/Week						Units
		First Term			Second Term			
		Th	Pr.	Tut	Th	Pr	Tut	
CE4301	Communication Systems	2	.	1	2	.	1	4
CE4302	Antennas & Propagation	3	.	1	3	.	1	6
CE4303	Secure Communication	2	.	.	2	.	.	4
CE4304	Satellite Communications	2	.	1	2	.	1	4
CE4305	Optical Communications	2	.	1	2	.	1	4
CE4306	Data Transmission&ComputerNetwork	2	.	1	2	.	1	4
CE4201	Engineering Project	1	3	.	1	3	.	4
CE4307	Laboratory	.	6	.	.	6	.	4
Total		14	9	5	14	9	5	34
		28			28			

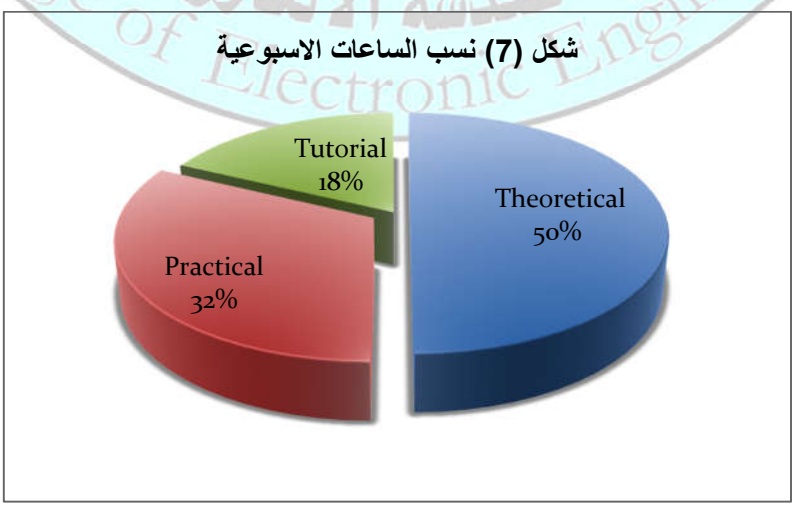
Total Theoretical : 14 Hour/Week

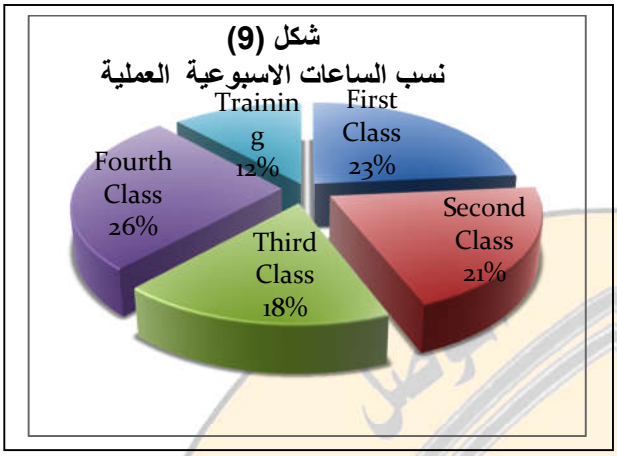
Total Practical : 9 Hour/Week

Total Tutorial : 5 Hour/Week

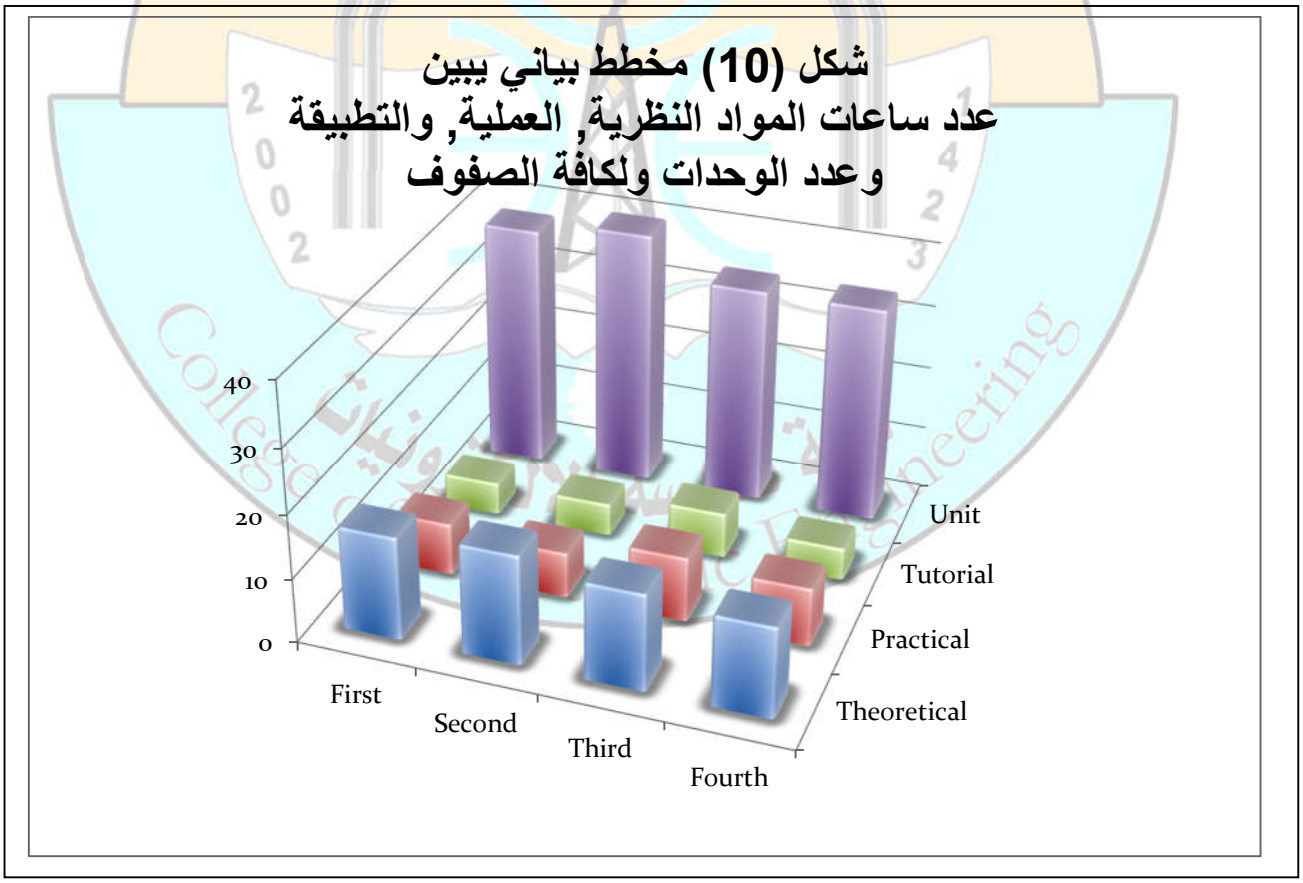
Total Units : 34

شكل (7) نسب الساعات الاسبوعية




شكل (8)
نسب الساعات الاسبوعية النظرية
4th Class 23%
1st Class 26%
3 rd Class 24%
2 nd Class 27%

شكل (9)
نسب الساعات الاسبوعية العملية
Trainin g 12%
First Class 23%
Fourth Class 26%
Second Class 21%
Third Class 18%


شكل (10) مخطط بياني يبين
عدد ساعات المواد النظرية, العملية, والتطبيقة
وعدد الوحدات ولكافة الصفوف
40
30
20
10
0
First
Second
Third
Fourth
Unit
Tutorial
Practical
Theoretical

جدول (٨) علاقة المقررات الدراسية مع متطلبات ABET

قسم هندسة الاتصالات		متطلبات برامج الكليات الهندسية											متطلبات الكليات لأقسام الكهرباء والإلكترونيك			
عنوان المنهج		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
CE1101	Computer Programming–I	√	√			√		√	√	√				√	√	
CE1102	Humanitarian subject				√		√	√	√		√					
CE1201	Basics of Electrical Engineering	√	√	√		√							√			√
CE1202	Physical Electronics	√				√							√		√	√
CE1203	Mathematics	√	√	√		√								√		√
CE1204	Engineering Drawing		√	√							√	√			√	
CE1301	Digital Techniques	√	√	√		√							√		√	
CE1302	Principle of Mechanical Engineering	√	√			√										√
CE1303	Laboratory		√		√	√	√					√	√		√	
CE2201	Engineering Analysis	√	√	√		√							√			√
CE2202	Industrial management		√		√	√	√	√	√					√		
CE2301	Communication Principles				√		√	√	√	√						
CE2302	Electronics		√	√		√							√		√	√
CE2303	Computer Programming –II	√	√	√		√		√	√	√				√	√	
CE2304	Electromagnetic Fields															
CE2305	Signals & Systems	√	√	√		√							√		√	√
CE2306	Digital Design		√	√		√					√	√	√			
CE2307	Laboratory		√		√	√	√					√	√		√	
CE3201	Digital Signal Processing	√	√	√		√							√		√	√
CE3301	Microwave Engineering	√	√			√		√	√	√	√	√	√	√	√	√
CE3302	Electronic Communication	√				√		√		√	√		√			√
CE3303	Digital Communication	√	√			√		√	√	√	√	√	√	√		√
CE3304	Microprocessor		√	√		√		√	√	√		√	√		√	
CE3305	Electronic Instrumentation		√			√		√	√	√	√		√		√	√
CE3305	Control Engineering	√	√	√		√							√		√	√
CE3307	Laboratory		√		√	√	√					√	√	√	√	
CE4201	Engineering Project	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
CE4301	Communication Systems		√		√	√		√	√	√	√	√	√	√	√	
CE4302	Antennas & Propagation	√	√	√		√			√	√	√	√	√		√	√
CE4303	Secure Communication	√	√	√			√			√	√	√	√	√		√
CE4304	Satellite Communications		√		√	√		√	√	√	√	√		√	√	√
CE4305	Optical Communications	√	√		√			√	√	√	√	√	√	√		√
CE4306	Data Transmission & Computer Network	√	√					√	√		√		√		√	√
CE4307	Laboratory		√		√	√	√					√	√	√	√	

جدول (٩) – مشاريع طلبة الصف الرابع

ت	اسم المشروع	السنة الدراسية
1	APC-based system for ultra-sonic imaging	2005-2006
2	Study and analysis of GPS system	2005-2006
3	Wireless control for ON-OFF operation of an electrical equipment	2005-2006
4	A study of CDMA Mobile comm..	2005-2006
5	Detection of data signal below noise level	2005-2006
6	Logarithmic antenna	2005-2006
7	Data transfer using LASER Technique	2005-2006
8	Doppler radar for car speed measurement	2005-2006
9	Design of OFDM transceiver	2005-2006
10	Design antenna working in the band (1-18 GHz)	2005-2006
11	Extracting mobile signals	2005-2006
12	Digital phase changer	2005-2006
13	Design and realization of active filter	2005-2006
14	Analysis and design of smart antenna	2005-2006
15	Frequency hopping oscillator	2005-2006
16	Analysis of electronic circuits using Visual Basic	2006-2007
17	Jammer for mobile signal	2006-2007
18	Design of 900 MHz patch antenna of mobile phone	2006-2007
19	Design and implementation of spread spectrum	2006-2007
20	Detection of buried telephone cables	2006-2007
21	Efficiency of multiple access in (TDMA,FDMA,CDMA) systems	2006-2007
22	Linear array antenna	2006-2007
23	Study of propagation & parameters affecting the depth of communication for mobile transmitter by computer	2006-2007
24	Passive repeater for mobile communication	2006-2007
25	Direction finder for electromagnetic source emission	2006-2007
26	Effect of the radiated power from mobile bass station	2006-2007
27	Ethernet to infrared communication	2006-2007
28	Voltage controlled oscillator used as FM modulator	2006-2007
29	Design and Implementation of FM transceiver	2006-2007
30	Frequency multipliers	2006-2007
31	New methods of ASK, FSK, PSK modulation & demodulation	2007-2008
32	IMEI Authentication in NSS in cellular cell	2007-2008
33	IR target detection	2007-2008
34	To study different materials as microwave absorbers used in anechoic chambers for RF measurements	2007-2008

2007-2008	Telephony system signaling
2007-2008	Smart antenna
2007-2008	Analysis of antenna used for very high frequency communication sy
2007-2008	Scanning computers network
2007-2008	Design and implementation the directive communication system depending on D
2007-2008	Study of Bluetooth communication system
2007-2008	Using WCDMA in 3rd generation cellular system
2007-2008	Best modulation demodulation technique used in mobile channel
2007-2008	Remote control a circuit using PC
2007-2008	Channel equalizer
2007-2008	WIMAX technology
2008-2009	Study the performance of the adaptive receiver for mobile radio cha
2008-2009	Lab view based control system
2008-2009	Study of the microwave spectrum for detection of embedded materi
2008-2009	Design and implementation of a FM transceiver system
2008-2009	Using the synthesizer in the mobile station in the GSM system
2008-2009	Design and implementation of the telephony subscriber card (part 2
2008-2009	Dialing tone generation and detection
2008-2009	Study and simulation of the orthogonal frequency division multiplex
2008-2009	Study and simulation of multi input multi output system (MIMO)
2008-2009	Evaluation of the network security system used in Mosul university
2008-2009	Study and application of the global position system.
2008-2009	Design and implementation of the telephony subscriber card (part 1
2009-2010	Investigation of scanned arrays antenna
2009-2010	Design and implementation of time switching mode in telephony sy
2009-2010	Design and implementation of programmed display
2009-2010	Study and analysis and design of range meter system based on ultra
2009-2010	Study and implementation of electromagnetic flow meter
2009-2010	Study and design of fractal antenna
2009-2010	Smart antenna system analysis and design.
2009-2010	Patient monitoring using WLAN
2009-2010	Infrared data communication
2009-2010	Channel estimation in MEMO system.
2009-2010	Multi code transmission for CDMA system
2009-2010	Implementation of ASK mod/demodulator to transfer digital data signal between
2010-2011	Characterization of power - line communication system

2010-2011	Design and implementation of the talking a clock
2010-2011	GPRS Based vechle monitoring system
2010-2011	Cognititve Wireless communication System
2010-2011	Channel Estimation and equalization using communication system
2010-2011	Ultra wide-band antennas
2010-2011	Improvement of MAC for DCF over fading channel in wiareless LA
2010-2011	Implementation of OFDM system using Matlab
2010-2011	An Implementation of the radar PPI Screen Using PC
2010-2011	Study of the communication Techniques in Rake reciever
2010-2011	Performance Study for CDMA wireless communication system
2010-2011	Channel Estimation in GPRS band communication system
2010-2011	A study about antenna diversity communication
2010-2011	Design and Implementation of FSK remote control system

The Syllabus Communication Engineering Department

The following is the syllabus of the subjects in the department curriculum.

First Year

Course Number : CE1101
Course Name : Computer Programming I.
Credit Hours : (6,2,0,2)
Course Content : Introduction ,Important of C,Simple program of C,scanf function ,printf function, loops (for, while, do),if statement ,array one ,two dimension ,function ,application in mathematics &electrical circuit

Course Number : CE1102
Course Name : Humanitarian Subject
Credit Hours : (4,2,0,0)
Course Content :
التطور التاريخي لحقوق الإنسان (المجتمعات البدائية الشرائع السماوية طور حقوق الانسان في لقوانين الوضعية), حقوق الإنسان التحديد والتعريف تقسيمات حقوق الإنسان (وتتم بدراسة مفصلة ومقارنة بين القانون والشريعة الإسلامية), ضمانات احترام وحماية حقوق الإنسان (الضمانات في الشريعة الإسلامية الضمانات على الصعيد الوطني الضمانات على الصعيد الدولي)

Course Number : CE1201
Course Name : Basics of Electrical Engineering
Credit Hours: (6,3,1,0) (Units, Theory, Tutorial, Practical)
Course Content : BASIC CONCEPTS, D.C. Network Theorems, Energy storage Elements, Analysis of Ac- circuits, MAGNETIC CIRCUITS AND TRANSFORMERS

Course Number : CE1202
Course Name :Physical Electronics
Credit Hours : (4,2,1,0)
Course Content : To study and analysis the solid states of materials and the basic electrical elements like as the PN junction, diodes, and transistors.

Course Number : CE1203
Course Name : Mathematics
Credit Hours : (6,3,1,0)
Course Content : The course describe perform the :derivatives, integration, and their scientific applications**.**

Course Number : CE1204
Course Name : Engineering Drawing
Credit Hours : (2,0,0,3)
Course Content : This course covers the following topics: BASIC CONCEPTS, Lettering and NUMERALS, Drawing of Geometrical patterns, Isometric projections, Computer Aided Engineering Drawing Auto CAD

Course Number : CE1301
Course Name : Digital Techniques
Credit Hours : (4,2,1,0)
Course Content : number systems, logic gates and boolean algebra,boolean function minimization, combinational logic circuits using discrete logic gates, combinational logic circuit using msi integrated circuits, introduction to sequential logic circuits

Course Number : CE1302
Course Name : Principle Of Mechanical Engineering
Credit Hours : (4,2,1,0)
Course Content : This course covers the following articles: Statics, Dynamics, Strength of Materials and Thermodynamics

Course Number : CE1303
Course Name : Laboratory
Credit Hours : (2,0,0,3)
Course Content : The experiments cover (Principles of measurements and measuring equipment, Principles of CRT and oscilloscopes, D.C. circuits, A.C. circuits, Diode characteristics and applications, Transistor characteristics and biasing, Digital circuits fundamentals.)

Second Year

Course Number : CE2201
Course Name : Engineering Analysis
Credit Hours : (6,3,1,0)
Course Content : Multiple Integrals, Sequences And Series, Vectors Functions, Ordinary Differential Equations, Solution Of Differential Equations By Power Series, Partial Differentiation Equation, Numerical Analysis Matrix Analysis, Statistics, Probability ,Complex Variable Theory, Applications Of MatLab

Course Number : CE 2202

Course Name : Industrial Management
Credit Hours : (4,2,0,0)
Course Content : General concept , Owner ship, decision making, Systems concept and value analysis, Production system and product design and development, Production system and product design and development, Product quality control, Material management purchase management purchase and inventory, Marketing management, Human resource management, Financial management, Industrial safety**.**

Course Number : CE2301
Course Name : Communication Principles
Credit Hours : (4,2,1,0)
Course Content : Include the Transmission line theory, Crank Diagram, Smith chart, Impedance Matching, Linear Modulation Technique, Angular Modulation

Course Number : CE2302
Course Name : Electronic I
Credit Hours : (4,2,1,0)
Course Content : This is the first course in electronic devices. Topics include both bipolar junction transistors (BJTs) and field effect transistors (FETs); Frequency response; Operational amplifier and its applications include comparators, summing amplifiers, integrators, differentiators.

Course Number : CE2303
Course Name : Computer Programming II
Credit Hours : (6,2,0,2)
Course Content : During this course student should be able to write advanced program in C++ using pointer , files and graphics ,design a full solution for problem in communication , electrical circuit and data analysis

Course Number : CE2304
Course Name : Electromagnetic Fields
Credit Hours : (4,2,1,0)
Course Content : This course covers the following topics: Electric field, Electric field intensity, Energy, Potential and Boundary condition,

Current and Capacitance. Magnetic field, Force, Dynamic Electromagnetic fields

Course Number : CE2305
Course Name : Signal and System
Credit Hours : (6,2,0,2)
Course Content : This course covers the following topics: Signals, Systems, time-domain analysis, frequency-domain analysis, fourier series, fourier transforms, Laplace transforms, Introduction to Z-transforms, Matlab applications in signals and systems analysis.

Course Number : CE2306
Course Name : Digital Design
Credit Hours : (4,2,1,0)
Course Content : This course covers the following topics: Top-Down Design of combinational Circuit .Sequential Logic Circuit. Synchronous Sequential Circuit- Design

Course Number : CE2307
Course Name : Laboratory
Credit Hours : (2,0,0,3)
Course Content : The experiments cover (Digital and logic circuits, Transistor circuits and small signal amplifiers, Filters، Differentiator and Integrator circuits, Transmission lines, AM modulation and demodulation, FM modulation and demodulation, OPAMP circuits)

Third Year

Course Number : CE3201
Course Name : Digital Signal Processing
Credit Hours : (4,2,1,0)
Course Content : Review Of Discrete Signals And Systems, Discrete Fourier Series, Dicsrete Fourier Transform, Convolution And Correlation, Discrete And Fast Fourier Transform, Z-Transform, Ramework For Digital Filter Design, Finite Impulse Response Digital Filter Design, Infinite Impulse Response Digital Filter Design, Applications Of Filter Banks In Audio & Image Processing, Noise Calculation

Course Number : CE 3301
Course Name : Microwave Engineering
Credit Hours : (4,2,1,0)
Course Content : Review Of Electromagnetic Theory, Wave Guides, Microwave Network Analysis Using S-Parameters, Passive Microwaves Components, Ferromagnetic Components, Active Microwave Circuts, Microwave Semiconductor Devices, Microstrip And Striplines, Filters And Microwave Filters, Microwave Amplifiers, Microwave Oscillators, Microwave Integrated Circuits.

Course Number : CE3302
Course Name : Electronic Communication
Credit Hours : (4,2,1,0)
Course Content : Review of a traditional radio and personal communication systems. Basic modeling of RF communication channel. Modulation, detection and multiple access schemes. Review of transceiver architectures and operation principles of RF blocks. Circuit design and analysis of basic RF CMOS blocks of (LNA, mixer, oscillator, frequency synthesizer, passive and active filter, and power amplifier). Limitations due to power, frequency, noise and nonlinear distortions. Review of integrable transmitter / receiver architectures and principles of RF CMOS circuit design. Review of data converters and baseband processors. Introduction to RF design tools

Course Number : CE3303
Course Name : Digital Communications
Credit Hours : (4,2,1,0)
Course Content : Include the sampling theory, PAM, PWM, PPM, PCM, DM, Digital modulation(ASK, FSK, PSK, DPSK, QPSK, DQPSK, MSK GMSK) circuits generation and detections, Bandwidth, probability of error

Course Number : CE3304
Course Name : Microprocessors
Credit Hours : (4,2,1,0)

Course Content : Introduction To 16bit Microprpcessor, 8086/8088 Family Assembly Language Programming , 8086 System Connections And Timing, Interrupts And Interrupt Service Procedure , I/O Programming, Interfacing , Paralle I/O And Interfacing Application , General Purpose Programmable Peripheral Devices: -

Course Number : CE3305
Course Name : Electronic Instrumentation
Credit Hours : (4,2,1,0)
Course Content : Instrumentation Errors, Transducers, Signal Conditioning, Signal Conversion, Instrumentation Amplifier, Analog Electronic Instruments, Digital Instruments, Interface Buses.

Course Number : CE3306
Course Name : Control Engineering
Credit Hours : (6,3,1,0)
Course Content : This course covers the following topics: I-CONTINUOUS CONTROL SYSTEM (System representation, Time domain analysis, State space analysis, Stability of system, Frequency response analysis, Design of control system) II-DIGITAL CONTROL SYSTEM (Z-transform, Sampled data control system, Time response analysis, Stability of system).

Course Number : CE3307
Course Name : Labortory
Credit Hours : (4,0,0,6)
Course Content : The students are to apply modern engineering practices and techniques. Each student should submit a written technical report for each experiment.

Fourth Year

Course Number : CE4201
Course Name : Engineering Project
Credit Hours : (4,1,0,3)
Course Content : Collaborative team work of the nature in a research environment is expected، including extensive interaction with other students. Each student should submit a written technical report and should attend the final oral examination

. The students apply verbal written and oral technical skills to document the design process .

Course Number : CE4301
Course Name : Communication Systems
Credit Hours : (4,2,1,0)
Course Content : Include the Study of the Telephony System, Mobile System, Radar Systems

Course Number : CE4302
Course Name : Antennas & Propagation
Credit Hours : (6,3,1,0)
Course Content : Introduction to antennas , radiation principles, Simple radiation systems, antenna arrays, broadband antennas, antenna aperture, Propagation principles, free space propagation, fading, polarization, reflection, refraction, diffraction, troposphere propagation. Ionosphere propagation, propagation by diffraction, Troposcatter. Troposcatter

Course Number : CE4303
Course Name : Secure Communications
Credit Hours : (4,2,0,0)
Course Content : Include the sampling theories of secured communication, Cryptography, Ciphering, Spread spectrum

Course Number : CE4304
Course Name : Satellite Communication
Credit Hours : (4,2,1,0)
Course Content : Introduction to satellite and satellite orbiting , transponder. Satellite services and satellite access techniques.
Course Number : CE4305
Course Name : Optical Communication
Credit Hours : (4,2,1,0)
Course Content : Review of fiber optics, Characteristics of optical fibers Review of digital modulation in optical communication, Optical sources and transmitters Optical detectors and receivers, Noise and detection, Dispersion in optical communication systems , Optical link design, Wavelength division multiplexers and demultiplexers

Course Number : CE4306
Course Name : Data Transmission& Computer Networks
Credit Hours : (4,2,1,0)
Course Content : Include the Network topology, ISO Network layer, Network component

Course Number : CE4307
Course Name : Laboratory
Credit Hours : (4,0,0,6)
Course Content : The principle objective is to ensure that students have a good quality capstone design & experience to integrate concepts from a range of classes in the core. The students are to apply modern engineering practices and techniques. Each student should submit a written technical report for each experiment.

Ninevah University
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Class	First			Theory :	3 Hrs/wk
Subject	Basics Of Electrical Engineering			Tutorial	1 Hrs/wk
Code	CE1201	Unit	6	Practical	Hrs/wk

Article	Hrs
BASIC CONCEPTS:	15

Voltage & current; Power & Energy; Dependent and Independent sources; Ohm's laws series & parallel connections; Delta- star connections and transformations.	
D.C. Network Theorems: Source transformation; Linearity & superposition; Thevenin's & Norton's Theorems; Source transportation; source superposition; Nodal analysis; Mesh analysis.	**35**
Energy Storage Elements: The capacitor; The Inductor; Analysis of RC-transient circuits; Analysis of RL-transient circuits; RLC transient circuits.	**25**
Analysis of AC- Circuits: The Phasor equivalent circuit; Methods of Ac-circuit Analysis; Power factor and average power in the sinusoidal Ac-circuits; Complex power; Series & parallel resonance; Calculation of current، voltage، and power in three–phase circuits with delta and star connections.	**38**
Magnetic Circuits and Transformers	**7**
Total	**120**

Text book:
1:" Engineering Circuit Analysis" By W. Hayt
2: "Introductory Circuit Analysis" By Boylested

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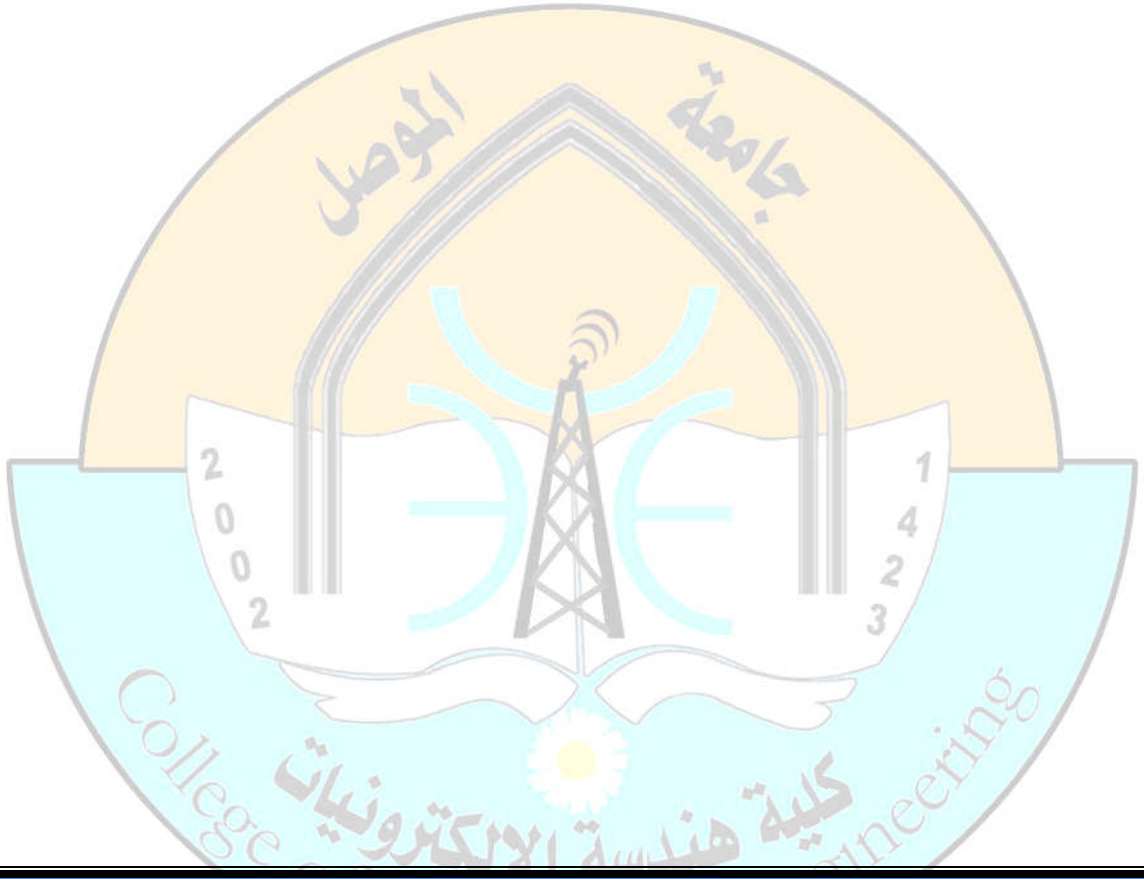
Class	**First**			**Theory :**	**2 Hrs/wk**
Subject	**Physical Electronics**			**Tutorial**	**1 Hrs/wk**
Code	**CE1202**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	**Hrs**

Energy Bands in Solids: Charged particles, field effect intensity; Potential energy, The ev units of energy –Nature of atom. Electronic structure of elements، Energy band theory of crystals; Lattice structure of crystals.	**12**
Transport Phenomena in Semiconductor: Mobility and conductivity; Properties of intrinsic P and N type semiconductors; Mass action law, conductivity modulation; Thermistors; Generation and recombination of charges; Diffusion current; continuity equation; Injection minority carrier charges; Potential variation within a graded semiconductors.	**12**
Junction Diode Characteristics: PN junction in equilibrium; Volt Ampere characteristics; Temperature dependence; diffusion capacitance;	**9**
Diode Circuit Analysis: Non-linear properties; Ideal diode; Basic theory and analysis of simple diode circuit; DC load line; Small signal analysis and concept of dynamic resistance; AC load line; Diode capacitance; Temperature effects of diode; Different types of diodes (Zener; schottckey; Varactor; Tunnel and negative resistance diodes).	**12**
RECTIFIERS: Circuit analysis of halfwave and full wave rectifiers, Bridge rectifier; Ripple and form factor calculations; Efficiency and IV for above circuits; Types of filters; C filters , L filter ,L .C. filter, PIE filter; Analysis of filter and calculation of ripple and regulation.	**9**
Clipping and Clam Ping Circuit:	**6**
Optoelectronic Devices: Principle of operation and characteristics of Photoconductive; photovoltaic and photoemissive sensors and light emitters; photodiode; photodetectors; phototransistors; Solar cell construction and characteristics and applications; LED characteristics; LED Eye Response, Curve and Geometric and applications; Optoisolators.	**12**
Transistors: Normal operation; PNP; NPN; Current components in transistor; Current gain; Common base; Input and output characteristics; Common emitter; Input and output characteristics; Common collector; Input and output characteristics.	**18**
Total	**90**

Text book:
1: INTEGRATEDELECTRONICS"MCGRAWHILL;9THREPRINT،1995.ByMILLMAN&HALKIES
2: " ELECTRONICS DEVICES AND COMPONENTS"، PITMAN، 1995 By MOTTERSHED،.
3: " SOLID STATE DIVICES"، PHI; 4TH EDITION، 1995.By STREETMAN،
4: "SEMICONDUCTOR DEVICES & CIRCUITS"، JOHN WILEY & SONS، 1992.By : M.S. TYAGI
5: " ELECTRONICS DEVICES & CIRCUITS THEORY"، HI; By BOYLSTED & NASHELSKY



Ninevah University
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Class	First			Theory :	3 Hrs/wk
Subject	Mathematics			Tutorial	1 Hrs/wk
Code	CE1203	Unit	6	Practical	Hrs/wk

Article	Hrs

Matrices And Determinants: i) Definitions ii) Properties. iii) Inverse of a matrix iv)Solution of Equations (Cramer's rule).	**12**
Differentiation: Techniques of differentiation; Chain rule; Implicit differentiation; Higher order differentiation; Applications of differentiation; maxima and minima; Curve plotting; Differentiation of trigonometric functions .	**14**
Transcendental Functions: (Inverse trigonometric; Natural logarithmic; Exponential and power) i) Definitions ii) properties iii) graphs iv) derivatives and integrals.	**14**
Applications Of The Definite Integral: i) Areas between curves. ii) Volumes of revolution. iii) Length of the curve. iv) Surface area of revolution.	**14**
Methods Of Integration: i) Trigonometric Substitutions. ii) Quadratics. iii) Partial fractions. iv) Integration by parts. v) Further Substitutions.	**14**
Vector Calculus: i) Representation of vectors in space (i;j;k) unit vectors. ii) Scalar product iii) Vector product . iv) Del operator; Gradient; Divergence and Curl.	**14**
Complex Numbers: i) Invented number systems. ii) The Argand diagram. iii) Addition; Subtraction; Product; Qutient; power and roots. Iv) Demoiver's Theorem.	**12**
Polar Coordinates: i) The Polar Coordinate system. ii) Graphs of polar equations.	**12**
Sequences And Series: i) Sequences: convergence; Test of monotone sum; test of convergence; alternating series. ii) series : geometric series; nth partial iii) Power and Taylor's series.	**14**
Total	**120**

Text book:
1: "Calculas"، **By Finney and Thomas**
2: "Calculas"، **By Thomas**

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Class	**First**			**Theory :**	**2 Hrs/wk**
Subject	**Digital Techniques**			**Tutorial**	**1 Hrs/wk**
Code	**CE1301**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Number Systems: Decimal number system; Binary; Octal and hexadecimal number systems; Conversion from one number to another number system; Addition; Subtraction; Multiplication and division using different number system; Representation of binary number insignia-magnitude; Sign 1's Complement and align 2's complement notation; Rules for addition and subtraction with complement Representation; BCD; EBCDIC; ASCII; Extended ASCII; Gray and other codes.	**10**
Logic Gates and Boolean Algebra: AND; OR; NOT; NAND; NOR; Ex-OR logic gates; Positive and negative logic; Fundamental concepts of Boolean algebra; De-Murrage's laws; Principles of duality; Simplification of Boolean expressions; Canonical and standard forms for Boolean function; SOP and POS, forms; Realization of Boolean functions using only NAND and NOR gates.	**10**
Boolean Function Minimization: Objectives of the minimization procedures; Karnaugh map method; Don't care conditions; Quine-McCluskey tabulation method; Concept of prime implicants.	**10**
Combinational Logic Circuits Using Discrete Logic Gates: Half adder and full adder; Half subtractor and full subtractor; Parity generator and checker; Code converters; Binary multiplier; Majority circuits; magnitude comparator	**10**
Combinational Logic Circuit Using MSI Integrated Circuits: Binary parallel adder; BCD adder; Encoder; priority encoder; decoder; Multiplexer and demultiplexer circuits; Implementation of Boolean functions using decoder and Multiplexer; BCD to 7-segment decoder; Common anode and common cathode 7-segment displays; Random access memory; Read only memory and erasable programmable ROMS	**15**
Introduction to Sequential Logic Circuits: Basic concepts of sequential circuits; Cross coupled SR flip-flop using NAND or NOR gates; JK flip- flop; Clocked flip- flop; D-type and Toggle flip-flops; Truth tables and excitation tables for flip- flops; Master- slave configuration; Edge triggered and Level triggered flip- flops; Elimination of switch bounce using flip- flops; Flip-flops with preset and clear.	**15**

Article	Hrs
Logic Design Using SSI Chips **Logic Design Using MSI Chips (Multiplexer; And Decoders); Expansion theorem; multiplexes ROM** **PAL; PLA; PLD; PALASM; examples.** **Logic Hazards**	**15**
Logic Families and their Comparison	**5**

	Total	**90**

Text book:
1: "Digital Logic and Computer Design By MORRIS MANO.
2: "Digital Computer Fundamentals" By BARTEE THOMAS.
3: "Digital Integrated Electronics" By TAUB AND SCHILLING.
4: "Modern Digital Design" By RICHARD SANDIGE.

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Class	**First**	**Theory :**	**2 Hrs/wk**
Subject	**Computer Programming - I**	**Tutorial**	**Hrs/wk**

Code	CE1101	Unit	6	Practical	2 Hrs/wk

Article	Hrs
Introduction، Why Programming، Programming Languages، Importance of C، Simple C program، Definition of statement، directives، header files	4
printf function، console input output sample functions، Identifiers، Basic data types، character، integer، float، double، long، unsigned، scanf function، format character specifiers، width specifiers، Operators، arithmetic and logical، sample programs Mathematical functions، representing mathematical functions as C statements، solving, equations using C, if and if … else statement، sample programs، switch statement, Loops، (for، while، do..while) statements، sample programs، nested loops، break and continue statements,	18
Some sample C standard functions، getchar، putchar، getch، getche، putch، gets، puts، delay، sound، random، ….. Etc، Macros، the define directive, Functions، types of functions، sample functions, Arrays، one، two and multidimensional arrays، initialization، indexing، sample programs, Passing arrays to functions	18
Variable types، definition of local، global، constant، static and volatile variables، , Enumerated text variables، , Pointers، Referencing، sample applications، Pointers and functions, File processing، types of files، sequential and random,	10
Introduction to object oriented programming using C++، classes	10
Total	60

Text book:
1: "Theory and problems of programming with C" By Byron S. Gottfried.
2: "Application Programming in ANSI C" By Richard Johnsonbaugh & Martin Kalin.

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Class	First	Theory :	Hrs/wk
Subject	Engineering Drawing	Tutorial	Hrs/wk

Code	CE1204	Unit	2	Practical	3 Hrs/wk

Article	Hrs
Basic Concepts: Introduction to Engineering drawing and its uses as an engineering language in industry; Dimensioning; Symbols and terms used in drawing; Proper use of drawing instruments; Use of international metric system; Names and dimensions of lines used in drawings.	6
Lettering And Numerals Arabic and Latin lettering and numerals.	3
Drawing Of Geometrical Patterns: Drawing various types of Geometrical patterns (Tracery); Various methods of drawing ellipses; Various types of tangents.	12
Drawing Of Sectional Views And Tangents: Drawing according to scale; Drawing various views of an actual object; Projections of all views necessary for a given object; Projection of views using first and third angle projection methods.	12
Isometric Projections: Freehand Sketching; proper and reasonable proportions.	12
Computer Aided Engineering Drawing Auto CAD: Preparing to draw with Auto cad; Basics of 2D Drawing; Edit & Modifications commands ; Placing dimensions & Text on drawing; Isometric drawing ; Basics of 3D drawing.	45
Total	**90**

Text book:
1: Engineering drawing & Graphic Technology" By Thomas E. French
2: " Autocad LT for windows" By KIRKPATRICK، J

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Class	First	Theory :	2 Hrs/wk
Subject	Principle Of Mechanical Engineering	Tutorial	1 Hrs/wk

Code	CE1302	Unit	4	Practical	Hrs/wk

Article	Hrs
Statics: Force system; Units system; Parallelogram law; Forces + components; Resultant of coplanar forces، components of force in space; Moment of a force; Moment of couples، equilibrium: Free body diagram; Coplanar system; Analysis of trusses; Friction: Nature of friction; Theory of friction; Coefficient of friction; Centroids & center of gravity – centroids of area; Centroids determined by integration; Moments of inertia: parallel axes Theorem; 2nd moment of area by integration; radius of gyration; moments of inertia of composite area.	26
Dynamics: Kinetics of particle; Rectilinear motion; Curvilinear motion; Rectangular components of curvilinear motion; Normal and tangential components of acceleration; Kinetics: Force; Mass and acceleration; Kinetics of particle Newton's 2nd law .	24
Theoremdynamics: Introduction; Active materials & their specifications; Work and heat in ideal gasses and steam، 1st law of thermodynamics، particle law in steam and gasses; 2nd law of thermodynamics، particle law in steam and gasses.	20
Strength Of Materials: Hook's law; Tension and compression stress; Thin-walled cylinders and spheres; Combined stress (Mohr's circle) shear and normal stress; Stresses in beams (initial principal).	20
Total	90

Text book:
1: Engineering Mechanics (statics) By: J.L.MERIAM
2: Engineering Mechanics(Dynamics) By: J.L.MERIAM
3: Applied heat for engineers، By :Sneeden &Kerr
4: ميكانيك المواد تأليف أيان جون هيرن

Ninevah University
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Class	First	Theory :	Hrs/wk
Subject	Laboratory	Tutorial	Hrs/wk

Code	CE1303	Unit	2	Practical	3 Hrs/wk

Article	Hrs
The principal objective is to ensure that students have a good quality capstone design & experience to integrate concepts from a range of classes in the core. The students are to apply modern engineering practices and techniques. Each student should submit a written technical report for each experiment. The experiments cover:- - Principles of measurements and measuring equipment. - Principles of CRT and oscilloscopes. - D.C. circuits. - A.C. circuits. - Diode characteristics and applications. - Transistor characteristics and biasing. - Digital circuits fundamentals.	
Total	**90**

Text book:
1:
2:
3:

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Class	First	Theory :	2 Hrs/wk
Subject	ثقافة جامعية	Tutorial	Hrs/wk

Code	CE1102	Unit	4	Practical	Hrs/wk

Article	Hrs
حقوق الإنسان - القسم الأول:- التطور التاريخي لحقوق الإنسان أولا:- المجتمعات البدائية - مرحلة ما قبل التاريخ - الحضارات الشرقية (بلاد وادي الرافدين والحضارة الفرعونية نموذجاً) - الحضارات الغربية (اليونانية والرومانية نموذجاً) ثانيا:- الشرائع السماوية - الديانة اليهودية - الديانة المسيحية - الديانة الإسلامية(بصوره أكثر تفصيلاً) ثالثاً:- تطور حقوق الانسان في القوانين الوضعية - نظرية العقد الاجتماعي - الحروب العالمية وأثرها في حقوق الانسان - التنظيم الدولي - القسم الثاني :- حقوق الإنسان التعريف بها وأنواعها أولا- التحديد والتعريف - الحق في الفقه الإسلامي - الحق في الفقه القانوني - تعريف حقوق الإنسان ثانياً- تقسيمات حقوق الإنسان (وتتم بدراسة مفصلة ومقارنة بين القانون والشريعة الإسلامية) الحقوق الجماعية(حق تقرير المصير، حق التنمية، الحق في بيئة مناسبة، حق الإنسان في العيش بسلام) الحقوق الفردية (الحقوق الاقتصادية والثقافية، الحقوق المدنية والسياسية الحقوق الصيغة بالشخصية) القسم الثالث:- ضمانات احترام وحماية حقوق الإنسان أولا – الضمانات في الشريعة الإسلامية ثانياً:- الضمانات على الصعيد الوطني ثالثا:- الضمانات على الصعيد الدولي	٣٠

Article	Hrs
الحريات العامة (بين الشريعة والقانون) أولا:- المقدمة ثانياً:- التعريف بالحريات العامة - الأصل اللغوي - الأصل التاريخي - الأساس القانوني	٣٠

- الأساس الشرعي ثالثا:- أسس الحريات العامة : - العدالة - المساواة - الحرية رابعاً:- الحريات العامة الو صفية - حرية الرأي - حرية الفكر - حرية الأعلام - المسا واه خامساً:- الشريعة الإسلامية والحريات العامة - موقف الإسلام من المرأة (الميراث, الزواج, تولي الوظائف) - موقف الإسلام من حرية العقيدة **نظم إدارة الدولة** أولا:- في تحديد النظم السياسية - فكره النظام السياسي - شرعية النظم السياسية - أنواع النظم السياسية ثانياً:- في النظام الديمقراطي - مقدمة تأصيلية - تعريف الديمقراطية - أركان ومرتكزات النظام الديمقراطي ثالثاً:- نماذج الديمقراطية - الديمقراطية المباشرة - الديمقراطية غير المباشرة - الديمقراطية شبة المباشرة - كيف يتم التحول إلى الديمقراطية رابعاً:- الديمقراطية ونظم إدارة الدولة - النظام المركزي - النظام اللامركزية - إشكاليات النظام الديمقراطي خامساً:- موقف الإسلام من الديمقراطية - الخطاب الإسلامي التقليدي - الخطاب الاسلامي المعاصر	
Total	٦٠

Text book:

Ninevah University
College Of Electronic Engineering
Communication Engineering Department

Class	**Second**	**Theory :**	**2 Hrs/wk**
Subject	**Communication Principles**	**Tutorial**	**1 Hrs/wk**

Code	CE2301	Unit	4	Practical	Hrs/wk

Article	Hrs
Introduction	**2**
Transmission Lines: Transmissions lines equations، pulses on lines، space- time diagrams., Sinusoidal waves on transmissions line; Graphical Solution of line equations; Crank diagram; Smith Chart، lossless and lossy lines**.,** Transmissions lines applications; Impedance matching، λ/4 transformers، Stub matching.	**28**
Amplitude Modulation: Modulation Index; Spectrum of AM signal، DSB، DSB/ SC، SSB and VSB signals., Amplitude Modulators، Balanced modulator، Switching modulator، SSB generation., Detection of AM signals; Envelope detectors، synchronous detectors .	**20**
Frequency Modulation: Modulation Index، Spectrum of FM signals، NBFM and WBFM، Phase Modulation، Relation between FM and PM signals power in FM signals. Frequency modulators; Direct and indirect methods frequency demodulators.	**18**
Noise: Energy and power signals، Energy and power spectral densities، correlation، Representation of thermal noise، noise figure. Noise in AM and FM system، pre emphasis and de emphasis، Probability.	**14**
Applications In Matlab	**8**
Total	**90**

Text book:

1: أساسيات الاتصالات د.سامي عبد الموجود د.خليل حسن سيد مرعي د.بايز السليفاني

2: "**Introduction to Communication System**" By STREMLER

3: "**Introduction to Analog & Digital Communication System**" By HAYKIN

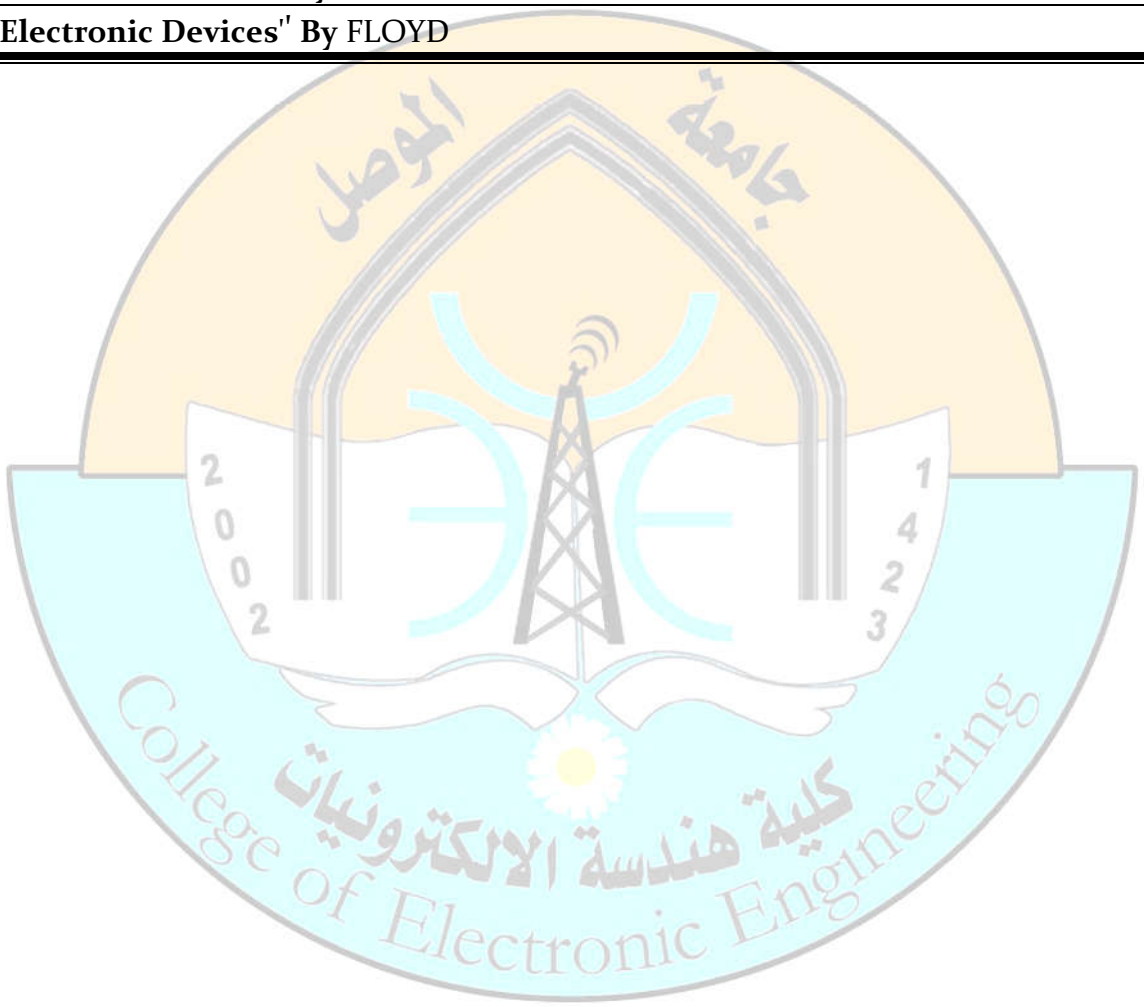
Class	**Second**			**Theory :**	**2 Hrs/wk**
Subject	**Electronics**			**Tutorial**	**1 Hrs/wk**
Code	**CE2302**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Introduction to Transistor Circits: NPN & PNP Bipolar Transistor; Current Flow Mechanism in Transistor Junctions; ransistor configurations; Current Gain Calculation [Alpha] and [Beta]; Transistor input/ output characteristics; DC Load line ; Operating point; Different DC circuit biasing.	**12**
Small Signal Analysis and Design: Small signal equivalent circuit for CB، CE and CC configuration; Input/Output resistance; Calculation of current and voltage Gain in small signal amplifier; Graphical Analysis for voltage gain; Hybird parameters to analyze transistor circuits.	**15**
Baising Staibbility: Stability factor analysis due to temperature variation (Effect of Ico، Vbe and Beta); Temperature compensation using diode biasing.	**6**
FET and MOS Transistor : Introduction to the theory and operations of JFFT & MOSFET; FET Transistor configurations; Transistors transfer characteristics; Amplifier Circuit Biasing; transistor Equivalent circuit; Small signal analysis of FET transistor.	**15**
Frequency Response: Definition and Concepts; Gain in decibel; Bode plot for the gain; The effect of the Coupling capacitor; Low frequency analysis due to the R-C Coupled amplifier in BJTs; the Effect of emitter bypass capacitor; Calculation of the Low cut-off frequency. Transistor amplifier at high frequencies; Hybrid PIE equivalent circuit at high frequency; High frequency behavior of CB & CE amplifier; High cut-off frequency; Gain Band-Width products for the above circuits; FET at high frequencies; CD and CS amplifier at high frequency;	**12**
Negative Feedback In Amplifiers : Basic concept of feedback amplifier ; Effect on gain due to feedback ; Input and out put impedances ; Feed back amplifier and sensitivity function ; Voltage series ، voltage shunt ، current series and current shunt configuration circuits ; Design analysis ; Frequency response of a feedback amplifier .	**12**

Article	Hrs
Operational Amplifier: Ideal Op-amp equivalent circuit; Operational Amplifier Specification; Circuit analysis of an Op-amp; Closed loop Op-amp Circuit (Inverting and Non-Inverting Circuit).	**9**

Power Electronic Devices: UJT Construction، Operation and characterises; Thyrsistor Equivalent Circuit ; Thyrsistor Characteristics and operation ; Application of the devices.		**9**
	Total	**90**

Text book:
1: "**Electronic Devices** '**By** MILLMAN
2: "**Electronic Devices**" **By** FLOYD



Ninevah University
College Of Electronic Engineering
Communication Engineering Department

Class	**Second**	**Theory :**	**2 Hrs/wk**

Subject	Computer Programming -II			Tutorial	Hrs/wk
Code	CE2303	Unit	6	Practical	2 Hrs/wk

Article	Hrs
Introduction to Graphics.	8
Arrays and Strings.	4
Control Structures:- If/then ; If /then/Else ;While ; Do While ; Do Until ; For; DO Loop while ; Do loop until; Exit Do; Exit For، I/O port.	8
MDI application، Using Mouse File I/O، Case statement، Error Handling.	6
Sub Procedures And Function.	6
Matlab Programming and Application.	8
Application Software (Labview) ، (Opnet)، Microwave Office)	12
Integrated Development Environment: Project Window; Tool Box ;Form Layout; Properties ;Menu Bar and Tool Bar	8
Total	90

Text book:
1: "Master visual Basic 6.0" By Evangelos Petroutsos
2: "Visual Basic in 12 easy lessons" By Grey Perry

Ninevah University
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Class	Second	Theory :	2 Hrs/wk
Subject	Electromagnetic Fields	Tutorial	1 Hrs/wk

Code	CE2304	Unit	4	Practical	Hrs/wk

Article	Hrs
Review of Vector Calculus.	**5**
Coulomb's Law and Electric Field Intensity: Experimental law of coulomb; Electric field intensity; Field of a continuous and volume charge distributions; line charge and sheet charge; Streamlines and sketches of fields.	**10**
Electric Flux Density and Gauss's Law: Electric flux density; Gauss's law; Application of Gauss's law; some symmetrical charge distributions.	**10**
Energy and Potential: Energy expended in moving a point charge in an electric field; Definition of potential difference and potential; Potential field of a point charge and system of charges; Potential gradient; Dipole.	**10**
Conductors; Dielectrics And Capacitance: Current and current density; continuity of current; Conductor Properties and boundary conditions. Nature of Dielectric Materials; Boundary Conditions for Perfect dielectric Materials; Capacitance; Several Capacitance Examples.	**10**
Poisson's and Laplace's Equations: Poisson and Laplace 's equations; Examples of the solution of Laplace equation; Examples of the solution of Poisson's equation.	**10**
Steady Magnetic Field: Boit – Savart law; Amperes law; Magnetic Flux & Magnetic Flux Density; Inductance; Scalar and Vector Magnetic Potentials.	**10**
Magnetic Forces and Materails:- Force on Moving Charge; Force on Differential Current. Elements; Force Between Current Differential Elements; Force and Torque on a Closed Circuit; Magnetization and Permeability; Magnetic Boundary Conditions; Magnetic Circuit	**10**
Time - Varying Fields and Maxwell'S Equations: Faraday's Law; Displacement Current; Maxwell's Equations in Point Form; Maxwell's Equations in Integral Form; Wave Equations; Wave Propagation in Different Medii.	**15**
Total	**90**

Text book:
1: :ENGINEERING ELECTROMAGNETICES Mc- Graw Hill; 5th Edition; 1992 ; 7th Reprint 1995 .By WILLAIM H.HAYT .
2: Elements of engineering electromagnetic Prentice Hall; 3rd Edition; 1992 By . N. N. RAO
3: Theory and problems of electromagnetics McGraw Hill; 2nd Edition; 1993.By JOSEPH A.

Ninevah University
College Of Electronic Engineering
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Class	Second	Theory :	2 Hrs/wk
Subject	Signals and Systems	Tutorial	Hrs/wk

Code	CE2305	Unit	6	Practical	2 Hrs/wk

Article	Hrs
SIGNALS AND SYSTEMS: Basic Definitions, Mathematical Models, Continuous- Time and Discrete-Time systems.	6
Operations on independent variable.	4
Signal and System Characteristics and MODELS: Basic Operations on Signals; Signal Characteristics; System Representations and Models; System Characteristics	6
Continuous- Time Signals and Systems: Time –Domain Representations of Continuous- Time Signals; Sinusoidal and Complex Exponential Signals; Singularity Function Signals; Signal Energy and Power.	4
Time Domain Analysis of Continuous-Time Signals: System Equation Solution; System Impulse Response; Zero-State Response of Linear; Time Invariant System; The Superposition Integral; Continuous-Convolution and Properties.	12
Frequency-Domain Representation of Continuous- Time Signal:- Spectra and Bandwidth of Continuous- Time Signals; Fourier Series Representations of Signals; Amplitude and Phase Spectra of Periodic signals; The Fourier Transform and Spectra of A periodic Energy Signals; The Fourier Transform and Spectra of Non energy signals.	6
Frequency-Domain Analysis of Continuous- Time System: System Frequency Response; Frequency-Response Determination; Frequency Response of Electric Circuits; Phase Delay and Group Delay; Bode Plots of Amplitude and Phase Responses.	4
Analysis of Continuous- Time System Using the Laplace Transform:- The Laplace Transform; Laplace Transform Evaluations and Theorems; Evaluations of Inverse Laplace Transform; Solution of Linear Itegro differential Equations; System Transfer Function; Frequency Response.	4
Continuous Time Filter: Distortion less Transmission; Ideal Filters; Approximation of Ideal Filters, Butterworth and Chedyshev Filters Design.	4

Article	Hrs
Time – Domain Analysis of Discrete-Time Systems: System Equation Solution; Recursive Solution of System Equation; System Unit Pulse Response; Zero-State Response or Linear-Time Invariant System; Discrete Convolution and Priorities.	4
Analysis of Discrete-Time Systems Using The Z-Transform: The z-Transform; Transform Evaluation and Theorem; Evaluation of Inverse z-	6

Transform; z-Transform of Linear Difference Equations; The System Transfer Function; System Stability and Frequency Response Using The Transfer Function.		
	Total	**60**

Text book:
1: "**Introduction to Signals & Systems**" By D.K. Lindner
2: "**Signals & Systems**" By Carlson

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Class	**Second**			**Theory :**	**2 Hrs/wk**
Subject	**Digital Design**			**Tutorial**	**1 Hrs/wk**
Code	**CE2306**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Introduction	**3**
Five Variables Minimazation	**3**
Additional Minimazation Tecnhniques: **Tabular; Prime; Implicit; Macklusky; Entered Variables**	**12**
Top-Down Desigin of Combainaonal Circuits: Gate Level ;Adders Subtractor; Multiplexer; Decoders	**12**
Sequential Logic Circuits: Delay Model; Characteristics equation, PS/NS Table; State Diagram; ASM Chart; Karnaugh Map; Transition Map; Timing Diagram of flip-flops.	**9**
Synchronous Sequential Logic: Mealy And Moore Circuits; Timing Diagram; Implicit Table State Reduction and state assignment.	**9**
Sequential Logic Circuits Desigin: Basic concepts of counters and registers; Binary counters; BCD counters; Up down counter; module-n counter; Design of counters using state diagrams and tables; Sequence generators;	**9**
Shift Register Shift left and Shift right Register, Register with parallel load, Types of shift register ,SISO, SIPO,PISO, PIPO, Ring Counter, Twisted Ring counter, Maximum Length shift Register	**9**
Asynchronous Circuit: Fundamental Mode Circuits; Design Steps. ESSENTIAL AND NON- ESSENTIAL HAZARDS, Asynchronous PLUSE MODE CIRCUITS	**24**
Total	**90**

Text book:
1: "Modern Digital Design،، By Richard S. Sandige

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Class	**Second**	**Theory :**	**3 Hrs/wk**
Subject	**Engineering Analysis**	**Tutorial**	**1 Hrs/wk**

Code	CE2201	Unit	6	Practical	Hrs/wk

Article	Hrs
Multiple Integrals: i) Double Integral. ii) Area and volumes. iii) Double Integral in Polar Coordinates iv) Evaluation of volume and triple Integrals. v) Evaluation of surface & surface Integrals.	8
Sequences And Series: i) Sequences: convergence; Test of monotone sum; test of convergence; alternating series. ii) series : geometric series; nth partial iii) Power and Taylor's series.	8
Vectors Functions: i)Equations of lines and planes. ii) Product of three or more vectors. iii) Vector function & motion : velocity and acceleration. iv)Tangential vectors. v) Curvature and normal vector.	10
Ordinary Differential Equations: i) First order (variables separable; homogeneous; linear – Bernoulli and exact). ii) Second order (Homogeneous and non homogeneous). iii) Higher order differential equations.	10
Solution Of Differential Equations By Power Series: Legendre s equation; Legendre s polynomials; Bessel function of the first and second kinds; Bessel function properties.	10
Partial Differentiation Equation: Wave equation; laplace equation; solution of boundary condition problems; general solution; solution by separation of variables.	10
Numerical Analysis: i)Solution of non-linear equations (Iteration; bisection and Newton-Raphson). ii) Finite differences. iii) Numerical differentiation and Integration. iv) Numerical solution of 1st order ordinary differential equations.	10
Matrix Analysis: Review of matrix theory; Linear transformation; Eigen values & eigen vectors; lace Lap transform of matrices; Application of matrices to electric circuits.	10
Statistics: Definition; Frequency distribution (relative & commutative; Mean; Standard deviation).	10

Article	Hrs
Probability: Definition; mutually exclusive & conditional probability; permutations & combinations; Probability distribution: Binomial; Normal & Poisson distributions.	10
Complex Variable Theory: Function of complex variable; complex differentiation; Analytic function & its	10

properties; Integration in the complex plane; Cauchy s theorem; Cauchy s integral formula for simply & multiply connected regions; Complex variable theory: Taylor's theorem; Laurent series; The residue theorem.		
Applications of Matlab		**14**
	Total	**120**

Text book:
1: "Advanced Engineering Mathematics" By KREYSIK
2: "Calculus" By Finney& Thomas

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Class	**Second**	**Theory :**	**Hrs/wk**

Subject	Laboratory			Tutorial	Hrs/wk
Code	CE2307	Unit	2	Practical	3 Hrs/wk

Article	Hrs
The principal objective is to ensure that students have a good quality capstone design & experience to integrate concepts from a range of classes in the core. The students are to apply modern engineering practices and techniques. Each student should submit a written technical report for each experiment. The experiments cover:- - Digital and logic circuits. - Transistor circuits and small signal amplifiers. - Filters، Differentiator and Integrator circuits. - Transmission lines. - AM modulation and demodulation. - FM modulation and demodulation. - OPAMP circuits.	
Total	90

Text book:
1:
2:
3:

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Class	Second			Theory :	٢ Hrs/wk
Subject	إدارة صناعية			Tutorial	Hrs/wk
Code	CE2202	Unit	٤	Practical	Hrs/wk

Article	Hrs
مفاهيم عامة **الادارة الهندسية، مباديء الادارة، الكفاءة، الفاعلية، الانتاجية، الكفاءة الانتاجية، الكفاءة الهندسية، الكفاءة الاقتصادية.**	6
أنواع المنظمات حسب مكيفاتها:- الانواع، المزايا، العيوب	6
صنع القرار في المنظمة:- خطوات صنع القرار، الية صنع القرار (حل المشكلة تحت ظروف التاكد وعدم التأكد.	6
مفهوم النظم وتحليل القيمة:- أنواع النظم، تحليل النظم، النظم الهندسية، تطبيقات النظم الهندسية، تحليل القيمة، أهداف تحليل القيمة، أنواع القيمة، مدخل، القيمة، تقنيات تحليل القيمة، أجراءات تحليل القيمة، المزايا والتطبيقات	8
نظام الانتاج وتصميم المنتج وتطويره:- مفاهيم (الانتاج، التصنيع، نظام الانتاج)، انواع نظم الاتنتاج، المزايا والعيوب، مفهوم تصميم المنتج وتطويره، أهميته، الاعتبارات الواجب مراعاتها في تصميم المنتج، أجراءات تطوير المنتج، التقييس، التوصيف، التبسيط	8
الرقابة على الجودة:- أنواع الرقابة على جودة المنتج، مخططات الرقابة الاحصائية وتطبيقاتها، نظم ادارة الجودة (ISO 9000) المفهوم والنشأة، الاهداف، التقسيمات	6
أدارة الصيانة والاستبدال:- الصيانة ما اهدافها، انواعها، المزايا والعيوب، نظم الصيانة باستخدام الحاسوب، مفهوم الاستبدال، اسباب الاستبدال، الطرق المستخدمة في اختيار البدائل في قرارات الاستبدال	6
أدارة الموارد (المشتريات، التخزين) المفهوم ، الوضائف، الاهداف، الاجراءات	6
السلامة الصناعية :- مفاهيم السلامة المهنية، اهدافها، محدداتها، السلامة الصناعية في مؤسسات الطاقة الكهربائية، المقومات، السيلقات، الادارة، اجراءات ، التوعية، معدات السلامة الصناعية في انشطة الكهرباء، اجراءات السلامة الصناعية في (مواقع العمل، منظومات القدرة، منظومات الاتصال)	8
Total	**60**

Text book:
1:
2:
3:

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Class	**Third**			**Theory :**	**2 Hrs/wk**
Subject	**Microwave Engineering**			**Tutorial**	**1 Hrs/wk**
Code	**CE3301**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Review of Electromagnetic Theory: Plane wave incidence on boundaries، reflection and transmission.	4
Wave Guides: Rectangular and circular cross section wave guides، Cavities.	10
Microwave Network Analysis Using S-Parameters.	8
Passive Microwaves Components: T and Magic T junctions، attenuators، Directional couplers.	12
Ferromagnetic Components: Isolators، Phase shifters، Circulators.	8
Active Microwave Circuits: Two-cavity Klystrons، Reflex Klystron، Magnetrons، **TWT** tubes.	12
Microwave Semiconductor Devices: Detectors and diodes., Transistors.	8
Micro strip and Strip lines	6
Filters and Microwave Filters.	6
Microwave Amplifiers.	6
Microwave Oscillators.	6
Microwave Integrated Circuits.	4
Total	**90**

Text book:
1: "Microwave Circuits and devices" By S. LIAO, **3** rd Ed.
2: "Microwave Engineering" By D, POZAR

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Class	**Third**			**Theory :**	**2 Hrs/wk**
Subject	**Electronic Communication**			**Tutorial**	**1 Hrs/wk**
Code	**CE3302**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Introduction to Radio Communication Systems	**3**
Radio –Frequency (Rf) Circuits: Amplifiers HF & RF amplifiers ، Oscillators RF، LC، Crystal & VCO، Passive and active filters.	**24**
Amplitude Modulation Circutis: AM Transmitters , AM Receivers	**18**
Frequency Modulation Circutis: FM Transmitters , FM Receivers, Pll Circuits	**18**
Television	**12**
Digital Modulation Circuits	**15**
Total	**90**

Text book:
1: "Basic Electronic Communication" By R. BLAKE
2: " Electronic Communications By J. S. ROBERTS
3: " Electronic Communication System" By Delmar Thomson Learning

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Class	**Third**			**Theory :**	**2 Hrs/wk**
Subject	**Digital Communication**			**Tutorial**	**1 Hrs/wk**
Code	**CE3303**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Introduction : Sampling Theory	**4**
Pulse Modulation : PAM، PWM، PPM، TDM	**10**
Pulse Code Modulation (PCM) : Delta Modulation ، compression and expansion techniques ، Error correction and detection ،PCM -TDM	**12**
Inter Symbol Interference and Shaping	**6**
Power Spectral Density of the Base Band Signal	**6**
Matched Filters	**6**
Information Theory :	**10**
Digital Modulation Techniques : Generation and detection circuits ، bandwidth calculation of the : ASK، FSK، PSK، QPSK، DPSK ، DQPSK ، MSK ، GMSK ، M-ASK ، M-FSK ،APK	**12**
Probability of Error and Noise Probability Of Error and channel efficiency of the (ASK ، FSK ، PSK ، DPSK ، QPSK ، DQPSK ، MSK ، GMSK ، APK)	**18**
Comparison Between the Digital Modulation Techniques	**6**
Information Theory: Short overview about (source coding, encryption and channel coding)	**2**
Fundamentals: **Discrete probability theory**: (random variable, probability mass function, joint probability mass function, conditional probability mass function, statistically independence, expected value (mean), variance, sample mean and Bay's rule)	**6**
Shannon's Information Measure: (information, mutual information, entropy, conditional entropy, chain rule for entropy and binary entropy function)	**6**
Source coding: (prefix free source coding, average code word length optimal algorithms for lossless source coding (Huffman algorithm and Lempel-ziv algorithm))	**6**

Article		Hrs
Rate Distortion		**4**
Channel Capacity		**6**
	Total	**120**

Text book:
1: "Introduction to Communication Systems" 1992 By F.Stremler "
2: "Digital and analog communication" 2001By L.W .Couch (sixth edition)

Ninevah University
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Class	Third			Theory :	2 Hrs/wk
Subject	Microprocessors			Tutorial	1 Hrs/wk
Code	CE3304	Unit	4	Practical	Hrs/wk

Article	Hrs
Introduction to 16bit Microprocessor: 8086 /8088 Architecture , Machine language, instruction , Internal execution and timing .	**6**
8086/8088 Family Assembly Language Programming: Data Transfer instructions ;Arithmetic instructions, logical, Shift and rotate instructions ; Branch instructions ; Loop instruction; NOP ; HLT and flag manipulation instructions; Assembler directives.	**12**
8086 System Connections and Timing : 8086 Hardware overview ; Basic Signal flow on 8086 buses ;Analyzing a minimum mode system; 8086 addressing and address decoding ; 8086 timing parameter .	**12**
Interrupts and Interrupt Service Procedure : 8086 interrupts and interrupt response ; 8086 interrupt types ; Hardware and software consideration for using interrupt .	**12**
I/O Programming : Fundamentals I/O consideration ;Programmed and interrupt I/O ; Block transfers and DMA ,I/O design example .	**12**
Interfacing : Programmable Parallel ports and handshake input/ output ; Interfacing microprocessors to keyboard and display ; D/A converter operation ; Interfacing and applications ;A/D converter ; Specifications and interfacing ; Serial communication interfaces .	**12**
Parallel I/O and Interfacing Application : Basic interfacing concepts 8255 Program Peripheral Interface ; Interfacing displays ; Keyboards;, 8279 Programmable keyboard interface;, interfacing memory ; Memory ; Mapped I/O .	**12**
General Purpose Programmable Peripheral Devices: 8253 Programmable Timer 8257 controller , 8259 interrupt controller .	**12**
Total	**90**

Text book:
1: "The Intel Microprocessor" By BARRY B. BREY,
2: "The 8088 & 8086 mp`s programming , interfacing S/W, H/W &applications", Prentice Hall, 2003 By W. A. Triebel & A. Singh

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Class	**Third**			**Theory :**	**2 Hrs/wk**
Subject	**Digital Signal Processing**			**Tutorial**	**1 Hrs/wk**
Code	**CE3201**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Review of Discrete Signals and Systems	**6**
Discrete Fourier Series: Spectra of periodic digital signals، Properties of series.	**9**
Dicsrete Fourier Transform: Properties، Frequency response of LTI systems.	**9**
Convolution and Correlation	**6**
DISCRETE AND FAST FOURIER TRANSFORM	**9**
Z- Transform: Review، Z-plane poles and zeros.	**6**
Framework for Digital Filter Design	**6**
Finite Impulse Response Digital Filter Design: window method، frequency sampling method، realization of FIR.	**12**
Infinite Impulse Response Digital Filter Design: Pole-zero method، Bilinear Z-transform، Realization of IIR.	**12**
Applications of Filter Banks in Audio & Image Processing	**9**
Noise Calculation	**6**
Total	**90**

Text book:
1: " Digital Signal Processing", By Emmanuel and Barrie
2: "Digital Signal Processing with Computer Applications", John Wiley & Sons , 1997 By PAUL A. LYNN

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Class	**Third**			**Theory :**	**2 Hrs/wk**
Subject	**Electronic Instrumentation**			**Tutorial**	**1 Hrs/wk**
Code	**CE3205**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs

Instrumintation Errors ، Noise	**4**
Transducers: Resistive، Capacitive، Inductive. Active Transducers.	**6**
Signal Conditioning: Input signal modification، scaling of measuring variables، delay lines، noise، signal averaging، interference، grounding، shielding، signal filtering، signal correlation، current-mode amplifier.	**6**
Signal Conversion: Conversion by transducer bridge، electronic multipliers، signal generator، a.c to d.c signal conversion، logic elements، sample & hold، A/D and D/A signal conversion، isolation amplifier.	**6**
Instrumentation Amplifier: Circuit design، characteristics، CMMR .	**6**
Analog Electronic Instruments: Analog (voltmeter، multi-meter، vector impedance meter ، frequency meter، CRT ، distortion analyzer، spectrum analyzer، Network Analyzer.	**12**
Digital Instruments: Digital indicator، voltmeter (dual slop، multi-slop، successive approximation، and voltage to frequency converter، ammeters، ohmmeters، multi-meters، counters (frequency، frequency ratio meter، time-interval meter، energy meter)، digital multiplexers، microprocessor-based meters	**12**
Interface Buses: Parallel port، RS-232، GPIB.	**8**
Total	**60**

Text book:
1: "Electronic Instrumentation and Measurement Techniques" ByWillliam David Cooper and Albert D. Helfrick.
2: Principles of Measurement systems By John P. Bentley
3: Electrical and Electronic Measurement By Ahmed A.Montaser and Karam A. sharshar
4: Electrical Measurment، signal processing and display By J.Webster

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Class	**Third**			**Theory :**	**3 Hrs/wk**
Subject	**Control Engineering**			**Tutorial**	**1 Hrs/wk**
Code	**CE3306**	**Unit**	**6**	**Practical**	**Hrs/wk**

Article	Hrs
Introduction and Basic Definition	**2**
Closed Loop and Open Loop Control Systes	**4**
Transfer Fonction: Electrcal System; Mechanical System; Servo System.	**4**
Block Diagram: Block Diagram Reductioin Algebra .	**4**
Signal Flow Graph: Mason Gain Rule.	**4**
State Variable Analyses: State Equation; Solution Of State Equation; State Diagram; Eigen Values; Eigen Vectors.	**6**
Time Domain Response: Typical Test Signals &Types Of The System; Steady State Error Due To Step, Ramp And Parabolic Input; Transient Response Of 2nd Order System .	**12**
Stability of Control System: Routh-Hurwtiz Criterion, Root Locus Analysis: Root Locus Plot; General Rules of Constructing Root Loci; Root Locus With Matlab; Root Locus Analysis Of Control System.	**4**
Frequency Response: Introduction; Plolar Plots; Nyquist Stability Criterion; Relative Stability; Gain margin; Phase Margin; Ploting Nyquist Plot With Matlab.	**12**
Bode Diagrams: Ploting Bode Diagram With Matlab; Log-Magnitude Verses Phase Plots; Closed Loop Frequency Respose; M M &N Circles; Nichcls Chart.	**12**
Control System Design By Frequency Response: Lead Compensation; Lag Compensation; Leatlag Compensation. ,	**12**
Design Of A PID Controller Using Root Locus Techniques: PID Design By Matlab.	**8**

Article	Hrs
Design of Control System In State Space: Observnabitity Of Control System ;Pole Placement ;State Feed Back Design ; Control Ability Of Control System.	**8**
Digital Contralsystem : Z- Trans Form & Inrevse Z-Trans From; Solving Of Difference Equation By Z- Trans	**12**

Form; State Space Representation Of Disecrete-Time Systems;Root Lous In Digital System; Stability Test For Digital Control System.		
Introduction To Fuzzy Control and Fuzzy Logic Controller		**4**
	Total	**120**

Text book:
1: "MODERN CONTROL SYSTEM" By OGATA 2001
2: "AUTOMATIC CONTROL SYSTEM" By B. KUO 2001

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Class	**Third**			**Theory :**	**Hrs/wk**
Subject	**Laboratory**			**Tutorial**	**Hrs/wk**
Code	**CE3307**	**Unit**	**4**	**Practical**	**6 Hrs/wk**

Article	Hrs
The principal objective is to ensure that students have a good quality capstone design & experience to integrate concepts from a range of classes in the core. The students are to apply modern engineering practices and techniques. Each student should submit a written technical report for each experiment.	
Total	

Text book:
1:
2:
3:

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Class	**Fourth**			**Theory :**	**2 Hrs/wk**
Subject	**Communication Systems**			**Tutorial**	**1 Hrs/wk**
Code	**CE4301**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Telephone and Switching System:	**35**

1. Introduction to electrical communication، study of natural of sound، sound intensity level, The human voice and auditory systems properties. 2. Subscriber set : Carbon microphone، Electromagnetic Loudspeaker، ringing unit، dialing unit، DTMF، pulse tone. 3. Telephony network : primary network، Distribution box unit (DBU)، secondary network, Cabinets، zero room، manhole room، Main distribution frame. 4. Telephony Exchange : type of exchangers، construction of exchanger، Digital subscriber card، Digital switching unit ، framing in telephony system. 5. Signaling in telephony systems، numbering mode in telephony system. **6.** Traffic theory in telephony system.	
Mobile Communication Systems: 1. Overview of mobile communication Technologies، Cellular communication concepts, Mobile generation systems، properties of GSM system، construction of the GSM system. 2. Mobile subscriber (MS) construction، signal flow in the MS، channel coding. 3. Air link between the MS and the base station، physical channel، logical channel. 4. Base station (BSS) construction، base station control (BSC)، base transceiver station (BTS)، antennas type in the base station. 5. Mobile Switching center System (MSC)، HLR، VLR، EIR. AUC، OMC، EC. **6.** Battery life، multi path effect and fading effect، mobility of (authentication، registration، Hand over، frequency hoping).	**35**
Radar Systems: Introduction to radar system، Radar types (passive، active، semi active)، Radar equation، Antenna patterns، Radar cross section، Detection probability and S/N، Pulsed radars، CW radars، MTI systems، Radar applications.	**20**
Total	**90**

Text book:
1: Digital Telephony ” 3ed Edition By: John C.Bellany.
2: ” Communication systems for mobile information society ” By: Martin Sauter.
3: ”Radar system Design and analysis” By: S.A.Hovanessian
4: "Understanding Telephone Electronics" By: STEPHEN 1. BICELOW

Ninevah University
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Communication Engineering Department

Class	**Fourth**			**Theory :**	**3 Hrs/wk**
Subject	**Antennas and Propagation**			**Tutorial**	**1 Hrs/wk**
Code	**CE4302**	**Unit**	**6**	**Practical**	**Hrs/wk**

Article	**Hrs**

Introduction to Antennas : Wave Equations ، Vector Potential A ، Vector Potential F	**6**
Radiation Principles :- Current Element، Radiation Pattern، Radiation Resistance، Directive Gain، Impedance، Polarization	**8**
Simple Radiating Systems: Short Dipole، Dipoles، Monopoles ، Small Loops	**8**
Wire Antennas	**8**
Array Antennas	**12**
Broadband Antennas	**8**
Aperture Antennas: Horn Antenna، Reflector Antenna	**12**
Microstrip Antennas	**6**
Propagation Principles	**8**
Free-Space Propagation	**8**
Fading، Polarization، Reflection، Refraction، Diffraction	**8**
Tropospheric Propagation	**8**
Ionospheric Propagation	**8**
Propagation By Diffraction	**8**
Troposcatter	**4**
Total	**90**

Text book:
1: "Antennas and Radiowave Propagation" By R.E.COLLIN
2: "Antenna theory"، Wiley By C.A.Balanis ، 2005

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Class	**Fourth**			**Theory :**	**2 Hrs/wk**
Subject	**Secure Communication**			**Tutorial**	**Hrs/wk**
Code	**CE4303**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs

Cryptography Security Threats، Attacks And Services The Code Systems Classical Cryptography:- Transposition Techniques، Substitution Techniques Confusion And Diffusion Conventional Cryptography And Des Modern Conventional Cryptography:- Triple Des، Advanced Enc. Standard، Blowfish Cipher Modes Cryptanalysis Stream Cipher And Pn Sequence Generators Public Key Cryptosystem And Rsa Authentication Techniques And Protocols Digital Signatures Techniques And Hash Functions	**30**
Spread Spectrum Spread Spectrum Techniques:- Direct Sequence، Frequency Hop، And Time Hop Introduction To Spread Spectrum Applications Spreading (Pseudo-Noise) Sequences Communication Over Fading Channels Pn Code Acquisition And Tracking Code Division Multiple Access (Cdma) Multiuser Detection Techniques Probability Of Intercept	**30**
Total	**60**

Text book:
1: "Digital Communication and Spread Spectrum Systems"**By Rodger E.Ziemer**
2: "Computer Networks"، **By A.Tanenbaum**، 2003
3: " Viterbi، CDMA principles of spread spectrum communication"، 1995

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Class	**Fourth**			**Theory :**	**2 Hrs/wk**
Subject	**Satellite Communication**			**Tutorial**	**1 Hrs/wk**
Code	**CE4304**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	**Hrs**

Introduction .	**3**
Frequency Allocation For Satellite Services.	**6**
Satellite Orbits:- Kippler's Laws; Geostationary Orbits.	**6**
Look Angles.	**3**
Satellite Up-Link & Down –Link Models .	**6**
Satellie Transponder Model .	**6**
Radio Wave Propagation And Polarization .	**6**
Antennas .	**6**
Transmission Losses.	**6**
Up-Link And Down-Link Equations.	**6**
Link Power Budgets.	**6**
System Noise And Carrier-To-Noise Ratio.	**6**
Receive-Only Home Tv-System (Rohtv)., Transmit-Receive Earth Stations.	**6**
Satellite Access Techniques:- (Fdma); (Tdma); (Sdma); (Cdma).	**6**
Reassignment And Demand Assignment .	**6**
Global Positioning System (Gps)	**6**
Total	**90**

Text book:
1: "**Satellite Communication** "By J. Rohody

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Class	**Fourth**			**Theory :**	**2 Hrs/wk**
Subject	**Optical Communication**			**Tutorial**	**Hrs/wk**
Code	**CE4305**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Review of Optics: Reflection and refraction of plane waves; Fresnel's formulas، Interference and interferometers، Diffraction، Optical coherence، Polarization of light، Data bus topology، ring، star، T، Fiber optic FDDI	4
CharacteristicsoOf Optical Fibers:- Wave propagation in multimode and single-mode optical fibers Coupling into and out of fibers، Attenuation، Group-velocity dispersion Polarization-mode dispersion	12
Review Of Digital Modulation In Optical Communication Systems:- Bit signaling and bit-group signaling methods، Bit error rate and bit-group error rate Time-division multiplexing، Frequency-division multiplexing	8
Optical Sources And Transmitters :- Light-emitting diodes، Semiconductor lasers، Edge-emitting lasers، Vertical-cavity surface-emitting lasers، Optical transmitters	6
Optical Detectors And Receivers:- Photodiodes، Phototransistors، Optical receivers	6
Noise and Detection:	6
Dispersion In Optical Communication Systems:- Dispersion in single-mode and multimode fibers Dispersion-induced pulse broadening in single-mode fiber System implications and real-life examples	6
Optical Link Design:- Power and noise budget ، Jitter and risetime budgets	6
Wavelength Division Multiplexers and Demultiplexers	6
Total	60

Text book:
1: "Fiber-Optic communication systems"، Wiley By G.P. Agrawal،
2: "Fiber optic communication "By Harold B. Killen، college of Technology، University of Hauston

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Class	**Fourth**			**Theory :**	**2 Hrs/wk**
Subject	**Data Transmission & Computer Networks**			**Tutorial**	**1 Hrs/wk**
Code	**CE4305**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Introduction and Definitions:	3

Data Communication، Networks، Protocols، Standards، and Standard organizations.	
BASIC CONCEPTS:- Line configuration، Topology، Categories of networks.	**6**
Transmission Media: Electromagnetic spectrum., Guided media: Unshielded Twisted Pair (UTP) Cable., Shielded Twisted Pair (STP) Cable., Coaxial Cable., Optical Fiber., Unguided media: Radio Transmission., Microwave Transmission., Satellite Microwave.	**9**
Interfaces and Modems: Data transmission: parallel، serial، synchronous and asynchronous., DTE-DCE interface and standards., Modems.	**6**
The OSI and TCP/IP Models	**6**
Networking and Internetworking Devices: Networking devices: NICs، Hubs، Repeaters، Bridges and Switches., Internetworking devices: Router and Gateways.	**6**
Data Link Control: Link Discipline، Flow control، Error control.	**6**
Data Link Protocols: Asynchronous protocols، Synchronous protocols.	**3**
Local area Network (LAN): Ethernet , Token Bus, project 802, Token Ring, FDDI.	**12**
TCP/IP Model and Protocols	**9**
Wireless LAN (WLAN): Introduction and history of (WLANs)، Standardization and frequency bands، IEEE 802.11 standard، WIFI، WIMAX، Bluetooth.	**9**
Wide Area Network (WAN)	**6**
Wireless WAN	**6**
Internet Working and Internet	**3**
Total	**90**

Text book:
1: "Introduction to Data Comm. And Networking"، By Pehrouz Forouzan.
2: "Computer Networks and Internets"، Douglas By E. Comer (4th edition)

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Class	**Fourth**			**Theory :**	**1 Hrs/wk**
Subject	**Engineering Project**			**Tutorial**	**Hrs/wk**
Code	**CE4201**	**Unit**	**4**	**Practical**	**3 Hrs/wk**

Article	**Hrs**

Collaborative team work of the nature in a research environment is expected، including extensive interaction with other students. Each syudent should submit a written technical report and should attend the final oral examination . The students apply verbal written and oral technical skills to document the design process .		
	Total	**30**

Text book:
1: "Fiber-Optic communication systems"، Wiley By G.P. Agrawal،
2: "Fiber optic communication "By Harold B. Killen، college of Technology، University of Hauston

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Class	**Fourth**			**Theory :**	**Hrs/wk**
Subject	**Laboratory**			**Tutorial**	**Hrs/wk**
Code	**CE4307**	**Unit**	**4**	**Practical**	**6 Hrs/wk**

Article	Hrs
The principal objective is to ensure that students have a good quality capstone design & experience to integrate concepts from a range of classes in the core. The students are to apply modern engineering practices and techniques. Each student should submit a written technical report for each experiment.	
Total	**180**

Text book:
1:
2:
3: