Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation

Academic Program and Course Description Guide for Department of Electronics and Communication Techniques

2025

Introduction:

The Department of Electronics and Communications Techniques was established in 1986-1987. It prepares and qualifies professionals with technical and technological expertise, enabling them to enter the job market and contribute efficiently to MAINTENANCE and development. This is achieved through the use of the latest curricula, electronic devices, and the adoption of cutting-edge ideas in designing and building COMMUNICATION systems. The department focuses on both the theoretical and practical aspects of electronic and communication systems and their technologies. Its mission is to equip students with the skills and knowledge required to become professionals in the fields of communication technology and electronic systems.

Academic Program Description Form

University Name: AL-Furat AL-Awsat Technical University

Faculty / Institute Name: Najaf Technical Institute

Scientific Department : Department of Electronics and Communications Techniques

Academic or Professional Program Name: Diploma in Electronics and Communications Techniques

Final Certificate Name: Diploma in Electronics and Communications Techniques

Academic System : Annual

Description Preparation Date: 2025

File Completion Date: 2 / 7 / 2025

Signature

Head of Department Name

Ahmed Fahim Ibrahim

Date : 2/7/2025

Signature

Scientific Associate Name

Salah Mahdi Saleh

Date: 8/7/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of Quality Assurance and University Performance Depatment

Abdul-Wahhab A. H. Shweliya

8.7.25

Approval of the Dean

1. Program Vision

The Technical Institute - Najaf aims through educational programs, to provide a technical educational system based on the requirements and needs of society and service facilities related to the specialty in a way that serves the required civil development.

2. Program Mission

Working to achieve the department's goals by providing an appropriate educational environment and preparing all the material and human requirements necessary to achieve this. And working to graduate groups capable of serving society by providing scientific, engineering and technical competence through technical education in accordance with internationally approved quality standards.

3. Program Objectives

1- Technical knowledge: Providing basic knowledge in the principles of electronic technologies in general and computer and communications technologies in particular, along with the knowledge necessary to support mathematics, communication principles, and the basics of electronic technology.

2- Technical skills: Developing the technical skills necessary to implement and design laboratory and field projects. Also developing the ability to formulate projects, solve problems,

and develop a practical plan to benefit from technical knowledge and diverse skills.

3- Communication skills: Developing the ability to organize and present information effectively, whether orally, in writing, or in graphs and statistics.

4- Preparing for the profession: Providing a broad appreciation of the problems that arise in professional practice.

4. **Program Accreditation**
N / A

5. **Other external influences**
N / A

6. Program Structure					
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Class**	**Credits**
Institution Requirements	4	10	8%	Baath Party Crimes	2
				Human Rights	4
				English I	2
				English II	2
College Requirements	5	30	24%	Engineering Drawing	6
				Computer Application I	6
				Computer Application II	6
				Mathematics	4
				Maintenance Workshop	8
Department Requirements	13	84	68%	Electric Circuits Analysis	8
				Electronics	8
				Digital Logic Design	8
				Workshops	8
				Occupational Safety	2
				Communications	8
				Communication Devices	8
				Electronic Circuits	8
				Laser Techniques	8
				Microwaves	8
				Computer Networks	3
				Programmable Logic Devices	3
				Project	4
Summer Training					
Other					

7. Program Description						
Year/ Level	Course Code	Course Name	Credit Hours			
			theoretical	practical	total	Type
First Academic Year		Electric Circuits Analysis	2	2	8	Basic
		Electronics	2	2	8	Basic
		Digital Logic Design	2	2	8	Basic
		Workshops		4	8	Basic
		Occupational Safety	2	–	2	Basic
		Computer Applications I	1	2	6	Assist.
		Mathematics	2	–	4	Assist.
		Engineering Drawing	1	2	6	Assist.
		English Language	2	–	4	General
		Human Rights	2	–	4	General

8. Program Description						
Year/ Level	Course Code	Course Name	Credit Hours			
			theoretical	practical	total	Type
Second Academic Year		Communications	2	2	8	Basic
		Communication Devices	2	2	8	Basic
		Electronc Circuits	2	2	8	Basic
		Laser Techniques	2	2	8	Basic
		Microwaves	2	2	8	Basic
		Computer Networks	1	2	6	Basic
		Programmable Logic Controllers	1	2	6	Basic
		Project	–	–	4	Basic
		Maintenance Workshop	–	4	8	Assist
		Computer Applications II	1	3	6	Assist
		English Language II	1	–	2	General
		Baath Party Crimes	2	–	4	General

8. Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	1- The ability to apply knowledge in mathematics, computers, and the basics of electronic technologies. 2- Knowledge of the basics of electrical and electronic circuits and methods of measurement and mathematical analysis. 3- Knowledge of the basics of communications and modern technologies in the field of communications and computer networks. 4- Knowledge of the foundations of occupational safety at work sites and the mechanisms for implementing them.
Skills	
Learning Outcomes 2	1- The ability to design and conduct experiments 2- The ability to operate and maintain devices and equipment. 3- The ability to design and analyze using design and simulation programs. 4- The ability to use modern technical methods, skills and tools necessary for technical work.
Ethics	
Learning Outcomes 3	1- Learn leadership and teamwork skills 2- Learn ethical professional behavior and

	adherence to laws and regulations. 3- Knowledge of instructions and regulations related to environmental preservation, climate preservation, and sustainable development. 4- Taking responsibility for the work assigned to him, adhering to the time specified for implementation, transparency and professionalism in the work.

9. Teaching and Learning Strategies
1- Lecture strategy.
2- Applied examples strategy.
3- Discussion strategy.
4- Practice strategy.

10. Evaluation methods
1- Written tests.
2- Laboratory practical tests.
3-Oral exams.
4- Weekly reports.
5- Extracurricular activities.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Assist, Prof. PhD		1			1	
Lecturer PhD	1	3			4	
Assist Lecturer		5			5	

Professional Development

Mentoring new faculty members

New lecturers are assigned practical subjects until they get adequate training, then they are assigned to teach theoretical subjects and have their performance evaluated by the department head, and the evaluation tools used to measure the level of student interaction, and the ability of conducting the study material.

Professional development of faculty members

1- Holding training courses and workshops in the field of teaching methods.
2- Holding scientific courses, seminars, and workshops in the field of scientific research and its mechanisms.
3- Holding training courses in the field of educational guidance.
4- Holding courses and workshops in the field of introducing laws and job regulations, as well as instructions, examination committees, and methods for evaluating students.
5- Activating the role of continuing education in the department and holding seminars, workshops and scientific courses in the field of specialization.

12. Acceptance Criterion
Central Admission

13. The most important sources of information about the program
1- Academic Course description guide issued by the Deans' Committee for Curriculum Development. 2- Guide to student affairs and central admission procedures. 3- University examination administration guide. 4- The strategic plan of the Najaf Technical Institute.

14. Program Development Plan
The objectives of the educational program are reviewed periodically, every three years, to develop them with developments taking place in the workplace. Samples of workplaces are visited by some teachers to observe developments and prepare the necessary recommendations for the department to review the educational objectives of the academic program and make the necessary changes accordingly. For the developments occurring and indicated in the study prepared by the coordination committee with employers, taking into account not to deviate from the vision of the Najaf Technical institute.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or Assist	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First Academic Year		Electric Circuits Analysis	B	*	*	*		*	*	*	*				
		Electronics	B	*	*	*		*		*	*				
		Digital Logic Design	B	*	*	*	*		*	*	*				
		Workshops	B		*		*	*	*	*	*	*		*	
		Occupational Safety	B				*					*	*	*	*
		Computer Applications I	A	*		*		*		*	*			*	
		Mathematics	A	*	*					*					*
		Engineering Drawing	A	*	*			*		*	*		*		*
		English Language	G				*						*	*	

		Human Rights	G				*					*	*	*	*
Second Academic Year		Communications	B	*	*	*	*	*	*	*	*			*	
		Communication Devices	B	*	*	*	*	*	*	*	*				*
		Electronc Circuits	B	*	*	*	*	*	*	*	*		*		
		Laser Techniques	B	*	*	*	*	*	*	*	*	*		*	
		Microwaves	B	*	*	*	*	*	*	*	*		*		*
		Computer Networks	B	*	*	*	*	*	*	*	*	*	*		*
		Programmable Logic Controllers	B	*	*	*	*	*	*	*	*	*	*		
		Project	B	*	*	*	*	*	*	*	*	*	*	*	*
		Maintenance Workshop	A	*	*	*	*	*	*	*	*	*		*	
		Computer Applications II	A	*	*	*	*	*	*	*	*				
		English Language II	G				*				*		*	*	
		Baath Party Crimes	G									*	*	*	*

Course Description Form	
1- Course Name :	
Electric Circuit Analysis	
2- Course Code :	
3- Semester / Year :	
First academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
120 h / 8 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Anwar Sabah Ahmed Email : inj.anw@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The Student will learn to apply the general electric laws in analyzing electric circuits 2- learn to choose the suitable software for circuit analysis 3- Learn the basic theories for circuit analysis and solve**

	mathematical examples on it. **4- Learn to connect the single phase and three phase loads and do the the required calculations on it.**
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**4**	Electricity ,Units System , Units Conversion , Basic Unit for Electricity , Solve Examples.	Electricity		
Week 2	**4**	DC Circuit analysis : Series , Parallel , Combined , and Star – Delta Circuit analysis and Solving Examples	Circuit Analysis		
Week 3	**4**	Applications on series, parallel, Combined, star, .and Delta circuits A- Kirchhoff's laws - definition of Kirchhoff's law - for current and voltage, with solving examples.			

		B- Maxwell - with solved examples			
Week 4	**4**	A- Thevenin's theory - definition of the theory - how to apply it in direct .current circuits B- Norton's theory - definition of the theory - how to apply it in direct current circuits.			
Week 5	**4**	Applications of Thevenin .and Norton's theorem Matching theory - definition of the theory - applied steps in solving direct current circuits that contain more than one source - examples of solutions			
Week 6	**4**	Definition of the current source and the voltage source (continuous power distributor) and how to convert from one to the other - The theory Maximum Power Transfer - definition of the theory and derivation of its relationships - applied examples. Alternating quantities			

		include - their definition, properties of alternating current - how to generate alternating current and draw its vector and its relationships - definition of the effective value (RMS) and the average value and their relationships to find the formation factor and value factor for irregular waveforms with applied examples.			
Week 7	**4**	Alternating vector quantities - their definition - phase and directional representation - phase angle and how to find it - finding the resultant of vector quantities, including multiplication, division, addition and subtraction - with applied .examples Study the effect of alternating current on a circuit containing only resistance - a circuit containing only pure inductance - a circuit containing only pure capacitance - finding the phase angle between voltage and current for			

		each circuit and solving examples			
Week 8	**4**	Study the effect of alternating current on a circuit containing resistance and inductance in series - A circuit containing resistance and inductance in series - A circuit containing resistance, inductance and capacitance in series - A circuit containing resistance and capacitance in series - Finding the relationship between current and voltage in the three cases - Phase angle - The total impedance of the circuit with applied examples.			
Week 9	**4**	The effect of alternating current on a circuit containing resistance and inductance in parallel - A circuit containing resistance and capacitance in parallel - A circuit containing resistance, inductance and capacitance in parallel - Finding the relationship between voltage and current in the three cases - Conductive phase angle, its definition and how to find it - Finding impedance - Permittivity with Practical examples.			

Week 10	**4**	- The description - ((J-Operator) or the complex coefficient to find the total impedance, total Admittance, current, voltage, and phase angle for circuits.			
Week 11	**4**	Resonant circuits - Series resonance circuit - Current, voltage, impedance, phase angle and frequency at resonance - finding the beam width - finding the quality factor - Drawing the relationship between inductive reactance and capacitive reactance w frequency - Solving examples - Parallel resonance circuit . - Current, voltage, impedance, phase angle, and resonant frequency - Drawing graphical relationships with frequency - Finding the quality factor - Solving examples. Applying theories such as Norton's theorem, Thevenin's theorem.			
Week 12	**4**	- Power in alternating current circuits includes calculating power in - circuits containing			

		resistance only - circuits containing inductance only, - circuits containing only capacitor - circuit containing resistance, inductance, and capacitance in series and parallel - - definition of active power and reactive power.			
Week 13	**4**	- Total reactive power (its definition) - Power triangle - Power factor - Applied examples. - Maximum power transfer in alternating current circuits - applied examples.			
Week 14	**4**	Measuring devices include - Types of measuring devices - nature of their work - moving coil measuring devices, their installation and uses in measuring voltage and current, mentioning their advantages and disadvantages and a drawing of the device.			
Week 15	**4**	The iron-core measuring device - installation and how to use it in measuring - advantages and disadvantages and			

		drawing the device's diagram.			
Week 16	**4**	- Dynamo-meter measuring devices - installation - drawing a diagram of the device - arrangement in the electrical circuit for measuring power - moment equations - advantages and disadvantages - the oscilloscope device - drawing of the device - installation and operation.			
Week 17	**4**	- Practical methods for measuring resistors of high, medium and small values - an ohmmeter in series and parallel - the ammeter and voltmeter method - the compensation method - a test-stone bridge - the voltage divider method - the switching method - examples of each method.			
Week 18	**4**	- Three-phase alternating current circuits - definition and how to generate alternating current: - single phase - two phases - three phases - with a			

		drawing of each circuit, star and Delta connections in three-phase - alternating current circuits, and special relationships for calculating line and phase current and voltage, total power and line capacity - phase power - examples.			
Week 19	**4**	Solve applied examples of three-phase alternating current, Delta and star connections, from balanced and unbalanced loads.			
Week 20	**4**	Methods for measuring power for three-phase loads - a wattmeter - how to connect it to a circuit to measure active power and calculate reactive power and apparent power with an example solution - measuring power using a wattmeter and a voltage - how to find the total power in this way and in the connected state Star and Delta.			
Week 21	**4**	-Magnetism - the magnetic circuit - an introduction to North and			

		South Pole magnetism - types of magnetic materials - the basic characteristics of magnetic materials - magnetic driving force - magnetic flux density and factors that affect magnetic flux - permeability and its effect – Magnetic circuits and the application of Kirchhoff's laws to them. Solve applied examples of magnetism.			
Week 22	**4**	The intrinsic inductance of the coil (electromagnetic induction) - its definition - the special relationships to find the self-inductance of the coil - the mutual inductance between two coils - and the relationships to find the mutual inductance depending on the type of connection of the two coils, which includes: A- Linkage of a mutually reinforcing sequence B- Reverse serial connection			
Week 23	**4**	Transformers - transformer installation - transformer drawing - features			

		- working principle and special relationships, types of transformers			
Week 24	**4**	Applied Examples			
Week 25 & 26	**4**	Curves of growth and decay of current from a dead circuit - explanation of this circuit and its effect on direct current - the general relationship of growth and decay of current in a coil - drawing the current and calculating the time constant			
Week 27	**4**	Applied Examples			
Week 28 & 29	**4**	Charging and discharging capacitors. It includes the use of capacitors in direct current circuits. The general relationship of charging and discharging a capacitor and current drawing - the effect of the time constant and its calculation.			
Week 30	**4**	Applied Examples			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	Introductory to circuit Analysis - Boylestad
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Digital Circuit Design	
2- Course Code :	
3- Semester / Year :	
First Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
120 h / 8 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Zainab Noman Hamdi Email : zainab.hamdi@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The Student will learn number systems (binary - octal - decimal - hexadecimal) and how to convert from one system to another.** **2- The student will learn the basic principles of logic circuits, Boolean**

	algebra, and logic gates. **3- The student gains knowledge of how to design logic circuits to perform a specific function.**
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**4**	- Binary number system - conversion from binary to Octal and vice versa. - conversion from binary to decimal and vice versa.			
Week 2	**4**	Octal and hexadecimal systems - conversion from octal to decimal and vice versa - conversion from binary to hexadecimal and vice versa - conversion from hexadecimal to decimal and vice versa			
Week 3	**4**	Arithmetic operations in the binary system			

		- 1st complement and 2nd complement - binary subtraction using complements	
Week 4	**4**	Digital Logic - Basics of Logic Gates	
Week 5	**4**	- Building AND and OR gates using switches, then diodes and transistors - their symbols and Truth tables - Building a NOT gate using a transistor, its symbols and Truth tables.	
Week 6	**4**	Boolean algebra: - Laws of Boolean algebra - formulating digital logic using Boolean algebra, de Mogan's theorems, and learning about the NAND and NOR functions.	
Week 7	**4**	Building different logic gates using NAND gate, NOR gate, exclusive gates. OR gate excavator, NAND gate, NOR exclusive gates, exclusive OR gate, exclusive AND gate.EX NOR,EXNAND,	
Week 8	**4**	For the complete construction of logical networks - SOP method - POS method	

		Using the laws of Boolean algebra and De Morgan's theorems in reducing logical networks - applied examples Karnaugh's map - for two variables - for three variables - four variables - practical applications - building logical networks and reducing them using Karnaugh's diagram
Week 9	**4**	BCD code and CRE code and conversion between them
Week 10	**4**	- Conversion from the decimal system to the BCD system and vice versa - the process of addition and subtraction using the system
Week 11	**4**	- Arithmetic circuits in the binary system - half-adder and full adder - addition and subtraction circuits in parallel
Week 12	**4**	Use parallel addition circuits to perform binary subtraction

Week 13	**4**	Building addition and subtraction circuits for the BCD system - applied examples
Week 14	**4**	Flip – Flops D, T, SR, JK, its construction, its truth tables
Week 15	**4**	The concept of using a JK Flip flop as a frequency part - counters, ascending and descending counters, decimal counters
Week 16	**4**	Design any desired series counter using a Karnaugh map and build its circuit using a JK flip flop and other types of gates.
Week 17	**4**	Synchronized counters - ascending descending
Week 18	**4**	Design any desired synchronous counter using flip flop (D, JK) and other types of gates
Week 19	**4**	Registers: The concept of feeding digital information - serial/parallel feeding - serial/sequential feeding - parallel/series feeding - parallel/parallel feeding

Week 20	**4**	-Shift registers to the right with consecutive loading - Shift registers to the left with consecutive loading			
Week 21	**4**	Parallel loading with Shift registers on the right round - ring counter - practical examples			
Week 22	**4**	- Decoders - The concept of decoder - Building a decoder circuit with applied examples			
Week 23	**4**	- 7 Segments Display			
Week 24	**4**	Digital to theoretical conversion DAC, methods of building it, applied examples			
Week 25	**4**	Conversion from theoretical to digital ADC, methods of building it			
Week 26	**4**	.Practical examples			
Week 27	**4**	Memory - its types. EPROM,PROM,ROM,RA			

		M			
Week 28	**4**	Microprocessor			
Week 29	**4**	The function of each part – input and output of the microprocessor, memory in the microprocessor			
Week 30	**4**	Applied Examples			

11- Course Evaluation
Distribution of the grade out of 100 according to the tasks assigned to the student, such as : - Daily preparation, daily oral Discussion and Contribution. - Monthly written exams, reports, etc. - The Accumulative grade through the year should be 50 degree - Final exam should be 50 degree.

12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	"Digital Computer Fundamentals" BY : Thomance , Bartee
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Electronics	
2- Course Code :	
3- Semester / Year :	
First Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
120 h / 8 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Zaid Abdulkareem Najee Email : zaid.najee@atu.edu.com	
8- Course Objectives :	
Course Objectives :	**1- Introducing the student to electronic components manufactured from semiconductors, their different types, composition, and properties.** **2- The student learns to analyze electronic circuits.**

	3- The student will learn about digital electronics, its components, integrated circuits, and simplified applications for operational amplifiers.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**4**	Semiconductor theory - atomic structure - energy levels - crystals - conduction in crystals - gap current - how gaps move		Lectures	**Daily Quizez and Oral Discussion**
Week 2	**4**	Doping - positive crystal (p) - negative crystal (n) - current of electrons and current of gaps - total resistance.			
Week 3	**4**	Semiconductor diodes (pn) - vacuum region formation - barrier voltage - energy hill - thermal effects - biased diode - forward bias -			

		reverse bias			
Week 4	**4**	– Characteristics curves in the forward and reverse directions – Ephemeral crossing current – Minority carrier current – Surface leakage current – Breaking voltage Breakdown voltage – (piv) Maximum forward current – Maximum reverse voltage – (PIVmax) – Equivalent circuit of the diode.			
Week 5	**4**	The diode as a current rectifier - a half-wave rectifier - the continuous value of the current and its calculation - the effective value - the critical frequency.			
Week 6	**4**	Full-wave rectifier - using the center branch transformer - gantry rectifier - calculating the continuous and effective value of the current - extracting the output frequency - comparison between the half-wave rectifier and the full-wave rectifier - comparison between the full-wave rectifiers - filters - filtering using amplitudes.			
Week 7	**4**	Filter (LC) Filter (RC) - DC output voltage - Ripple - Voltage multiplier ripple - Trimming circuits - Positive trim - Negative trim - Compound trim - Peak-to-peak detector			

Week 8	**4**	Zener diode - structure - symbolism - impedance - refraction - avalanche - zener refraction - breaking voltage - carrying capacity - zener impedance - temperature effect - zener approximation - constant voltage joins a constant voltage source circuit - variable capacitance diode (varctor) and its applications.			
Week 9	**4**	Bipolar transistor - structure - bias regions - (αdc) - (βdc) - relationship between (αdc) and (βdc) - types of bias - connection formulas - approximation in the transistor and the equivalent circuit.			
Week 10	**4**	Transistor characteristic curves - working areas - definition of (ICBO) and (ICEO) - current gain curve - the relationship between (IC) and (ICBO).			
Week 11	**4**	Transistor bias-base bias-emitter bias circuits			
Week 12	**4**	Collector bias - self-bias - feed-back bias - voltage divider bias - practical examples			
Week 13	**4**	Transistor-line DC equivalent circuits.			
Week	**4**	Action points - rest point			

14		(Q-point) applied examples.			
Week 15	**4**	Transistor in small signal amplification - alternating equivalent circuit - ideal approximation - hybrid constants - equivalent circuit using (h) coefficients			
Week 16	**4**	- Voltage gain - Current gain - Power gain - Input and output resistors - Small signal amplifiers - Base market - Emitter market.			
Week 17	**4**	The use of a transistor in voltage regulation - a series regulator - a parallel regulator - a constant voltage source circuit.			
Week 18	**4**	Junction field effect transistor (JFET) - structure - symbol - working theory - property curves - exchange conductivity curve.			
Week 19	**4**	- Definition of narrow voltage (vp), (Idss), VGSOFF - characteristic curves (MOSFET) - (D-MOSFET), (E-MOSFET)			

Week 20	**4**	Bias circuits (FET) – constant current source bias – working point – self-bias – equivalent circuit for (FET) in small signal amplification.			
Week 21	**4**	Comparing the types of FET (JFET and MOSFET) and (BJT)			
Week 22	**4**	Light dependent resistor (LDR) - light emitting diode - photo-diode - photo-transistor			
Week 23	**4**	Seven-segments panel installation and application.			
Week 24	**4**	Silicon controlled rectifier (SCR) – its structure – its symbol – its properties and its working theory – the triac – its diac – their symbol – its properties – its working theory.			
Week 25	**4**	Comparison between thyristor, diac and triac			
Week 26	**4**	– Protection of thyristors, diacs and triacs			
Week 27	**4**	– Protection of the thyristor (from voltage, from voltage change, from current, from current			

		change)			
Week 28	**4**	Integrated circuits - their meaning - an idea about their manufacture and installation - their advantages and disadvantages			
Week 29	**4**	Operational amplifier (741) – terminal symbol			
Week 30	**4**	– Applications of amplifier 741 – (In amplifying a small signal, combining two signals - a differentiator - an integrator - a block, etc.)			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources

Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Human Rights	
2- Course Code :	
3- Semester / Year :	
First Academic year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
60 h / 4 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Ahmed Hamzah Mahdi Email : ahmed.hamza.inj@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The student learns the laws and regulations related to human rights.** **2- The student learns about international human rights organizations.** **3- The student learns the**

	foundations of litigation and claiming his rights in various cases.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**2**	Human rights - definition - goals		Lectures	**Daily Quizez and Oral Discussion**
Week 2	**2**	The roots of human rights and their development in human history - human rights in ancient and medieval times.			
Week 3	**2**	Human rights in ancient civilizations, especially the Mesopotamian civilization. Human rights in divine laws, with a focus on human rights in Islam			
Week 4	**2**	Human rights in the Middle Ages: Human rights in political			

		doctrines, schools, and theories - Human rights in corporations and their declarations, revolutions and constitutions (English documents - American Revolution - French Revolution - Russian Revolution)			
Week 5	**2**	Human rights in contemporary and modern history - international recognition of human rights since World War I and beyond - United Nations)			
Week 6	**2**	Regional recognition of human rights - the European Convention on Human Rights 1950 - the American Convention on Human Rights 1969 - the African Charter on Human Rights 1981 - the Arab Charter on Human Rights 1994.			
Week 7	**2**	National human rights organizations			
Week 8	**2**	NGOs and human rights (ICRC - Amnesty International - Human Rights Watch)			
Week 9	**2**	National human rights organizations			

Week 10	**2**	Human rights in Iraqi constitutions between theory and reality			
Week 11	**2**	The relationship between human rights and public freedoms: - in the Universal Declaration of Human Rights.			
Week 12	**2**	In regional charters and national constitutions			
Week 13	**2**	Essential human rights and collective human rights.			
Week 14	**2**	Economic, social and cultural human rights and civil and political human rights			
Week 15	**2**	Modern human rights: facts in development - the right to a clean environment - the right to true solidarity.			
Week 16	**2**	Guarantees of respect and protection of human rights at the national level - guarantees in the constitution and laws - guarantees in the principle of the rule of law.			
Week	**2**	Guarantees in			

17		constitutional oversight - guarantees in freedom of the press and public opinion - the role of non-governmental organizations in respecting and protecting human rights.			
Week 18	**2**	Guarantees, respect and protection of human rights at the international level: - The role of the United Nations and its specialized agencies in providing guarantees.			
Week 19	**2**	The role of regional organizations - (Arab League - European Union - African Union - Organization of American States - ASEAN)			
Week 20	**2**	General theories of freedoms - the origin of rights and freedoms - the project's position on declared rights and freedoms - use of the term general freedoms.			
Week 21	**2**	The functional nature of the concept of public freedoms: philosophical considerations of the functional right -			

		structural considerations of the positive right - economic considerations and public freedoms.			
Week 22	**2**	The legal rule of the state of law			
Week 23	**2**	The legal rule of the state of law			
Week 24	**2**	Regulation of public freedoms by public authorities			
Week 25	**2**	Non-judicial litigation or grievance			
Week 26	**2**	Judicial appeal - determining the state's responsibility for implementing legitimacy			
Week 27	**2**	The impact of double judiciary on public freedoms according to administrative jurisprudence			
Week 28	**2**	Equality: the historical development of the concept of equality			
Week 29	**2**	The modern development of the idea of equality			
Week 30	**2**	gender equality Equality between individuals according to their beliefs and members.			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree

- Final exam should be 50 degree.

12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Engineering Drawing	
2- Course Code :	
3- Semester / Year :	
First Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
90 h / 6 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Rand Muaffaq Email : rand.muaffaq@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- Training the student on the correct foundations of engineering drawing.** **- drawing and reading electronic and electrical maps.** **2- The student learns using engineering drawing equipment and tools,**

	understanding maps, and drawing their engineering views and projections. **3- Distinguishing between electronic components, reading electrical maps, plotting them, and drawing electronic circuits.**
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**3**	The importance of engineering and industrial drawing - drawing tools and their uses - corrective drawing sizes - painting sizes - drawing a drawing data table - definitions of point, line and surface.		Lectures	**Daily Quizez and Oral Discussion**
Week 2	**3**	Drawing types of lines: hidden line, hidden line,			

		center line, cutting line, cutting line for small parts, cutting line for large parts, cutting level line, dimension line, and extension line (board drawing).			
Week 3	**3**	Another painting on lines includes a group of simple geometric shapes and contains a group of lines.			
Week 4	**3**	Explanation of electrical and electronic symbols			
Week 5	**3**	Drawing electrical and electronic symbols board			
Week 6	**3**	Writing Latin letters and numbers - a board that includes writing numbers and letters vertically and then at an angle575 in sizes from four mm to ten mm.			
Week 7	**3**	Completion of the previous painting			
Week 8	**3**	How to distribute and install measuring devices (ammeter, voltmeter, wattmeter) and protective devices (separators - fuses - cutting devices - circuit breakers - switches).			
Week 9	**3**	Geometric operations include: 1- Dividing a straight line in equal and unequal proportions 2- Bisecting a straight line 3- Establishing a			

		perpendicular on a straight line or arc from a point inside and a point outside it 4- Drawing a straight line parallel to a known straight at a known distance 5- Bisecting an angle 6- Finding the center of a known arc or circle 7- Drawing a tangent circle Sides of a floating triangle from the inside and outside (one panel drawing).			
Week 10	**3**	Drawing tangents to a circle: 1- Draw an arc that touches two known circles from the inside. 2- Draw an arc that touches two known circles from the outside. 3- Draw a straight line that touches two known circles from the outside. 5- Draw an arc of a known radius that touches a straight line and a known circle.			
Week 11	**3**	Drawing a regular polygon given the length of the side in the general way, drawing a regular pentagon given the diameter of the circle, drawing a regular hexagon given the diameter of the circle - drawing the perspective of the circle at an angle of 30.			
Week 12	**3**	Electrical installations - drawing a special drawing for the electrical installations of a room			

		with an attached storeroom.			
Week 13	**3**	Draw a diagram of the complete connections of the fluorescent tube			
Week 14	**3**	Drawing an electronic wiring board containing a group of electronic circuits.			
Week 15	**3**	Draw a simple solid shape at angle 30 and angle 45.			
Week 16	**3**	Explaining the placement of dimensions on a drawing in a geometric manner. Drawing a painting that includes two perspectives with all dimensions in a geometric manner.			
Week 17	**3**	Drawing a complex perspective that contains cylindrical shapes or cavities - drawing a painting that includes two perspectives with the dimensions written in a geometric manner.			
Week 18	**3**	Continue the previous topic with a painting.			
Week 19	**3**	Drawing a board for an electronic circuit containing gates.			

Week 20	**3**	Drawing an electronic circuit board containing integrated circuits			
Week 21	**3**	Drawing an electronic circuit board containing gates and integrated circuits			
Week 22	**3**	Applications on drawing projections from different perspectives.			
Week 23	**3**	Perspective drawing of the three views			
Week 24	**3**	Cutting in objects, cutting angle - cutting lines (slicing)			
Week 25	**3**	Definition of parts that cannot be cut (focuses on complete cutting only) A plate that includes projections after cutting.			
Week 26	**3**	Drawing a board to control the speed of a three-phase motor			
Week 27	**3**	How to read a map or set of maps for electrical circuits.			
Week 28	**3**	Electrical drawing applications on the electronic calculator.			

Week 29	**3**	Using Auto CAD system			
Week 30	**3**	Use of ORCAD system.			

11- Course Evaluation
Distribution of the grade out of 100 according to the tasks assigned to the student, such as : - Daily preparation, daily oral Discussion and Contribution. - Monthly written exams, reports, etc. - The Accumulative grade through the year should be 50 degree - Final exam should be 50 degree.

12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	**Engineering Drawing Technology((A.W-Wander William))MC-Graw-Hill**
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Occupational safety	
2- Course Code :	
3- Semester / Year :	
First Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
30 h / 2 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Sura Salam Email : sura.salam.inj@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The student learns occupational safety requirements.** **2- The student learns about international organizations for setting occupational safety standards.** **3- The student learns how to deal with occupational safety**

	tools at the work site.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1 & 2	**1**	Basic principles of occupational safety		Lectures	**Daily Quizez and Oral Discussion**
Week 3 & 4	**1**	The Organizations responsible on standards and regulations in OS.			
Week 5 & 6	**1**	Industrial environment pollution - Standards for measuring pollution in the industrial environment			
Week 7 & 8	**1**	Fire risks			
Week 9 & 10	**1**	Fire fighting methods and extinguishing systems			
Week 11 & 12	**1**	Fire safety considerations			

Week 13 & 14	**1**	Injury risks			
Week 15 & 16	**1**	Transportation and Store risks			
Week 17 & 18	**1**	Occupational safety in handling equipment and machines			
Week 19 & 20	**1**	Electricity risks			
Week 21 & 22	**1**	Methods to prevent electric shock			
Week 23 & 24	**1**	first aid			
Week 25 & 26	**1**	Personal protective equipment on the job site			
Week 27 & 28	**1**	Dealing with hazardous materials at the work site in terms of storage, transportation and use.			
Week 29 & 30	**1**	General tasks and responsibilities that must be followed to maintain Occupational safety.			

11- Course Evaluation
Distribution of the grade out of 100 according to the tasks assigned to the student, such as : - Daily preparation, daily oral Discussion and Contribution.

- Monthly written exams, reports, etc. - The Accumulative grade through the year should be 50 degree - Final exam should be 50 degree.

12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Workshops	
2- Course Code :	
3- Semester / Year :	
First Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms : I	
n Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
120 h / 8 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Makki Jaber Email : Makki.kadhum@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The Student will gain the manual experience in dealing with tools and practical experience.** **.** **2- The student will learn to use electronic components in building simple and complete circuits and examining electronic circuits and their**

	components. **3- The student learns about working on a lathe machine, cutting metals with a cutting and nulling machine, and installing some simple structures.**
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**4**	Principles of industrial safety inside electrical workshops - protection from electric shocks - identifying the tools used inside the electrical workshop - power sources - training in using an oven. Micrometer to measure the wires used in the coil Method of using different types of soldering irons (with different capacities) and spot soldering irons		Lectures	Daily and periodically Tests
Week	**4**	Electrical transformers .			

2		Its types - magnetic circuit - electrical circuits - opening the transformer, taking information from the old transformer for the primary and secondary coils - measuring the wire diameters of the transformer - measuring the plastic winding template - rewinding the primary and secondary coils.			
Week 3	**4**	Types of electric motors (single-phase and three-phase), such as a shaded-pole motor (small water pump motor), operating the motor - disassembling it - taking information - making a template - winding the coils - placing insulators - connecting the soldered ends - insulating with varnish - inspection and testing - possible malfunctions To occur in the engine (electrical and mechanical)			
Week 4	**4**	Electrical installations. Types (Al-Dahri) - Burying inside pipes - Establishing Siemens - Drawing the circuit, Establishing a lamp with a control circuit - Practical exercise establishing the circuit Draw the circuit establishing two lamps in parallel with a switch and			

		a socket Practical application of the circuit. Drawing the internal connection of a fluorescent lamp circuit - replacing one of the two lamps with a fluorescent lamp			
Week 5	**4**	Drawing a two-way circuit for establishing a two-way lamp using a two-way key. Practical application Identifying electrical collectors - their types, use, and thermal position monitors Operating the single-sided motor by means of an antenna with a push button Starting a motor and changing the direction of rotation of a single-phase motor using contactors and a timer			
Week 6	**4**	Training on making electrical installations (installation inside pipes) The process of cutting pipes - bending pipes - using springs			
Week 7	**4**	How to use various measuring devices in the			

		workshop, such as (an ohmmeter and an oscilloscope equipped with a capacity of.....)			
Week 8	**4**	How to use caustic materials - Types of caustic materials used in workshops - Welding training, including caustic material. Types of solder used - soldering auxiliary materials - soldering some wires and some components. How to use a caustic soldering iron – number of soldering irons – e.g Solder sucker (soldering removal)			
Week 9	**4**	To train on some electronic components and upload them from the printed board Various printed electronic circuits - learn how to install them and install the various components on them The different types of resistors in terms of the material from which the resistors are made, the capacity that each resistor can withstand, how to read the values of			

		the resistors using different methods - variable - and special resistors (v d r, b t c, n t c) how to check them.			
Week 10	**4**	Make a circuit to connect resistors in series - Make a circuit to connect resistors in parallel - Make a circuit to connect resistors in series and parallel - Examine circuits The different types of capacitors in terms of the type of insulator used between the capacitor plates, the voltage that the capacitor can withstand, reading capacitor values using the different methods used in coding - how to check capacitors and ways to replace them. Make circuits to connect the expansions in parallel, series, and mixed on the printed board with examination.			
Week 11	**4**	The different types of switches used on electronic devices and methods of checking them - the current that each switch can withstand - the use of all			

		types. Types of fuses used in electronic circuits.			
Week 12	**4**	– Types and diameters of wires used in fuses – The current that each type can withstand – How to repair fuses			
Week 13	**4**	Coils - their types - methods of examining them - their use - identifying faults - reading the types of coils that use color codes in their numbering - electrical transformers, their types and examining them - determining the type of transformer in an auto transformer - the difference between an autotransformer and ordinary transformers			
Week 14	**4**	The different types of semiconductors, diodes, transistors, etc.) in terms of how they are manufactured and the materials used in their manufacture - the methods used in numbering them - finding their equivalent Inspection of semiconductors (diode, transistor, etc.).			
Week 15	**4**	Faulty and working transistors and diodes, as well as a group of them. Integrated electronic circuits - learning about			

		pin numbering to understand the types of these circuits - how to manufacture these circuits - internal components in manufacturing.			
Week 16	**4**	The caustics used in soldering integrated electronic circuits, the correct method for soldering the (O) and how to remove the solder from the edges of the printed electronic circuit and remove it from the circuit.			
Week 17	**4**	How to read electronic maps and how to track malfunctions to determine the location of the malfunction and the causes of the malfunction.			
Week 18	**4**	Showing a practical film on how to manufacture electronic components (rectifiers, capacitors, transistors).			
Week 19	**4**	Introducing the student to how to design electronic circuits on a printed board and distributing the electronic components on it - how to solder these components (simple circuit). The method is repeated for the student to design a more complex circuit.			

Week 20	**4**	Different valves - their internal components - identifying the outer edges of the valve base, how to check valves from the valve halls, how to check valves using a valve inspection device.			
Week 21	**4**	Field increase for an industrial facility			
Week 22	**4**	Building multiple and simple electronic circuits on printed boards and learning how to examine and test them. • Filters • Half-wave uniform. • Full wave uniformer. • Common emitter amplifier • Two-stage amplifier • RC oscillator • Hartley oscillator • Operations amplifier			
Week 23	**4**	Lathe workshop Learn about various measuring devices and how to use them. How to operate the lathe and use various tools and			

		cutting tools. How to install a rod on the lathe, making straight lathes. Training on using the lathe to make different shapes.			
Week 24	**4**	Workshop Different types of coils, saws, and various measuring equipment and their uses.			
Week 25	**4**	Practice on plumbing and simple filing. Practice on cutting with a saw, training on the drilling and grinding process, and performing a simple exercise on it.			
Week 26	**4**	Welding Gas welding, identifying the devices and equipment used			
Week 27	**4**	Training on using gas welding devices in a simple exercise			
Week 28	**4**	Electric welding - learning about the devices and equipment used			
Week 29	**4**	Training on using electric welding devices in a simple exercise			
Week 30	**4**	Spot welding, identifying the devices used and performing a simple exercise			
11- Course Evaluation					
Distribution of the grade out of 100 according to the tasks assigned to the					

student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
English Language I	
2- Course Code :	
3- Semester / Year :	
First Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
30 h / 2 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Sura Salam Email : sura.salam.inj@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The Student will learn about the basics and grammar of the English language.** **2- The student will Gain experience and skill in reading, listening and writing in English.** **3- The student learns**

	the skills in speaking English.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**1**	Recognizing letter sounds/using vowel sounds to spell words.		Lectures	Daily and periodically Tests
Week 2	**1**	Reasons and how to use being verbs in sentences			
Week 3	**1**	How to turn sentences into a question: How to answer the question with a yes or no?			
Week 4	**1**	How to negate sentences/use a and an			
Week 5	**1**	Using demonstrative nouns for near and far, singular and plural			
Week 6	**1**	Use possessive pronouns			
Week 7	**1**	Prepositions and their			

		uses			
Week 8	**1**	Complementary prepositions and their uses			
Week 9	**1**	Colors and adjectives and how to use them before nouns			
Week 10	**1**	Some of the interrogative nouns and how to formulate the question and its answer			
Week 11	**1**	Completing interrogative nouns and how to formulate the question and its answer			
Week 12	**1**	New words and plural methods			
Week 13	**1**	New adjective words and how to pluralize the noun described			
Week 14	**1**	Introduction to the simple present tense and a group of verbs			
Week 15	**1**	Complete explanation of the simple present tense with examples and short passages			
Week 16	**1**	The present continuous tense and a group of new verbs			
Week 17	**1**	Continue explaining the present continuous tense and short pieces.			
Week	**1**	The present perfect			

18		tense with new verbs and how to use it			
Week 19	**1**	Complete the explanation of the present perfect tense with short passages			
Week 20	**1**	The simple past tense and new regular and irregular verbs			
Week 21	**1**	Complement the past perfect tense with short passages			
Week 22	**1**	Past continuous tense with new verbs			
Week 23	**1**	Complete the explanation of the past continuous tense with short passages			
Week 24	**1**	The past perfect tense with a new group of verbs			
Week 25	**1**	Complete the explanation of the past continuous tense with short passages			
Week 26	**1**	Simple future tense and new verbs			
Week 27	**1**	Complete the explanation of the simple future tense			

		with short passages			
Week 28	**1**	Exclamation			
Week 29	**1**	Passive voice			
Week 30	**1**	External passages include what was previously studied with questions			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources

Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Computer Applications I	
2- Course Code :	
3- Semester / Year :	
First Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
90 h / 6 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Rand Muaffaq Email : rand.muaffaq@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The Student will learns the generations of computers and the stages of their development.** **2- The student learns about computers and their internal and external parts, and their commands.** **3- The student learns the MS-DOS operating**

	system and deal with its internal and external commands.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**3**	Introduction to computers and their generations Physical components and parts of the calculator: internal and external parts, and peripheral devices		Lectures	Daily and periodically Tests
Week 2	**3**	Parts of a calculator's software: system software and application software.			
Week 3	**3**	MS-DOS operating system: The concept of operating system,			

		system reference, disks, directories and their file levels.			
Week 4	**3**	Internal operating system commands: dir-del-time-date-cls-rd-cd-md-echo-prompt-ren-copy-vol-path			
Week 5	**3**	Internal operating system commands: dir-del-time-date-cls-rd-cd-md-echo-prompt-ren-copy-vol-path			
Week 6	**3**	Internal operating system commands: dir-del-time-date-cls-rd-cd-md-echo-prompt-ren-copy-vol-path			
Week 7	**3**	External operating :system commands edit-tree-format-chkdsk-diskcopy			
Week 8	**3**	External operating system commands: edit-tree-format-chkdsk-diskcopy			
Week 9	**3**	External operating system commands: edit-tree-format-chkdsk-diskcopy			

Week 10	**3**	Windows operating system: The concept of the system, its advantages, basic requirements, and versions. Operating the Windows system, main desktop screen components, icon concept.			
Week 11	**3**	Working with the keyboard and how to deal with mouse activities. Components and importance of the taskbar, entering programs from the start command. Exit the system, restart and turn off the computer.			
Week 12	**3**	The concept of the window for any program and learning about its main components.			
Week 13	**3**	Working with desktop icons such as: My computer-my Documents-Recycle Bin...etc			

Week 14	**3**	Identify the components of my computer: Disks and their types, formatting and partitioning the hard disk. Working with floppy disks.			
Week 15	**3**	Folders and files, methods of copying folders and files, cutting and pasting. The trash can and its advantages, how to delete and retrieve files from the trash.			
Week 16	**3**	Change the desktop background, control the screen saver, and change the appearance and colors of window menus.			
Week 17	**3**	Using control panel and mouse programs. Add and delete programs.			
Week 18	**3**	Execute programs directly using the RUN command. How to switch to the MS-DOS operating system signal and handle its commands.			
Week	**3**	Use of additional			

19		programs: window explorer, calculator, note taking, plotter, etc.			
Week 20	**3**	Working with the Notes window when writing texts: Save, retrieve, print, change print style and format.			
Week 21	**3**	Dealing with the drawing program: commands for creating, saving and retrieving drawings. Learn about different methods of getting help. Use entertainment programs such as window media player to play movies.			
Week 22	**3**	Viruses: The concept of viruses in computers, their types, how to infect them, treat them, and deal with anti-virus programs available within the Windows operating system			

		environment.			
Week 23	**3**	Viruses: The concept of viruses in computers, their types, how to infect them, treat them, and deal with anti-virus programs available within the Windows operating system environment.			
Week 24	**3**	Word processors: scanning, moving, copying and cutting text, enhancing texts with italics, bolding and underlining, organizing printing and changing font size and type, creating tables and organizing cells, columns and lines, controlling notes and margins, final preparation of the document, organizing spaces and filling lines. Working with several documents at the same time and transferring data and texts .between them			
Week 25	**3**	Extended page operations: Create a simple work page according to specifications,			

		entries, numerical constants, and global functions. Use editing features, make adjustments to the page structure, including relative cells and their headings, change the page display while regulating the size of cells, lines, and columns, font size, and creating charts.			
Week 26	**3**	Database management: creating tables, entering data, adding/deleting and modifying data records. Modify the table structure, enter agreement terms .(AND/OR)			
Week 27	**3**	Show Charts: Create slides including block art and tables, modify the chart display by adding/deleting and removing slides individually			
Week 28	**3**	Show Charts: Create slides including block art and tables, modify the chart display by adding/deleting and removing slides individually			
Week	**3**	Creating advanced			

29		exercises with Microsoft Word Regulating its width and height. Tables: merging and splitting cells, calculations, mixing and shading .columns and cells			
Week 30	**3**	Creating advanced exercises in Exercises on the ready-made programs Adobe Photoshop, exploring image sources (size and resolution), selection techniques (original and complex). Exercises in: drawing and coloring tools, blending, masks, layers, organizing and filtering the system, creating a Word document with tables, charts, and watermarks. Creating forms Messaging, addressing, transmission and .routing			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Mathematics	
2- Course Code :	
3- Semester / Year :	
First Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
60 h / 4 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Zaid Abdulkareem Najee Email : zaid.najee.@atu.edu.com	
8- Course Objectives :	
Course Objectives :	**1- The student learns the mathematical laws necessary to analyze and understand electrical circuits.** **2- The student learns the foundations of differentiation and integration and its applications.** **3- The student learns**

	to solve differential equations.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**2**	Details of theoretical vocabulary		Lectures	Daily and periodically Tests
Week 2	**2**	Matrices - determinants			
Week 3	**2**	Electrical applications			
Week 4	**2**	Trigonometric identities and trigonometric equations			
Week 5	**2**	Complex numbers – geometric representation of a complex number			
Week 6	**2**	The relationship of electrical units to the installed setup			
Week 7	**2**	Find the roots of the complex numbers			
Week 8	**2**	Exponents, logarithms and their laws			

Week 9	**2**	Differentiation - algebra of derivatives - polynomial functions and their derivatives			
Week 10	**2**	Chain rule - complex function - parametric function.			
Week 11	**2**	Differentiation applications - maximum and minimum values			
Week 12	**2**	Distance, speed and acceleration – general physics and engineering applications.			
Week 13	**2**	Finding the arc length of a curve - various applications.			
Week 14	**2**	Finding the arc length of a curve - various applications.			
Week 15	**2**	The tangent and perpendicular equation - velocity and acceleration - calculations of the change in voltage and current as a function of time			
Week 16	**2**	The tangent and perpendicular equation - velocity and acceleration - calculations of the change in voltage and current as a function of time			
Week	**2**	Drawing functions -			

17		drawing the trigonometric function, inverse, exponential, and logarithmic functions and their relationship with each other - maximum and minimum limits and inflection points - asymptotic			
Week 18	**2**	Drawing functions - drawing the trigonometric function, inverse, exponential, and logarithmic functions and their relationship with each other - maximum and minimum limits and inflection points - alignments			
Week 19	**2**	Objectives - Objectives of algebraic and trigonometric functions - Applications to objectives			
Week 20	**2**	Integration - laws and its relationship to differentiation - definite and indefinite integration			
Week 21	**2**	Integration - laws and its relationship to differentiation - definite			

		and indefinite integration			
Week 22	**2**	Applications of integration - the area under two curves and between two curves - the approximate area using the trapezoid rule and Simpson - rotational volumes, with attention to drawing according to the coordinate system.			
Week 23	**2**	Applications of integration - the area under two curves and between two curves - the approximate area using the trapezoid rule and Simpson - rotational volumes, with attention to drawing according to the coordinate system			
Week 24	**2**	General methods of integration include substitution, division, and the use of partial, exponential, and .logarithmic fractions			
Week 25	**2**	General methods of integration include substitution, division, and the use of partial, exponential, and logarithmic fractions.			
Week 26	**2**	General methods of integration include substitution, division, and the use of partial, exponential, and logarithmic fractions			
Week 27	**2**	General methods of integration include substitution, division, and the use of partial, exponential, and			

		logarithmic fractions.			
Week 28	**2**	Solve differential equations			
Week 29	**2**	Solve differential equations			
Week 30	**2**	Solve differential equations			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources

Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

قسم التقنيات الالكترونية و الاتصالات

المواد الدراسية

المرحلة الثانية

Course Description Form	
1- Course Name :	
Programmable Logic Controllers (PLCs)	
2- Course Code :	
3- Semester / Year :	
Second Academic Year / Semester	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
45 h / 6 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Laith Falah Email : laith.falah@.atu.edu.com	
8- Course Objectives :	
Course Objectives :	**1- The Student will learn the components of programmed controllers, how to program them, their applications.** **2- The student will Identify the tools of programming the PLC logic controller and its types, with a focus on the ladder logic**

	programming method. **3- The student learns how to build a program using a logic controller to control a specific application.**
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**3**	Introducing the vocabulary of the academic subject and distributing exam grades - an introductory overview of programmed control and its application fields.		Lectures	**Daily Quizez and Oral Discussion**
Week 2	**3**	Sensors compatible with the programmed controller (temperature, proximity, pressure, movement, etc.)			

Week 3	**3**	Electrical switches, electrical contacts, and how they work.			
Week 4	**3**	Identify electrical contacts and how they work.			
Week 5	**3**	Learn about the Ladder logic programming language.			
Week 6	**3**	Implementing logic circuits (AND, OR, NOT, etc.) using the logical language.			
Week 7	**3**	Timers, their types, and ways of representing them in the ladder logic language, with applied examples			
Week 8	**3**	Holding the sign and releasing it in the ladder logic language.			
Week 9	**3**	Digital counters in ladder logic language with applied examples			

Week 10	**3**	Practical examples: Changeover circuit using ladder logic language.			
Week 11	**3**	An applied example of a traffic signal.			
Week 12	**3**	An applied example of opening and closing a gate based on motion sensors.			
Week 13	**3**	Circuit for operating a single-phase motor with two on and off switches (Motor Starter) using ladder logic language.			
Week 14	**3**	Three-phase motor drive circuit (Delta-Star).			
Week 15	**3**	An applied example of an electric elevator circuit.			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	**Programmable Controllers Theory and Implementation, Second Edition, by L. A. Bryan & E. A. Bryan, © 1988, 1997 by Industrial Text Company Published by Industrial Text Company.**
Main References (Sources)	**MITSUBISHI ELECTRIC, FX-TRN-BEG-E, USER'S MANUAL, Manual number: JY997D02901 Manual revision: E, June 2015**
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Crimes of Baath Regime	
2- Course Code :	
3- Semester / Year :	
First Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
30 h / 2 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Email :	
8- Course Objectives :	
Course Objectives :	The aim of studying the Baath regime crimes is that there is a missing research knowledge link in the Iraqi research field . It relates to more than three decades during which the Baath Party ruled Iraq and committed

	humanitarian crimes. It is a major political issue, as well as the importance of historical studies, especially in the field of archiving and analysis Documents related to Baath regime crimes.

9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**1**	Baath Party crimes according to the Iraqi Criminal Court Law in 2005 The concept of crimes and their categories		Lectures	**Daily Quizez and Oral Discussion**
Week 2		Definition of crime linguistically and idiomatically			
Week 3		Crime departments			

Week 4		Types of international crimes			
Week 5		Decisions issued by the Supreme Criminal Court			
Week 6		Discussion of crimes and decisions issued by the Supreme Court			
Week 7		Explaining the definition of crimes and their types			
Week 8		Psychological crimes			
Week 9		Mechanisms of psychological crimes			
Week 10		Psychological effects of crimes			
Week 11		Social crimes			
Week 12		Militarization of society			
Week 13		Learn about the crimes committed by the former regime			
Week 14		Writing a report showing the crimes committed by the Baathist regime from other sources			

Week 15		A brief summary of the student's opinion about teaching crimes			
Week 16		Violations of Iraqi laws			
Week 17		Pictures of human rights violations			
Week 18		Some decisions regarding political and military violations of the Baath regime			
Week 19		Exam			
Week 20		Prison and detention places of the Baath regime			
Week 21		Exam			
Week 22		Environmental crimes			
Week 23		Military and radioactive contamination and mine explosions			
Week 24		Destruction of cities and villages (scorched earth policy)			

Week 25		Drying the marshes			
Week 26		Razing palm groves, trees and crops			
Week 27		Collective compensation crimes			
Week 28		The events of the cemeteries of the genocide committed			
Week 29		Chronological classification of genocide graves in Iraq, period 1963 AD - 2003 AD			
Week 30		Chronological classification of genocide graves in Iraq, period 1963 AD - 2003 AD			

11- C**ourse Evaluation**

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources

Required Textbooks (Curricular books , any)	**(Baath Party crimes) , Textbook**
Main References (Sources)	

Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Electronic Circuits	
2- Course Code :	
3- Semester / Year :	
Second Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
120 h / 8 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Zainab Musatafa Email : zainabmustafa@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The student will learn to basic electronic circuits.** **2- The student learns how to design and use electronic circuits in many practical applications.** **3- The student learns the electronic components that are used in power**

	amplification processes.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**4**	Class A power amplifiers		Lectures	Daily and periodically Tests
Week 2	**4**	Class B power amplifiers			
Week 3	**4**	Class C power amplifiers			
Week 4	**4**	Power Supplies			
Week 5	**4**	Voltage regulators using variable resistance, zener diode, series and parallel transistor, Darlington			
Week 6	**4**	Thyristors, methods of switching on and off thyristors, methods of switching on the gate			

		in AC, DC circuits, pulses, applications for silicon modules			
Week 7	**4**	Oscillators and their definition - backfeed and its types, drawing their diagrams and finding the mathematical relationships for the final amplification of the system (forward gain - back gain - return circuit) - conditions of oscillation			
Week 8	**4**	Examples of oscillator circuits (LC oscillator - Hartley oscillator - Colbits oscillator - phase shift oscillator)			
Week 9	**4**	The transistor as a switch - its operation specifications on the load line - its response to a rectangular input wave - switching times -			
Week 10	**4**	Vibrators and their different types (monostable-unstable-bistable) Mathematical relations			
Week 11	**4**	- Collector and base resistors - input and output waveforms -			

		their circuits - their design - practical ideas - protecting them - overcoming possible distortions in the output signals - pulse width control.			
Week 12	**4**	Operational amplifier - typical diagram - template input - non-block input - input impedance - template amplifier circuit output - non-blocking amplifier gain - voltage follower and amplification equation - host - equation for adding N number of inputs - non-blocking host.			
Week 13	**4**	Inverter collector circuit and output equation			
Week 14	**4**	- Non-inverting collector circuit and output equation - mathematical examples.			
Week 15	**4**	Subtractor circuit and calculation equations to subtract two input voltages VO=V2-V1 - applied circuit			
Week 16	**4**	Operations amplifier applications - the integrator and its circuit - derivation of its equation - example - inserting a square wave into the integrator circuit and			

		finding its output wave			
Week 17	**4**	- Example - Inserting a pulse wave into the integrator circuit and finding the output wave - Example - Effect of integrator voltage - Solving exercises.			
Week 18	**4**	The comparator - its circuit - the business idea - introducing a triangle wave to the regular input and connecting the non-standard input to ground - introducing a triangle wave to the regular input and connecting the non-standard input to a positive reference voltage			
Week 19	**4**	Nonlinear applications of the op-amp amplifier - the example rectifier - the idea behind using the op-amp in rectifier circuits - its advantages over circuits without the op-amp a comparison between the ideal and non-ideal properties of the rectifier - the ideal half-wave rectifier circuit - the idea of its work - the ideal full-wave rectifier circuit - the idea of the work.			

Week 20	**4**	Schmidt switch - False transformation in the comparator and how to prevent it from occurring - Example - Schmidt circuit, drawing its conversion properties - Example - Introducing a random wave into the Schmidt switch circuit and drawing the output voltage - Solving exercises.			
Week 21	**4**	Wave generators using op-amps - square wave generator - its circuit - derivation of the equation for the frequency of the output wave - modulating the circuit to give a rectangular wave - example - circuit design.			
Week 22	**4**	Monostable vibrating pulse generator, its circuit - working idea - drawing waves - derivation of the equation for the output pulse width - example - circuit design.			
Week 23	**4**	Triangle wave generator - circuit - working idea - drawing waves - derivation of equations for this - derivation of the frequency equation for			

		the output wave.			
Week 24	**4**	Analog calculator - its design - solved examples - timer 555 - its structure - diagrams for its use in vibrators - equations for calculating pulse width time - solved .examples			
Week 25	**4**	Effective RC filters - their advantages - properties - -HPF- LPF- (Features - Properties - Equations - Response Curves)			
Week 26	**4**	Arithmetic examples -			
Week 27	**4**	Effective RC filters- - BSFBPF their advantages- properties- - (Features - properties - equations - response curves.			
Week 28	**4**	Arithmetic examples			
Week 29	**4**	Basic methods of manufacturing integrated circuits (single-crystalline, thin-film and thick-film)			
Week 30	**4**	Manufacture of an integrated circuit for an NPN transistor - Manufacture of integrated resistors and capacitors -			

		Manufacture of an integrated circuit for a simple electronic .circuit			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources

Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Project	
2- Course Code :	
3- Semester / Year :	
Second Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
60 h / 4 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Email :	
8- Course Objectives :	
Course Objectives :	**1-** The student learns to deal with his group of students in order to support group work**.** **2- The student learns to choose the research or project problem and set goals and find a solution to the research problem.** **3- The student learns to write the final project report in an organized**

	manner in the research format.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1 & 2 & 3	**2**	Distributing the projects to the students, meeting with the supervising professor, and beginning to review the library to obtain resources for the project assigned to the students		Lectures	**Daily Quizez and Oral Discussion**
Week 4 - 10	**2**	Collect information about the project, begin the theoretical study, and prepare the necessary designs to implement the project.			
Week 11 & 14	**2**	Begin implementing the planned designs in practice and conducting experiments			
Week 15 -	**2**	Tests to obtain practical results - testing and			

18		evaluation of the previous stage.			
Week 18 - 21	**2**	Transferring the laboratory-conducted experiments to the panels to obtain the practical designed model, conduct testing on the final model, and obtain the final results for discussion.			
Week 22 & 23	**2**	Discussing the practical results and their compatibility with the realistic results and finding the necessary explanations for the apparent cases.			
Week 24 - 28	**2**	Arrange the written parts of the report for each of the previous stages of writing the final report on the project as follows: project name: Project Professor: Student names: Conclusion: Chapter One: Introduction Chapter Two: The theoretical part Chapter Three: The practical part and results Chapter Four: Discussion of results,			

		conclusions and proposals. references			
Week 29 - 30	**2**	Delivering the practical model of the project with the final report for final testing and evaluation.			

11- Course Evaluation	
Distribution of the grade out of 100 according to the tasks assigned to the student, such as : - Monthly oral Discussion. - The Accumulative grade through the year should be 30 degree - Final Presentation and defense be 70 degree.	
12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Communication Devices	
2- Course Code :	
3- Semester / Year :	
Second Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
120 h / 8 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Maitham AL-Salman Email : maitham.alsalman@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The Student will learn various communications devices and the stages that take place on transmitted and received signals.** **2- The student learns about the components and structure of the terrestrial communications network and transmission lines.**

	3- The student learns methods for analogue encoding of digital data. **4- The student learns about methods of encoding information to detect and correct errors.**

9- Teaching and Learning Strategies

Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**4**	9. telephone transmiter 10. telephone reciver 11. one way line 12. tow way line 13. analog and codes		Lectures	**Daily Quizez and Oral Discussion**
Week 2	**4**	- D . C signals (morse code) - Disadvantages of D.C signals - A.C signals - Advantages of A.C signals - Relation between - A,F,C (application)			

Week 3	**4**	- Structures of telephone communication - Local and trunk telephone communication definition for - Systems used **(simplex , holf doublex , fulldoublex , pabx , pmbx)**			
Week 4	**4**	Two wires and four wires transmission sys Four and four wire amplifier circuits Two wire and two wire amplifier circuits **Two wier and four wire amplifier circuits (HYBRID coils)**			
Week 5	**4**	Troubles happen in Hybrid coil Echo suppressors **Applications**			
Week 6	**4**	Transmission media Introduction **Relation between media and freg**			
Week 7	**4**	**Explaining all kinds of transmission media (all kinds)**			
Week 8	**4**	- Attenuation line transmission media - Attenuation contact - Attenuation curves for (twisted wire pair , coaxial cables **Wave guide)**			

Week 9	**4**	Attenuation line radio Location of repeaters **(problems and application)**			
Week 10	**4**	Modulation and demodulation Introduction Spectrum human speech **Dicibles for gaine , noise , losses , soundlevel) band width**			
Week 11	**4**	Multiplexing FDM Freg , division multiplexing			
Week 12	**4**	• Trunks and wide band facilities • Bell system . (CCIT standard) **Loading of multichannel**			
Week 13	**4**	High frequency H.F system H.F propagation **Radio link system**			
Week 14	**4**	The transmission of FM using microwave system Radio link repeaters			
Week 15	**4**	Antenna Earth station technology			
Week	**4**	Sattelite			

16		**Earth space window**			
Week 17	**4**	Path loss Sattelite earth link **Functionnal opration of standard earth station**			
Week 18	**4**	**Regional sattellite communication system introduction**			
Week 19	**4**	Small earth station **The transmission of digital data** **The BIT and binary convention**			
Week 20	**4**	Coding **Error detection and error correction**			
Week 21	**4**	Binary transmission and the concept of time **Digital transmission system**			
Week 22	**4**	PCM Sampling **PAM wave**			
Week 23	**4**	**Practical system (slock diagram)**			
Week	**4**	Early system			

24		**Modern broadcast coaxial cable**			
Week 25	**4**	Transmission of video over radio link **Transmission of video over satellite**			
Week 26	**4**	Relay **Facsimile communication**			
Week 27	**4**	Applications Advatages and disadvantages **Basic facsimile opration**			
Week 28	**4**	Fundmaental system interface			
Week 29	**4**	Facsimile transmission **Facsimile transmission standard**			
Week 30	**4**	Digital radio Definition and scope Applications **Basic radio and link consideration**			

11- Course Evaluation	
Distribution of the grade out of 100 according to the tasks assigned to the student, such as : - Daily preparation, daily oral Discussion and Contribution. - Monthly written exams, reports, etc. - The Accumulative grade through the year should be 50 degree - Final exam should be 50 degree.	
12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	**j. Carr. ,"Understanding Telephone Electronic"**

Main References (Sources)	
Recommended Books References	**M. Schultz ," Electronic "Communication**
Electronic References - Websites	

Course Description Form	
1- Course Name :	
English Language II	
2- Course Code :	
3- Semester / Year :	
Second Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
30 h / 2 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Sura Salam Email : sura.salam.inj@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The Student will learn about the basics and grammar of the English language.** **2- The student will Gain experience and skill in reading, listening and writing in English.** **3- The student**

	learns the skills in speaking English.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**1**	Recognizing letter sounds/using vowel sounds to spell words		Lectures	Daily and periodically Tests
Week 2	**1**	Reasons and how to use being verbs in sentences			
Week 3	**1**	How to turn sentences into a question: How to answer the question with a yes or no?			
Week 4	**1**	How to negate sentences/use a and an			
Week 5	**1**	Using demonstrative nouns for the near and far for the singular and plural/			
Week 6	**1**	Use possessive pronouns			

Week 7	**1**	Prepositions and their uses			
Week 8	**1**	Complementary prepositions and their uses			
Week 9	**1**	Colors and adjectives and how to use them before nouns			
Week 10	**1**	Some of the interrogative nouns and how to formulate the question and its answer			
Week 11	**1**	Completing interrogative nouns and how to formulate the question and its answer			
Week 12	**1**	New words and plural methods			
Week 13	**1**	New adjective words and how to pluralize the noun described			
Week 14	**1**	Introduction to the simple present tense and a group of verbs			
Week 15	**1**	Complete explanation of the simple present tense with examples and short passages			
Week 16	**1**	The present continuous tense and a group of new verbs			
Week	**1**	Continue explaining			

17		the present continuous tense and short passages.			
Week 18	**1**	The present perfect tense with new verbs and how to use it.			
Week 19	**1**	Complete the explanation of the present perfect tense with short passages.			
Week 20	**1**	The simple past tense and new regular and irregular verbs.			
Week 21	**1**	Complement the past perfect tense with short passages.			
Week 22	**1**	Past continuous tense with new verbs.			
Week 23	**1**	Complete the explanation of the past continuous tense with short passages.			
Week 24	**1**	The past perfect tense with a new group of verbs			
Week 25	**1**	Complete the explanation of the past continuous tense			

		with short passages			
Week 26	**1**	Simple future tense and new verbs			
Week 27	**1**	Complete the explanation of the simple future tense with short passages			
Week 28	**1**	Exclamation			
Week 29	**1**	Passive voice			
Week 30	**1**	External pieces include what was previously studied with questions			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources

Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Computer Applications II	
2- Course Code :	
3- Semester / Year :	
Second Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
90 h / 6 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Sahar Mohammed Email : sahar.mohammed.inj124@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The student acquires skill in important computer applications.** **2- The student learns the programming language MATLAB and uses it in the field of communications.** **3- The student learns website**

	design.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**3**	- Front Page program for website design:		Lectures	Daily and periodically Tests
Week 2	**3**	- Learn about the program's concepts, benefits, specifications, features, and methods of operation			
Week 3	**3**	- Create and coordinate a page and website via the front page)			
Week 4	**3**	- Hyperlinking web pages - Create forms on the website via the front page)			
Week 5	**3**	- Excel program: getting to know the concept of the program: its benefits,			

		specifications, features, and ways to operate it, getting to know the main screen and its components, and how it contains various menus and effective tools.			
Week 6	**3**	- The concept of the cell, basic data types and how to enter them			
Week 7	**3**	How to save the - Worksheet and Workbook. Close the program And close the file			
Week 8	**3**	- Open the saved file - enter data and perform simple calculations			
Week 9	**3**	- Learn how to adjust and format data within a single cell or group of cells.			
Week 10	**3**	- Learn about ways to collect data or groups of cells in their different forms, as well as how to sort data.			
Week 11	**3**	- Use some of the functions provided by the program, such as: AVE, SQRT, COUNT,			

		MAX, MIN, SUM, and other useful statistical functions.			
Week 12	**3**	- Identify the conditional function if and logical functions (and, or, not) and how to apply their equations.			
Week 13	**3**	- Getting to know the editing process provided by the program - copying and moving data, and learning about the concept of copying mathematical operations and the concept of relative cells. And absolute cells. Absolute.			
Week 14	**3**	- Control cell width and change its style and format by using formatting tools.			
Week 15	**3**	- Learn how to add, delete, freeze, or hide rows and columns on a work page and how to print digital data or charts			
Week 16	**3**	- Dealing with diagrams. How to convert digital and textual data into different types of charts using the Chart Wizard - Learn how to make modifications and revisions.			
Week	**3**	- Presentation program			

17		(Power Point): - Learn about the concept and how the program works			
Week 18	**3**	- Learn how to create and display program slides			
Week 19	**3**	Getting to know the Matlab program and its most important versions, and learning about the program's interface and basic operations			
Week 20	**3**	Learn about Matlab commands.			
Week 21	**3**	Learn how to create the file (m.file), matrices, vectors, and operations on them			
Week 22	**3**	Identify logical expressions in Matlab and add properties to drawing within the program			

Week 23	**3**	2-Dimensional drawing			
Week 24	**3**	Identify loops			
Week 25	**3**	Introduction to simulation in Matlab			
Week 26	**3**	Application of Matlab in electronic circuits			
Week 27	**3**	Application of Matlab in analog communications - AM type			
Week 28	**3**	Application of Matlab in analog communications - FM type			
Week 29	**3**	Application of Matlab in digital communications - ASK type			
Week 30	**3**	Application of Matlab in digital communications - FSK and PSK			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources

Required Textbooks (Curricular books , any)	
Main References (Sources)	

Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Laser Techniques	
2- Course Code :	
3- Semester / Year :	
Second Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
120 h / 8 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Email :	
8- Course Objectives :	
Course Objectives :	**1- The student learns the basics of laser light.** **2- The student gains experience and skills in creating and dealing with laser light.** **3- The student learns about the different methods of**

	constructing various types of lasers.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**4**	Introduction to lasers, laser spectroscopy, and Raman spectroscopy/uses of lasers		Lectures	Daily and periodically Tests
Week 2	**4**	Transition between energy levels			
Week 3	**4**	Absorption and emission ratios			
Week 4	**4**	Continue explaining the rates of absorption and emission			
Week 5	**4**	Boltzmann distribution			
Week 6	**4**	Census reversal			
Week 7	**4**	Inducing population inversion in atoms at			

		three levels			
Week 8	**4**	Inducing number inversion in atoms at four levels			
Week 9	**4**	Various laser media			
Week 10	**4**	Laser components and structures			
Week 11	**4**	How the laser works in detail			
Week 12	**4**	Explaining the properties of lasers and the benefits of these properties			
Week 13	**4**	Continue explaining the rest of the laser properties and benefits			
Week 14	**4**	Pumping to cause population inversion			
Week 15	**4**	Types of pumping			
Week 16	**4**	Laser spectrometry			
Week 17	**4**	Direct absorption spectrophotometry			
Week 18	**4**	Various techniques			

		for laser spectrometry			
Week 19	**4**	Time-resolved spectroscopy			
Week 20	**4**	Time-resolved spectroscopy techniques			
Week 21	**4**	How to achieve Time-resolved spectroscopy techniques			
Week 22	**4**	The relationship between Intensity and time delay in Time-resolved spectroscopy			
Week 23	**4**	Raman spectroscopy/introduction and importance			
Week 24	**4**	Uses of Raman spectroscopy			
Week 25	**4**	Investigation of Raman spectroscopy			
Week 26	**4**	Laws of Raman spectroscopy			

Week 27	**4**	Cavity dumping			
Week 28	**4**	Q- Switching			
Week 29	**4**	Q- Switching and pockels effect			
Week 30	**4**	Passive Q-switching , Mode Locking			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources

Required Textbooks (Curricular books , any)	
Main References (Sources)	
Recommended Books References	
Electronic References - Websites	

Course Description Form	
1- Course Name :	
Communication Systems	
2- Course Code :	
3- Semester / Year :	
Second Academic Year	
4- Description Preparation Date :	
2024	
5- Available Attendance Forms :	
In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
120 h / 8 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Murtadha Ali Nusaif Email : murtadha.shukur.inj@atu.edu.iq	
8- Course Objectives :	
Course Objectives :	**1- The student learns the basic information of telecommunications systems.** **2- The student learns about the systems and structures of radio, television, and telephone systems.** **3- The student learns the methods of transferring information**

	in communications systems, their specifications, features, and the operations that take place on them.
9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**4**	Filters – BSF Filters: (RC))-(LPF)-(HPF)-(BPF)		Lectures	Daily and periodically Tests
Week 2	**4**	Active Filters (BSF):-LPF)-(HPF)-(BPF).			
Week 3	**4**	Embedding - its meaning - its types - Embedding (AM) vector analysis.			
Week 4	**4**	Frequency spectrum - power distribution - calculation of the equivalent modulation factor.			
Week 5	**4**	Types of amplitude modulation (AM) with their frequency			

		spectrum			
Week 6	**4**	Types of modulators used to generate AM: Balanced modulator - toroidal modulator - Coin modulator - other modulators.			
Week 7	**4**	Modulation Detection (AM) – Envelope Detector – Synchronous Detector Distortion in detection circuits – (AGC)			
Week 8	**4**	Block diagram of the amplitude modulated wave transceiver - amplitude comparison coefficients of receivers (sensitivity - selectivity - quality - distortion).			
Week 9	**4**	Frequency modulation (FM) modulation (PM) - mathematical analysis of modulated waves - modulation ratio - frequency deviation.			
Week 10	**4**	Transmission bandwidth and frequency spectrum for PM and FM modulation.			
Week 11	**4**	FM modulation and generation methods -			

		direct method, indirect method, amplified frequency modulation (Secttreo FM) - Stero			
Week 12	**4**	FM signal detection - proportional detector - Fostersley method.			
Week 13	**4**	Coding - Sampling Theory (Quantization) - Transformation Coding.			
Week 14	**4**	Modulation (PM) - Advantages of pulse modulation - Types (PCM)-(PPM)-(PDM)-(PAM).			
Week 15	**4**	Distribution (Multiplexing) -(FDM) - (TDM).			
Week 16	**4**	PSK-FSK-ASK digital modulation.			
Week 17	**4**	Transmission information and system capacity – error (SNR) signal to noise ratio			
Week 18	**4**	Cell phones - Frequencies used - Technologies used (FDMA) - (TDMA) - (CDMA).			
Week 19	**4**	Telegraph circuits - (Teleprinters) - radio .telegraph transmitters			

Week 20	**4**	FaximileTransmission**))-(**Fas-Receiver**)- ((**Telex			
Week 21	**4**	Optical fibers - types - characteristics - transmitters and receivers.			
Week 22	**4**	Types of antennas - basics of antennas - antenna parameters.			
Week 23	**4**	Propagation of radio waves (terrestrial - celestial - line-of-sight waves).			
Week 24	**4**	Vertical antennas - ferrite rod antennas - UHF antennas, microwave and horn .antennas			
Week 25	**4**	Use of microwaves in communications.			
Week 26	**4**	Satellite communications - features and properties - transmission and reception - ground stations. - satellite			

		orbits - multiple .access			
Week 27	**4**	Microwaves - their generation - frequency **.**spectrum			
Week 28	**4**	Mobile phones - Introduction - Technologies used - The most important considerations in transmission - Shadow - Interference - Noise. - Transmitting signals wirelessly - Wireless (and wireless - wired)			
Week 29	**4**	GSM networks ; Functions and structure			
Week 30	**4**	Thuraya - Thuraya services - Thuraya features - SMS - Thuraya uses - Geographical areas for network service .coverage			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
- Daily preparation, daily oral Discussion and Contribution.
- Monthly written exams, reports, etc.
- The Accumulative grade through the year should be 50 degree
- Final exam should be 50 degree.

12- Learning and Teaching Resources

Required Textbooks (Curricular books , any)	**2-Electronic Communication . Dennis -Riddy**

Main References (Sources)	
Recommended Books References	**Principle of communication -4 systems Tuab & Segilling**
Electronic References - Websites	

Course Description Form
1- Course Name:
Microwaves
2- Course Code:
3- Semester / Year:
Second Academic Year
4- Description Preparation Date:
2024
5- Available Attendance Forms:
In Class Attendance

6- Number of Credit Hours (Total) / Number of Units (Total) :	
120 h / 8 units	
7- Course administrator's name (mention all, if more than one name) :	
Name: Anwer Sabah Ahmed Email: inj.anw@atu.edu.iq	
8- Course Objectives:	
Course Objectives:	**1- The goal of this course is to aid students in comprehending the fundamentals of microwave theory and methodology.** **2- To present the uses of microwave**

	engineering in contemporary radar and satellite communication systems. **3- Students will be able to build basic passive and active microwave components, analyze microwave networks.**
9- Teaching and Learning Strategies	
Strategy:	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and

				monthly tests - Scientific reports.	
10- Course Structure:					
Week	**Hours**	**Required Learning Outcomes**	**Unit or Subject Name**	**Learning Method**	**Evaluation Method**
Week 1	**4**	Spectrum of electromagnetic waves, propagation of electromagnetic waves	Microwaves		
Week 2	**4**	Microwave region. Uses of microwaves			

Week 3	4	Atmospheric effects in space, controls, attenuation			
Week 4	4	The effect of microwaves on living organisms			
Week 5	4	Characteristics of the guide guide, with circular cross-section and rectangular cross-section			
Week 6	4	The product of the field is the wavelength cut-off in the waveguide			
Week 7	4	Microwave speed. Standing waves -			

		resistance - Smith chart			
Week 8	4	Microwave elements, terminations, positive guide transformers - attenuators			
Week 9	4	Image template, selected channels			

Week 10	4	Sliding Line – Twisted and sloped microwave detector			
Week 11	4	Directional coupler			
Week 12	4	Mixed conductor			
Week 13	4	Miniature waveguide, filters			

Week 14	4	Corridor, insulator			
Week 15	4	Faraday rotary attenuator, optical waveguide			
Week 16	4	Principles of antennas, radiation model			
Week 17	4	Antenna Gain – Polarization			
Week 18	4	Types of antennas			
Week 19	4	Gun antenna – Gun oscillator			

Week 20	4	Resonant cavitation – resonant absorption Klystron			
Week 21	4				

Week 22	4	Magnetron			
Week 23	4	Traveling wave valve			
Week 24	4	Parabolic antenna model measurements			
Week 25	4	Helical antenna model measurements			
Week 26	4	Strip antenna model measurements			
Week 27	4	H-level pattern measurements for a linear type antenna			

Week 28	4	E-level model measurements for a linear type antenna			
Week 29	**4**	Dielectric antenna model measurements			
Week 30	**4**	Doppler effect study			

11- Course Evaluation
Distribution of the grade out of 100 according to the tasks assigned to the student, such as : - Daily preparation, daily oral Discussion and Contribution. - Monthly written exams, reports, etc. - The Accumulative grade through the year should be 50 degree - Final exam should be 50 degree.

12- Learning and Teaching Resources	
Required Textbooks (Curricular books , any)	D. M. Pozar, Microwave engineering. Hoboken, Nj: Wiley, 2012.
Main References (Sources)	F. Gustrau, RF and Microwave Engineering. John Wiley & Sons, 2012.
Recommended Books References	Microwave Measurements (Materials, Circuits and Devices)" by R J Collier and A D Skinner
Electronic References - Websites	https://www.sanfoundry.com/

Course Description Form
1- Course Name :
Communication Workshop
2- Course Code :
3- Semester / Year :
Second Academic Year
4- Description Preparation Date :
2024
5- Available Attendance Forms :

In Class Attendance	
6- Number of Credit Hours (Total) / Number of Units (Total) :	
120 h / 8 units	
7- Course administrator's name (mention all, if more than one name) :	
Name : Email :	
8- Course Objectives :	
Course Objectives :	**The student acquires skills in how to maintain and operate information transmission (communications) devices.**

9- Teaching and Learning Strategies	
Strategy :	- Scientific lectures - Practical Lab. Experiments - Scientific trips - Daily, quarterly and monthly tests - Scientific reports.

10- Course Structure :

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
Week 1	**4**	Introduce Equipment in the workshop and how to use it		Lectures	Daily and periodically Tests

Week 2	**4**	Malfunction in the dial phone			
Week 3	**4**	Malfunction in the push button phone device.			
Week 4	**4**	A malfunction in the telephone circuit from the exchange to the subscriber			
Week 5	**4**	Malfunction in the telephone network			
Week 6-8	**4**	Malfunction in the crossbar switch			
Week 9-11	**4**	Malfunctions in an electronic switch			

Week 12	**4**	A malfunction in the group formation phase of a messaging station			
Week 13	**4**	Malfunction in the redundant group stage (S.G) of a messaging station			
Week 14	**4**	Malfunction in the audio frequency phase (V.F) of a relay station			

Week 15	**4**	Malfunction in the telegraph stage of a messaging station			
Week 16	**4**	Malfunction in the channel axis stage (channel a dapler) of a numerical messaging station			
Week 17	**4**	A malfunction in the encoding and recoding (codec) of a digital messaging station			
Week 18	**4**	Malfunction in the digital multiplex stage of a digital messaging station			
Week 19	**4**	A malfunction in the auxiliary signal stage of a numerical messaging			

		station			
Week 20	**4**	Malfunction in the alarm unit of a numerical messaging station (Alarm).			
Week 21	**4**	Malfunction in the transmission center of a numerical messaging station			

Week 21	**4**	Another malfunction in the numerical .messaging system			
Week 22 - 23	**4**	Malfunction in telex transmission			

Week 24 -25	**4**	Malfunction in fax transmission			
Week 26 - 27	**4**	Fault in the optical cable device			
Week 28 - 30	**4**	Malfunction in the wireless telephone device			

11- Course Evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as :
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- Final exam should be 50 degree.

12- Learning and Teaching Resources

Required Textbooks (Curricular books , any)	**2-Electronic Communication . Dennis -Riddy**
Main References (Sources)	
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Electronic References - Websites	