



43. Course Specification of Electronic communications

I. Course Identification and General Information:					
1.	Course Title:	Electronic communications			
2.	Course Code & Number:	CNE325			
3.	Credit hours:	C.H			Total
		Th.	Tu.	Pr.	
		2	2	2	-
4.	Study level/ semester at which this course is offered:	Fourth Year/ Second Semester			
5.	Pre –requisite (if any):	Communications Principles (CNE221)			
6.	Co –requisite (if any):	None			
7.	Program (s) in which the course is offered:	Bachelor of Communication Engineering and Network			
8.	Language of teaching the course:	English			
9.	Location of teaching the course:	Faculty of Engineering - Sana'a University			
10.	Prepared By:	Asst. Prof. Dr. Mohamed Ali Hankal			
11.	Date of Approval	2020			

II. Course Description:
The objective of this course is to introduce the electronic devices used in communications systems as basic analog transmitter and receiver, and also analysis the electrical circuits that are included in the transmitters and receivers like oscillators, modulator, frequency synthesizers, signal detector, mixers and tuners.

	III. Course Intended learning outcomes (CILOs) of the course	Reference PILOs
a1	Define the principles of the electronic devices used in communication systems like the transmitter and receiver	A1, A2
a2	Demonstrate the electrical circuits that are included in the transmitters and receivers for example oscillators, frequency synthesizers and mixers	A1, A2
b1	Analyze the electrical circuits in the transmitters and receivers	B3
b2	Compare between the AM, FM and PM Modulators	B3

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



c1	Use different types of frequency Synthesizers in designing transmitters	C2
c2	Design analog transmitters and receivers	C2
d1	Collaborate effectively within a teams	D1
d2	Effectively manage tasks, time and resources	D3

(A) Alignment Course Intended Learning outcomes (CILOs) in Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Define the principles of the electronic devices used in communication systems like the transmitter and receiver	<ul style="list-style-type: none"> ▪ Lectures ▪ Discussion 	<ul style="list-style-type: none"> ▪ Examinations ▪ Assignments
a2- Demonstrate the electrical circuits that are included in the transmitters and receivers for example oscillators, frequency synthesizers and mixers	<ul style="list-style-type: none"> ▪ Lectures ▪ Discussion 	<ul style="list-style-type: none"> ▪ Examinations ▪ Assignments

(B) Alignment Course Intended Learning outcomes (CILOs) in Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Analyze the electrical circuits in the transmitters and receivers	<ul style="list-style-type: none"> ▪ Discussion ▪ Demonstration ▪ Brain storm ▪ Problem solving 	<ul style="list-style-type: none"> ▪ Essay test ▪ Assignments ▪ Laboratory Performance
b2- Compare between the FM and PM Modulators	<ul style="list-style-type: none"> ▪ discussion ▪ Demonstration ▪ Brain storm ▪ Problem solving 	<ul style="list-style-type: none"> ▪ Essay test ▪ Assignments ▪ Laboratory Performance

(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Use different types of frequency Synthesizers in designing transmitters	<ul style="list-style-type: none"> ▪ Self and independent learning 	<ul style="list-style-type: none"> ▪ Laboratory reports ▪ Practical exams

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



	<ul style="list-style-type: none"> ▪ Tutorials & practical classes, ▪ Computer based teaching 	
c2- Design analog transmitters and receivers	<ul style="list-style-type: none"> ▪ Self and independent learning ▪ Tutorials & practical classes, ▪ Computer based teaching 	<ul style="list-style-type: none"> ▪ Laboratory reports ▪ Practical exams

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Collaborate effectively within a multidisciplinary teams	<ul style="list-style-type: none"> ▪ Small group working ▪ Student-led Seminars ▪ Practical Work 	<ul style="list-style-type: none"> ▪ Laboratory reports, ▪ Assignments, ▪ Lab. Exam.
d2- Effectively manage tasks, time and resources	<ul style="list-style-type: none"> ▪ Small group working ▪ Student-led Seminars ▪ Practical Work 	<ul style="list-style-type: none"> ▪ Laboratory reports, ▪ Assignments, Quizzes, ▪ Lab. Exam.

V. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes
1.	Introduction to Electronic Communications	<ul style="list-style-type: none"> ▪ Power Measurements ▪ Modulation and Demodulation ▪ The Electromagnetic Frequency Spectrum ▪ Bandwidth and Information Capacity ▪ Noise Analysis 	1	2	a1, a2, b1
2.	Signal Analysis and Mixing	<ul style="list-style-type: none"> ▪ Signal Analysis ▪ Complex Waves 	1	2	

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



		<ul style="list-style-type: none"> ▪ Fourier Series for Rectangular Waveform ▪ Linear Summing ▪ Nonlinear Mixing 			a1, a2, b1, d1, d2
3.	Oscillators, Phase-Locked Loops and Frequency Synthesizers	<ul style="list-style-type: none"> ▪ Feedback Oscillators ▪ Frequency Stability ▪ Crystal Oscillators ▪ Phase-locked Loops ▪ PLL Capture and Lock Rangs ▪ Phase Comparator ▪ PLL Loop Gain ▪ PLL Closed-loop Frequency Response ▪ Frequency Synthesizers 	2	4	a1, a2, b1, c1, d1, d2
4.	Amplitude Modulation Transmission	<ul style="list-style-type: none"> ▪ Principles of Amplitude Modulation ▪ AM Modulating Circuits ▪ AM Transmitters ▪ Carrier Shift ▪ AM Envelopes Produced by Complex Nonsinusoidal Signals ▪ Quadrature Amplitude Modulation 	2	4	a1, a2, b1, b2, c2, d1, d2
5.	Amplitude Modulation Reception	<ul style="list-style-type: none"> ▪ Receiver Parameters ▪ AM Receivers ▪ AM Receiver Circuits ▪ Net Receiver Gain 	1	2	a1, a2, b1, b2, c2, d1, d2
6.	Med-term Exam	<ul style="list-style-type: none"> ▪ The previous topics 	1	2	a1, a2, b1, b2, c1, c2, d2
7.	Single – Sideband Communications Systems	<ul style="list-style-type: none"> ▪ Single-Sideband Systems 	2	4	a1, a2, b1, b2, d1, d2

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



		<ul style="list-style-type: none"> ▪ Comparison of Single-Sideband Transmission to Conventional AM ▪ Mathematical Analysis of Suppressed-Carrier AM ▪ Single-Sideband Generation ▪ Single-Sideband Transmitters ▪ Single-Sideband Receivers ▪ Single-Sideband Suppressed Carrier and Frequency-Division Multiplexing ▪ Double-Sideband Suppressed Carrier and Quadrature Multiplexing 			
8.	Angle Modulation Transmission	<ul style="list-style-type: none"> ▪ Angle Modulation ▪ Mathematical Analysis ▪ Deviation Sensitivity ▪ Frequency Deviation and Percent Modulation ▪ Frequency Analysis of Angle Modulated Waves ▪ Bandwidth Requirements of Angle-Modulated Waves 	1	2	a1, a2, b1, b2, d1, d2
9.	Angle Modulation Transmission (continued)	<ul style="list-style-type: none"> ▪ Deviation Ratio ▪ Average Power of An Angle-Modulated Wave ▪ Noise and Angle Modulation ▪ Frequency and Angle Modulators ▪ Direct FM Transmitters ▪ Indirect FM Transmitters 	2	4	a1, a2, b1, b2, c2, d1, d2

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



10.	Angle Modulation Reception and FM Stereo	<ul style="list-style-type: none"> ▪ FM Receivers ▪ FM Demodulators ▪ Quadrature FM Demodulators ▪ FM Noise Suppression ▪ FM Stereo Broadcasting ▪ Two-Way FM Radio Communications 	2	4	a1, a2, b1, b2, c2, d1, d2
11.	Final Exam	All Topics	1	2	a1, a2, b1, b2, c1, c2, d2
Number of Weeks /and Units Per Semester			16	32	

B - Tutorial Aspect:				
Order	Tutorial Skills List	Number of Weeks	Contact Hours	Learning Outcomes
1.	Introduction to Electronic Communications <ul style="list-style-type: none"> • Power Measurements • Bandwidth and Information Capacity • Noise Analysis 	2	4	a1, a2, b1
2.	Signal Analysis and Mixing <ul style="list-style-type: none"> • Complex Waves • Fourier Series for Rectangular Waveform 	2	4	a1, a2, b1, d1, d2
3.	Oscillators, Phase-Locked Loops and Frequency Synthesizers <ul style="list-style-type: none"> • Feedback Oscillators • Crystal Oscillators • Phase-locked Loops • PLL Capture and Lock Rangs • Phase Comparator • PLL Loop Gain • PLL Closed-loop Frequency Response 	2	4	a1, a2, b1, c1, d1, d2
4.	Amplitude Modulation Transmission <ul style="list-style-type: none"> • Modulation Coefficient • Bandwidth of AM modulators • AM Envelopes 	2	4	a1, a2, b1, b2, c2, d1, d2

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



	<ul style="list-style-type: none"> Power of AM signal 			
5.	Amplitude Modulation Reception <ul style="list-style-type: none"> IF Bandwidth Improvement in the noise Image Frequency Net Receiver Gain Output Frequency Spectrum 	2	4	a1, a2, b1, b2, c2, d1, d2
6.	Angle Modulation Transmission <ul style="list-style-type: none"> Deviation Sensitivity Frequency Deviation and Percent Modulation Average Power of An Angle-Modulated Wave Nosie and Angle Modulation 	2	4	a1, a2, b1, b2, c2, d1, d2
7.	Angle Modulation Reception and FM Stereo <ul style="list-style-type: none"> Output Voltage Pre- and Postdeceuiou S/N Ratios Carrier Power Image Frequency 	2	4	a1, a2, b1, b2, c2, d1, d2
Number of Weeks /and Units Per Semester		14	28	

Head of
 Department
 Asst. Prof. Dr.
 Adel Ahmed Al-
 Shakiri

Quality Assurance
 Unit
 Assoc. Prof. Dr.
 Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed
 AL-Bukhaiti

Academic
 Development
 Center & Quality
 Assurance
 Assoc. Prof. Dr.
 Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed
 Abbas



C - Practical Aspect:				
Order	Tasks/ Experiments	Number of Weeks	Contact hours	Learning Outcomes
1.	Introduction to electronic circuits	1	2	a1, a2, b1, d1, d2
2.	Series and Parallel tuned circuits	2	4	a1, a2, b1, d1, d2
3.	LC oscillators	2	4	a1, a2, b1, c1, d1, d2
4.	AM modulation	3	6	a1, a2, b1, b2, c2, d1, d2
5.	AM detection	2	4	a1, a2, b1, b2, c2, d1, d2
6.	FM modulation	2	4	a1, a2, b1, b2, c2, d1, d2
7.	FM detection	1	2	a1, a2, b1, b2, c2, d1, d2
8.	Practical Exam	1	2	a1, a2, b1, b2, c1, c2
Number of Weeks /and Units Per Semester		14	28	

VI. Teaching strategies of the course:
<ul style="list-style-type: none"> ▪ Lectures ▪ Discussion ▪ Problem solving ▪ Self and independent learning ▪ Tutorials & practical classes, ▪ Brain storm ▪ Demonstration

Head of
 Department
 Asst. Prof. Dr.
 Adel Ahmed Al-
 Shakiri

Quality Assurance
 Unit
 Assoc. Prof. Dr.
 Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed
 AL-Bukhaiti

Academic
 Development
 Center & Quality
 Assurance
 Assoc. Prof. Dr.
 Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed
 Abbas



VII. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Feedback Oscillators	a1, a2, b1, c1, d1, d2	4 th	2
2.	Phase-locked Loops	a1, a2, b1, c1, d1, d2	7 th	2
3.	Frequency Synthesizers	a1, a2, b1, c1, d1, d2	10 th	2
4.	AM Transmitters and Receivers	a1, a2, b1, b2, c2, d1, d2	12 th	2
5.	FM Transmitters and Receivers	a1, a2, b1, b2, c2, d1, d2	15 th	2
Total				10

VIII. Schedule of Assessment Tasks for Students During the Semester:					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Quizzes	5 th , 7 th , 11 th , 14 th	10	5%	a1, a2, b1, b2, c1, c2
2.	Assignments	4 th , 7 th , 10 th , 12 th , 15 th	20	10%	a1, a2, b1, b2, c2, d1, d2
3.	Midterm Exam	8 th	30	15%	a1, a2, b1, b2, c2, d2
4.	Practical Exam	15 th	20	10%	a1, a2, b1, b2, c2, d2
5.	Final Exam theory	16 th	120	60%	a1, a2, b1, b2, c2, d2
Total			200	100%	

IX. Learning Resources:	
<ul style="list-style-type: none"> • Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher). 	
1- Required Textbook(s) (maximum two).	
	1. Wayne Tomasi (2012), Electronic Communications Systems, 5 th Edition, U.S.A. Pearson. 2. Jeffrey S. Beasley (2014), Electronic Communications: A Systems Approach. 2 nd Edition. U.S.A. Pearson.
2- Essential References.	
	1- Louis E. Frenzel (2016), Electronic Communications Systems, 4 th Edition, U.S.A. McGraw Hill.

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



	2- George Kennedy, Bernard Davis (1993), Electronic Communication Systems. 4 th Edition, India. Tata McGraw Hill
3- Electronic Materials and Web Sites etc.	
	1-www.ieee.com 2- http://link.springer.com/ 3- http://www.sciencedirect.com/

IV. Course Policies:	
1.	Class Attendance: - The students should have more than 75% of attendance according to rules and regulations of the faculty.
2.	Tardy: - The students should respect the timing of attending the lectures. They should attend within 15 minutes from starting of the lecture.
3.	Exam Attendance/Punctuality: - The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for mid-term exam and final exam.
4.	Assignments & Projects: - The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5.	Cheating: - If any cheating occurred during the examination, the student is not allowed to continue and he has to face the examination committee for enquiries .
6.	Plagiarism: - If one student attends the exam on another behalf; he will be dismissed from the faculty according to the policy, rules and regulations of the university.
7.	Other policies: - All the teaching materials should be kept out the examination hall and mobile phones are not allowed. - Mutual respect should be maintained between the student and his teacher and also among students. Failing in keeping this respect is subject to the policy, rules and regulations of the university.

Head of
 Department
 Asst. Prof. Dr.
 Adel Ahmed Al-
 Shakiri

Quality Assurance
 Unit
 Assoc. Prof. Dr.
 Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed
 AL-Bukhaiti

Academic
 Development
 Center & Quality
 Assurance
 Assoc. Prof. Dr.
 Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed
 Abbas



<p>Reviewed By</p>	<p><u>Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat</u> <u>President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi</u> <u>Name of Reviewer from the Department: Asst. Prof. Dr. Mohammed Al-Suraby</u></p>
	<p><u>Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa</u> <u>Assoc. Prof. Dr. Ahmed Mujahed</u> <u>Asst. Prof. Dr. Munasar Alsubri</u></p>

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



Template for Course Plan of Electronic Communications

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member	Asst. Prof. Dr. Mohamed Ali Hankal	Office Hours					
Location & Telephone No.	Engineering Faculty	SAT	SUN	MON	TUE	WED	THU
E-mail				8 - 12			

II. Course Identification and General Information:						
1.	Course Title:	Electronic communications				
2.	Course Code & Number:	CNE325				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	2	2	-	
4.	Study level/ semester at which this course is offered:	Fourth Year/ Second Semester				
5.	Pre –requisite (if any):	Communications Principles				
6.	Co –requisite (if any):	None				
7.	Program (s) in which the course is offered:	Bachelor of Communication Engineering and Networks				
8.	Language of teaching the course:	English				
9.	Location of teaching the course:	Faculty of Engineering - Sana'a University				
10.	Prepared By:	Asst. Prof. Dr. Mohamed Ali Hankal				
11.	Date of Approval	2020				

III. Course Description:
The objective of this course is to introduce the electronic devices used in communications systems as basic analog transmitter and receiver, and also analysis the electrical circuits that are included in the transmitters and receivers like oscillators, modulator, frequency synthesizers, signal detector, mixers and tuners.

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



IV. Intended learning outcomes (ILOs) of the course:	
<ul style="list-style-type: none"> Brief summary of the knowledge or skill the course is intended to develop: 	
<ol style="list-style-type: none"> Define the principles of the electronic devices used in communication systems like the transmitter and receiver Demonstrate the electrical circuits that are included in the transmitters and receivers for example oscillators, frequency synthesizers and mixers Analyze the electrical circuits in the transmitters and receivers Compare between the AM, FM and PM Modulators Use different types of frequency Synthesizers in designing transmitters Design analog transmitters and receivers Collaborate effectively within a team Effectively manage tasks, time and resources 	

V. Course Content:				
A – Theoretical Aspect:				
Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1.	Introduction to Electronic Communications	<ul style="list-style-type: none"> Power Measurements Modulation and Demodulation The Electromagnetic Frequency Spectrum Bandwidth and Information Capacity Noise Analysis 	1 st	2
2.	Signal Analysis and Mixing	<ul style="list-style-type: none"> Signal Analysis Complex Waves Fourier Series for Rectangular Waveform Linear Summing Nonlinear Mixing 	2 nd	2
3.	Oscillators, Phase-Locked Loops and Frequency Synthesizers	<ul style="list-style-type: none"> Feedback Oscillators Frequency Stability Crystal Oscillators 	3 rd , 4 th	4

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



		<ul style="list-style-type: none"> ▪ Phase-locked Loops ▪ PLL Capture and Lock Rangs ▪ Phase Comparator ▪ PLL Loop Gain ▪ PLL Closed-loop Frequency Response ▪ Frequency Synthesizers 		
4.	Amplitude Modulation Transmission	<ul style="list-style-type: none"> ▪ Principles of Amplitude Modulation ▪ AM Modulating Circuits ▪ AM Transmitters ▪ Carrier Shift ▪ AM Envelopes Produced by Complex Nonsinusoidal Signals ▪ Quadrature Amplitude Modulation 	5 th ,6 th	4
5.	Amplitude Modulation Reception	<ul style="list-style-type: none"> ▪ Receiver Parameters ▪ AM Receivers ▪ AM Receiver Circuits ▪ Net Receiver Gain 	7 th	2
6.	Midterm Exam		8 th	2
7.	Single – Sideband Communications Systems	<ul style="list-style-type: none"> ▪ Single-Sideband Systems ▪ Comparison of Single-Sideband Transmission to Conventional AM ▪ Mathematical Analysis of Suppressed-Carrier AM ▪ Single-Sideband Generation ▪ Single-Sideband Transmitters ▪ Single-Sideband Receivers 	9 th ,10 th	4

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



		<ul style="list-style-type: none"> ▪ Single-Sideband Suppressed Carrier and Frequency-Division Multiplexing ▪ Double-Sideband Suppressed Carrier and Quadrature Multiplexing 		
8.	Angle Modulation Transmission	<ul style="list-style-type: none"> ▪ Angle Modulation ▪ Mathematical Analysis ▪ Deviation Sensitivity ▪ Frequency Deviation and Percent Modulation ▪ Frequency Analysis of Angle Modulated Waves ▪ Bandwidth Requirements of Angle-Modulated Waves 	11 th	2
9.	Angle Modulation Transmission (continued)	<ul style="list-style-type: none"> ▪ Deviation Ratio ▪ Average Power of An Angle-Modulated Wave ▪ Noise and Angle Modulation ▪ Frequency and Angle Modulators ▪ Direct FM Transmitters ▪ Indirect FM Transmitters 	12 th ,13 th	4
10.	Angle Modulation Reception and FM Stereo	<ul style="list-style-type: none"> ▪ FM Receivers ▪ FM Demodulators ▪ Quadrature FM Demodulators ▪ FM Noise Suppression ▪ FM Stereo Broadcasting ▪ Two-Way FM Radio Communications 	14 th ,15 th	4
11.	Final Exam		16 th	2
Number of Weeks /and Units Per Semester			16	30

B - Tutorial Aspect:			
Order	Tutorial Skills List	Number of Weeks	Contact Hours

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



1.	Introduction to Electronic Communications <ul style="list-style-type: none"> • Power Measurements • Bandwidth and Information Capacity • Noise Analysis 	1 st , 2 nd	4
2.	Signal Analysis and Mixing <ul style="list-style-type: none"> • Complex Waves • Fourier Series for Rectangular Waveform 	3 rd , 4 th	4
3.	Oscillators, Phase-Locked Loops and Frequency Synthesizers <ul style="list-style-type: none"> • Feedback Oscillators • Crystal Oscillators • Phase-locked Loops • PLL Capture and Lock Rangs • Phase Comparator • PLL Loop Gain • PLL Closed-loop Frequency Response 	5 th , 6 th	4
4.	Amplitude Modulation Transmission <ul style="list-style-type: none"> • Modulation Coefficient • Bandwidth of AM modulators • AM Envelopes • Power of AM signal 	7 th , 8 th	4
5.	Amplitude Modulation Reception <ul style="list-style-type: none"> • IF Bandwidth • Improvement in the noise • Image Frequency • Net Receiver Gain • Output Frequency Spectrum 	9 th , 10 th	4
6.	Angle Modulation Transmission <ul style="list-style-type: none"> • Deviation Sensitivity • Frequency Deviation and Percent Modulation • Average Power of An Angle-Modulated Wave • Nositie and Angle Modulation 	11 th , 12 th	4

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



7.	Angle Modulation Reception and FM Stereo <ul style="list-style-type: none"> • Output Voltage • Pre- and Postdetection S/N Ratios • Carrier Power • Image Frequency 	13 th , 14 th	4
Number of Weeks /and Units Per Semester		14	28

C - Practical Aspect:			
Order	Tasks/ Experiments	Number of Weeks	Contact hours
1.	Introduction to electronic circuits	1 st	2
2.	Series and Parallel tuned circuits	2 nd , 3 rd	4
3.	LC oscillators	4 th , 5 th	4
4.	AM modulation	6 th , 7 th , 8 th	6
5.	AM detection	9 th , 10 th	4
6.	FM modulation	11 th , 12 th	4
7.	FM detection	13 th	2
8.	Practical Exam	14 th	2
Number of Weeks /and Units Per Semester		14	28

VI. Teaching strategies of the course:	
<ul style="list-style-type: none"> ▪ Lectures ▪ Discussion ▪ Problem solving ▪ Self and independent learning ▪ Tutorials & practical classes, ▪ Brain storm ▪ Demonstration 	

VII. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Feedback Oscillators	a1, a2, b1, c1, d1, d2	4 th	2

Head of
 Department
 Asst. Prof. Dr.
 Adel Ahmed Al-
 Shakiri

Quality Assurance
 Unit
 Assoc. Prof. Dr.
 Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed
 AL-Bukhaiti

Academic
 Development
 Center & Quality
 Assurance
 Assoc. Prof. Dr.
 Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed
 Abbas



2.	Phase-locked Loops	a1, a2, b1, c1, d1, d2	7 th	2
3.	Frequency Synthesizers	a1, a2, b1, c1, d1, d2	10 th	2
4.	AM Transmitters and Receivers	a1, a2, b1, b2, c2, d1, d2	12 th	2
5.	FM Transmitters and Receivers	a1, a2, b1, b2, c2, d1, d2	15 th	2
Total				10

VIII. Schedule of Assessment Tasks for Students During the Semester:				
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1.	Quizzes	5 th , 7 th , 11 th , 14 th	10	5%
2.	Assignments	4 th , 7 th , 10 th , 12 th , 15 th	20	10%
3.	Midterm Exam	8 th	30	15%
4.	Practical Exam	15 th	20	10%
5.	Final Exam theory	16 th	120	60%
Total			200	100%

IX. Learning Resources:	
<ul style="list-style-type: none"> • Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher). 	
1- Required Textbook(s) (maximum two).	
	1. Wayne Tomasi (2012), Electronic Communications Systems, 5 th Edition, U.S.A. Pearson. 2. Jeffrey S. Beasley (2014), Electronic Communications: A Systems Approach. 2nd Edition. U.S.A. Pearson.
2- Essential References.	
	1- Louis E. Frenzel (2016), Electronic Communications Systems, 4 th Edition, U.S.A. McGraw Hill. 2- George Kennedy, Bernard Davis (1993), Electronic Communication Systems. 4 th Edition, India. Tata McGraw Hill
3- Electronic Materials and Web Sites etc.	

Head of Department
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit
 Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed Abbas



1- www.ieee.com 2- http://link.springer.com/ 3- http://www.sciencedirect.com/

X. Course Policies:	
1.	Class Attendance: - The students should have more than 75% of attendance according to rules and regulations of the faculty.
2.	Tardy: - The students should respect the timing of attending the lectures. They should attend within 15 minutes from starting of the lecture.
3.	Exam Attendance/Punctuality: - The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for mid-term exam and final exam.
4.	Assignments & Projects: - The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5.	Cheating: - If any cheating occurred during the examination, the student is not allowed to continue and he has to face the examination committee for enquiries .
6.	Plagiarism: - If one student attends the exam on another behalf; he will be dismissed from the faculty according to the policy, rules and regulations of the university.
7.	Other policies: - All the teaching materials should be kept out the examination hall and mobile phones are not allowed. - Mutual respect should be maintained between the student and his teacher and also among students. Failing in keeping this respect is subject to the policy, rules and regulations of the university.

Head of
 Department
 Asst. Prof. Dr.
 Adel Ahmed Al-
 Shakiri

Quality Assurance
 Unit
 Assoc. Prof. Dr.
 Mohammad Algorafi

Dean of the Faculty
 Prof. Dr. Mohammed
 AL-Bukhaiti

Academic
 Development
 Center & Quality
 Assurance
 Assoc. Prof. Dr.
 Huda Al-Emad

Rector of Sana'a University
 Prof. Dr. Al-Qassim Mohammed
 Abbas

Sana'a University
Faculty of Engineering
Department: Electrical Engineering
Title of the Program: Communication Engineering and Networks



Head of
Department
Asst. Prof. Dr.
Adel Ahmed Al-
Shakiri

Quality Assurance
Unit
Assoc. Prof. Dr.
Mohammad Algorafi

Dean of the Faculty
Prof. Dr. Mohammed
AL-Bukhaiti

Academic
Development
Center & Quality
Assurance
Assoc. Prof. Dr.
Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed
Abbas

Sana'a University
Faculty of Engineering
Department: Electrical Engineering
Title of the Program: Communication Engineering and Networks



Head of
Department
Asst. Prof. Dr.
Adel Ahmed Al-
Shakiri

Quality Assurance
Unit
Assoc. Prof. Dr.
Mohammad Algorafi

Dean of the Faculty
Prof. Dr. Mohammed
AL-Bukhaiti

Academic
Development
Center & Quality
Assurance
Assoc. Prof. Dr.
Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed
Abbas