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

Academic Program and Course Description Guide

2024

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: Southern Technical University

Faculty/Institute: Technical Institute of Architecture

Scientific Department: Electronic and communications technologies

Academic or Professional Program Name: Diploma in electronics and communications technology

Final Certificate Name: Diploma in electronic and communications technologies

Academic System: quarterly

Description Preparation Date: 5/10/2023

Signature:

Head of Department

Name:..Dr.Muhsen Jabbar Qubian

Date: 11/3/2024

Signature:

Scientific Associate Name:.

Suhad Jassim Khalifa

Date:12/3/2024

File Completion Date: 10/3/2024

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Naglaa Kadhem Abdel Hassan

Date: 12/3/2024

Signature:

Approval of the Dean

12/3/2024

1. Program Vision

Forming a scientific or human base in the field of maintenance, programming and upkeep of electronic devices and computer applications. It seeks to prepare plans to develop staff and curricula to ensure that the requirements of quality standards are met, in addition to keeping pace with development and ready-made applications in order to contribute to achieving part of them, and for the department to be a distinguished scientific research edifice in its programs and curricula. And his scientific research.

2. Program Mission

The department seeks to prepare specialized staff with a high level of professionalism to deal with electronic and information software and work to provide appropriate opportunities to develop the community's capabilities in investing in the developments in technology and meeting their needs in the field of computers, and providing training consulting services.

3. Program Objectives

1- Preparing qualified technical personnel to maintain electronic equipment and devices.

2- Preparing and verifying the data and entering it into the computer.

3- Participate in testing, auditing and debugging programmed systems.

4- Participation in preparing communications system designs.

4. Program Accreditation

None

5. Other external influences

1-Application + research projects + ongoing workshops for students.

2- Also, external influences contribute to solving many of the dilemmas related to approved studies.

3- Labor market needs, quality of graduates, and support of students' skills.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	15 The first stage 16The second stage	25 units 23 units	46% 54%	Specialization + assistant
Summer Training	For two months for the first stage			
Other				

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
2022/2023 The first stage Chapter I	COM1	Computer principles 1	0	2
	MATH	mathematics	2	0
	ELEC	Principles of electronics	2	2
	DC	DC circuits	2	2
	DIG	Principles of digital circuits	2	2
	DRA	Electrical and engineering drawing	0	3
	WOR	The workshop	0	4
	HUM	Human rights and democracy	2	0
المجموع			10	15
2022/2023 The first stage Chapter II	ENG	English language (1)	2	0
	WOR	The workshop	2	4
	ELEC	Electronics	2	2
	AC	AC circuits	2	2
	DIG	Digital circuit applications	2	2
	DRA	Calculator assisted drawing	0	4
	SFE	Occupational safety	2	0
المجموع			12	14
2022/2023 The second phase Chapter one	ELEC	Electronic circuits (1)	2	2
	DEV	Measuring devices (1)	2	2
	COM	Microcalculators (1)	2	2
	COMMU	Communications (1)	2	2
	WOR	Electronic devices maintenance	0	4

	ENG	English language (2)	2	0
	PLC	Logic control circuits	2	2
	PRO	Research project	0	0
المجموع			14	14
	ELEC	Electronic circuits (2)	2	2
	DEV	measuring devices (2)	2	2
	DIG	Digital communications	2	2
	WOR	Maintenance of electronic devices	0	4
	CON	Control systems	2	2
	COMP	Computer applications	0	2
	ICS	Audio and visual devices	2	2
	CRI	Baath crimes	2	0
	PROJ	research project	0	2
المجموع			12	18

Number of theoretical hours for the two years = 42 Percentage of theoretical hours = 40%

Number of practical hours for two years = 62 Percentage of practical hours = 60%

Total graduation units for the two years = 104

8. Expected learning outcomes of the program

Knowledge

A1- Introducing the student to the design of electronic circuits and the extent of their realistic implementation.

A2- Teaching the student the basics of electronics.

A3- Providing the student with the skills to implement and install electronic equipment and devices.

A4- The student's knowledge of digital and logical circuits and their implementation areas. **A5- The student's knowledge of the labor market and changes in the fields of electronics.** **A6- The student's knowledge of how to conduct laboratory experiments and how to analyze and apply the results.**	
Skills	
B1 - Carrying out periodic and emergency maintenance work for electronic equipment and devices. **B2 - Installing electronic devices and their components and implementing maintenance methods for them.** **B 3- Maintaining electronic devices and ensuring their durability.** **B4- Installing, maintaining and operating communications and digital devices.**	
Ethics	
C1- Introducing the graduate into the labor market and spreading the spirit of fair competition. **C2- Competition among undergraduate students for the purpose of completing higher university studies.** **C3- The ability to analyze, deduce, and practice professional ethics in all circumstances.**	

C4- Working under pressure, adopting equality and justice, and working as a member of one team.	

9. Teaching and Learning Strategies

- Education strategies:

Teaching strategies are the methods and approaches followed by the professor in communicating educational goals to students. Below are some of the teaching strategies:

1- Lecture or delivery strategy: In which the professor presents information, facts, and other ideas to the students related to the topic at hand.

2- Discussion strategy: In this type of teaching strategy, the professor determines the topic that will be discussed in the lecture

3- Problem-solving strategy: In this strategy, the cognitive environment of students is activated through problem-solving activities, through most positive processes and activities that stimulate thinking and raise motivation to learn.

4-Project-based learning strategy: This strategy relies on design work that requires applied work. Students are assigned an applied project for the activity, and they are forced to research, read, and use books and all cognitive sources in order to accomplish what is required.

-Learning strategies:

These are the methods that the student follows in order to get the best benefit from the educational material, and the most important strategies are:

1- Conducting daily exams for students before the start of the lecture in order to remember previous lectures and information.

2-One of the best types of learning methods is (studying), through which the student can

memorize any electronic design circuit or law.

3- Inference, that is, teachers can reinforce this strategy by asking inferential questions after each lecture.

10. Evaluation methods

Tests of both written and oral, in-person and electronic, daily, semester and final examinations, in addition to daily examinations, writing reports, discussing experiments and analyzing results.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
1- A.P.DR. Muhsin Jabbar Kabayan 2-A.L. Iqbal Hanoun listens 3- A.L. Wissam Rahim Rassan 4- A.L. Mortada Thaer Salem	communication electricity electricity Calculators	Networks Control Power Systems networks	Giving awareness lectures Holding workshops and seminars		Personnel personnel personnel	lecturer

5- A.L. Saja Sami Mahmoud	Law	rights				lecturer

Professional Development

Mentoring new faculty members

1- Holding workshops, seminars and seminars on developments in the field of electronics and information technology for reliability.

2- Put them in courses to develop administrative skills, time management, and smart skills.

3- Keeping pace and following up on the implementation of the government program and income.

Professional development of faculty members

The focus in the Department of Electronic and Communications Technologies in general is on continuous improvement. The department always seeks to improve the scientific and administrative process and overcome all the difficulties and obstacles that hinder the educational program by developing human resources for personal and professional development.

The following procedures explain the steps implemented or in the process of implementation in this area:

D1. Continuous improvement and development of faculty members through training programs and workshops inside and outside the department, university and country.

D2. Increasing extracurricular activities, such as holding conferences, scientific seminars,

and personal and sports creativity, locally, regionally, and internationally.

D3. Encouraging faculty members to obtain the highest academic and administrative ranks through promotions.

D4. Providing modern scientific sources and books for the department's library to keep pace with continuous progress.

12. Acceptance Criterion

1-Acceptance rates obtained by students in vocational preparatory school.

2-The institute's examinations for the department and the student's desire.

3- Examining the student's fitness and mental ability.

4- Central admission issued by the Ministry of Higher Education.

13. The most important sources of information about the program

•The curriculum approved by the Ministry of Higher Education and Scientific Research and its guidelines.

• Decisions and recommendations of the scientific committees at the Southern Technical University.

• Courses in teaching methods.

• Self-assessment report (SAR) for previous years.

• Description of courses.

• Courses in civil society organizations.

• Conferences, seminars, workshops and panel discussions.

• Relevant state institutions.

- **Internet searches for similar experiences.**
- **Personal experiences**
- **Labor market needs**

14. Program Development Plan

1- Adding materials that keep pace with the change and development taking place in various electronic and communications technologies.

2- Deleting and creating old materials while preserving the basics and their continuity.

3- Stimulating and encouraging scientific and practical visits to laboratories, operating companies and government departments.

4- Developing curricula to keep pace with the times, technology and globalization.

5- Opening specialized branches in the field of measurement, control, and network maintenance according to the needs of the labor market.

6-Use and develop comprehensive virtual laboratories.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
The First		Principles of electronics	Specialized	√	√	√		√	√	√	√	√	√	√	√
		Digital circuits	Specialized	√	√	√	√	√	√	√	√	√	√	√	√
		Electrical circuits	Specialized	√	√	√		√	√	√	√	√	√	√	√
		The workshop	Specialized	√	√	√	√	√	√	√	√	√	√	√	√
		mathematics	assist	√	√	√	√	√		√		√	√	√	√
The Second		Electronic circuits	Specialized	√	√	√			√	√	√	√	√	√	√
		Microcomputers	Specialized	√	√	√	√	√	√	√	√	√	√	√	√
		Telecommunications	Specialized	√	√	√	√	√	√	√	√			√	√

		Control systems	**Specialized**	√	√	√		√	√	√		√	√		√
		English language (2)	**General**	√	√	√	√	√	√	√	√	√	√		√

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

Course Description Form

1. Course Name:
Measurement and control devices
2. Course Code:
3. Semester / Year:
The first stage: quarterly...there are mainly quarterly subjects only, and they end with the end of the semester, which are (human rights, and computers) and replaces these two subjects in the second semester (occupational safety and the English language). **The second stage: Annual.... There are semester subjects in this system for the first semester (PLC, and the English language), and they are solved.** **The place of these two subjects in the second semester (control and computers)**
4. Description Preparation Date:5/10/2023
This description was prepared by the committee placed in the electronics department
5. Available Attendance Forms:
In-person + electronic + integrated
6. Number of Credit Hours (Total) / Number of Units (Total)
120 hours annually. 4 hours per week / 120 units
7. Course administrator's name (mention all, if more than one name)
Name:1-Muhsin Jabbar kabayan .....Email: muhsin.alamery@stu.edu.iq 2- Iqbal Hanoon Essig .....Email:iqbal.hanoon@stu.edu.iq
8. Course Objectives
1- Teaching the student the concept of measuring devices and the conditions for indicating them and teaching them. **2-Devices for measuring various electrical quantities, both electronic and digital.**

3- Measuring pressure and temperature with electrical and non-electrical devices.

4 Elements of power transformers, their types, and their use in measuring bridges.

5- Elements of registration and environmental visa.

9. Teaching and Learning Strategies

Strategy	
	- Education strategies: **Teaching strategies are the methods and approaches followed by the professor in communicating educational goals to students. Below are some of the teaching strategies:** **1- Lecture or delivery strategy: In which the professor presents information, facts, and other ideas to the students related to the topic at hand.** **2- Discussion strategy: In this type of teaching strategy, the professor determines the topic that will be discussed in the lecture** **3- Problem-solving strategy: In this strategy, the cognitive environment of students is activated through problem-solving activities, through most positive processes and activities that stimulate thinking and raise motivation to learn.** **4- Project-based learning strategy: This strategy relies on design work that requires applied work. Students are assigned an applied project for the activity, and they are forced to research, read, and use books and all cognitive sources in order to accomplish what is required.**

-Learning strategies:

These are the methods that the student follows in order to get the best benefit from the educational material, and the most important strategies are:

1- Conducting daily exams for students before the start of the lecture in order to remember previous lectures and information.

2-One of the best types of learning methods is (studying), through which the student can memorize any electronic design circuit or law.

3 - Conclusion, that is, teachers can reinforce this strategy by asking inferential questions after each lecture.

10. Course Structure:

Digital circuits (first stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours	**1- Teaching the student the basics of logical circuits in electronic computers and how to** **2- Build simple digital circuits using Truth tables**	eneral idea of numerical stems (types and details) 2-Transfer between the numerical systems 3- Logic gates (types, working principle, truth (tables, logical symbol low to connect the logic es to form logic circuits Boolean algebra and the rule of de-Morgan Simplification of logical equations using Boolean gebra and the laws of De Morgan's laws The design of the logical gates using NOR and NANDcircuits 8-Ways of writing the quation from truth table (POS, SOP) Karnaugh Map (for two variables, the three	**lecture And the laboratory**	**Oral and written tests**

Vacation 1 **2** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12** **13** **14** **15**	 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours	**Teaching the student swing circles Counters, addition circuits, and registers.**	variables, the four (variables) Simplification of logical uations using Karnaugh Map 11-Calculations in the binary system (addition, subtraction, subtraction .(using complements) 12-Logi circuit applications (half adder, full adder, parallel adder circuits) Binarysubtractorcircuits (half subtractor,full subtractorparallel tractor) circuit using the der circuit by method of 1s complements 14-The circuit of digital nparator (one stage and two stages) 5-The circuit of decoder size of 2:4 ,3:8 and 4:10 ..... **second course** 1-The circuit of encoder size of 4:2, 8:3 and 10:4 2-Introduction to quential logic circuits, a general idea f the Flip Flop, flip flop type (S-R) 3-The flip flop type J-K nd master slave flip flop 4-The D- flip flop and T flip flop -The registers, design of registers, enter the information and output from registers he shift register, shift to left, shift to right 7-The counter- Asynchronous counter 8-The synchronous unter- the cycle counter -The multiplexer and its applications The code convertor -the application of code convertor 11-Programmable logic array Concepts of programmable logic array(PLA);Concepts of programmable array (logic(PAL -Buffers, Non inverting uffers, inverting buffers,		

			Tri-state buffers, transmission gates 13-Introduction to uential logic latches and flip flops, Latches- Edgetriggered flip flop, Flip-flop operating characteristics, Flip-flop applications 4-Introduction To State ،Machine Design 15-State diagram and State table		

11. Course Structure:

Electrical circuits and measurements (first stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours	The student will be able to: 1- Get to know Measuring devices different and their uses 2- Get to know Printed electronic boards and dealing with her 3- Being able to build various electronic circuits on	1-How to use measuring devices Various tools in the vorkshop, such as (amphometer, oscilloscope, power,...). 2-How to use caustics - types Irons used in the rkshop - training on the Samsung ironing program. 3- How to use solder absorbent caustic – solder removing tools such as Jordan absorbent (Soldering Sucker), Wire Lime Remover (Old Remover), raining on some of its operating uipment on the printed board, the caustics used in soldering he integrated electronic circuit - ect proficiency in IC soldering - how emove the electronic lighting doses nd remove them from the circuit. ifferent printed electronic circuits - arning how to perforate them and tall various electronic components on them. -The different types of resistors here the material the resistors are made of - the capacity that each resistance can withstand - low to read resistor values using methods Various – variable resistors and Special (VDR, PTC, NTC) And how to check it. 6- Make a circuit to connect the resistors to straight ke a circuit to connect the resistors to	**lecture And the laboratory**	**Oral and written tests**

		Printed board and Learn how to examine and test it.	Parallelism ke a circuit to connect the resistors to eries and parallel within a circuit The different types of expanders here is the type of insulator used? panels and the voltage they bear - ling capacitor values using different hods - How to check capacitors and s to replace them - Making circuits to connect capacitors to es, parallel, and mixed connectivity On the printed board with the examination. 8-Different types of keys l in electronic devices and methods esting them - the current they can withstand Each key - use each type. 9-Types of fuses used in ronic circuits - types and diameters of wires used in fuses - The current that each type can withstand - How to repair fuses. 10-Different types of quasi Connectors (Diode, transistor, etc.) from Where it is manufactured and the materials Methods used in its manufacture Number them and find their equivalents. nspection of faulty semiconductors (diode, transistor, etc.) Valid for a group of them. 12- Integrated Circuits - entify the numbering of parties to several Types of these circuits - how Manufacture of these circuits - components involved in manufacturing. Showing a scientific film about how Electronic components industry sistors, capacitors, transistors, etc.). - How to read electronic maps and e circuits to determine the location of the fault Its causes. The student learned how to design ectronic circuits on the board and ll the electronic components on it - how der these components to the board (simple circle). ..... **second course**		
Vacation					
1	4 hours		1- The previous work is repeated by standing up The student designs a more complex circuit.		
2	4 hours		Examination of semiconductors - nsistors and diodes that are faulty and suitable for the assembly Of which.		
3	4 hours		3- A field visit to one of the ndustrial facilities in the socialist sector.		
4	4 hours		4- Building complex and simple ctronic circuits on printed boards Learn how to check it and		
5	4 hours				
6	4 hours				
7	4 hours				
8	4 hours				

9 **10** **11** **12** **13** **14** **15**	4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours		Testing it is like a filter circuit. onstruct a half-wave unified circuit he printed board and identification How to examine and test it. Construct the full wave circuit on e printed board and learn how to inspect and test it. Build a full-wave voltage multiplier it on a printed board and identify it How to examine and test it. Construct a circle of clippers on the printed board and identify How to inspect and test it. 9-Using a Zener Diode as a voltage regulator circuit On the board Print and learn how Checked and tested. 10- Construct a transistor amplifier circuit he printed board and identification ow to examine and test it (based on actical common emitter amplifier circuit. 11- Construct a two-stage amplifier circuit Printed board and learn how Checked and tested. Build a push-pull amplifier circuit e printed board and learn how to inspect and test it. Build an RC Oscillator circuit on a ed board and learn how to examine and test it. 14- Build a Hartley circuit on a printed board and learn how Checked and tested. 15- Build a circuit with a ariable DC voltage supply on the printed board Learn how to check it and Test it.		

12. Course Structure:

Laboratories/electronic workshop(first stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 **2** **3** **4** **5** **6** **7** **8**	4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours	The student will be ab to: 1- Get to know Measuring devices	1-How to use measuring devices ous tools in the workshop, such s (amphiometer, oscilloscope, power supply,...). 2-How to use caustics – types ustics used in the workshop - training on caustic welding. 3-How to use a soldering	**lecture** **And the** **laboratory**	**Oral and** **written tests**

9 **10** **11** **12** **13** **14** **15**	4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours	different and their use 2- Get to know Printed electronic boards and dealing with her 3- Being able to build various electronic circuits on Printed board and Learn how to examine and test it.	on - a soldering iron, such as a soldering iron older sucker), older remover, Training on some electronic mponents and placing them on printed board, caustics used in oldering integrated electronic rcuits - the correct method for ldering an IC - how to remove solder from the ends of an ectronic circuit and remove it from the circuit. 4-Different printed ctronic circuits - learning how o perforate them and install ious electronic components on them. 5-The different types of resistors here the material the resistors made of - the capacity that each resistance can withstand - How to read resistor values using methods arious – variable resistors and Special (VDR, PTC, NTC) And how to check it. 6- Make a circuit to connect the resistors to straight Make a circuit to connect the resistors to Parallelism Make a circuit to connect the resistors to Series and parallel within a circuit 7-The different types of expanders Where is the type of insulator used? panels and the voltage they bear - Reading capacitor values using different methods – How to check capacitors and ways to replace them – Making circuits to connect capacitors to Series, parallel, and mixed connectivity n the printed board with the examination. 8-Different types of keys sed in electronic devices and nethods of testing them - the current they can withstand Each key - use each type. 9-Types of fuses used in lectronic circuits - types and ameters of wires used in fuses The current that each type can withstand - How to repair fuses. -Files - types - methods amination - uses - identification		

			ures - reading file types that use color codes and numbering. trical transformers - their types - Methods of examining it - determining the type of transformer – Autotransformation – the difference between Autotransformers and transformers Ordinary. 10-Different types of quasi Connectors (Diode, transistor, etc.) from here it is manufactured and the materials ethods used in its manufacture Number them and find their equivalents. 11- Inspection of faulty niconductors (diode, transistor, etc.) Valid for a group of them. 12- Integrated Circuits - entify the numbering of parties to several Types of these circuits - how Manufacture of these circuits - components involved in manufacturing. 13- Showing a scientific film about how ectronic components industry sistors, capacitors, transistors, etc.). 14- How to read electronic maps and trace circuits to ermine the location of the fault Its causes. 15- The student learned how design electronic circuits on the oard and install the electronic components on it - how older these components to the board (simple circle).		
vacation			..... **second course**		
	4 hours				
1	4 hours		1- The previous work is repeated by standing up The student designs a more complex circuit. 2- Examination of miconductors - transistors and des that are faulty and valid for the assembly Of which. 3- A field visit to one of the ustrial facilities in the socialist sector. 4- Building complex and simple electronic circuits on		
2	4 hours				
3	4 hours				
4	4 hours				
5	4 hours				
6	4 hours				
7	4 hours				
8	4 hours				
9	4 hours				
10	4 hours				

11 **12** **13** **14** **15**	4 hours 4 hours 4 hours 4 hours		printed boards Learn how to check it and esting it is like a filter circuit. 5- Construct a half-wave unified circuit On the printed board and identification How to examine and test it. 6- Construct the full wave circuit on e printed board and learn how to inspect and test it. 7- Build a full-wave voltage ultiplier circuit on a printed ard and learn how to examine and test it. 8- Construct a circle of ppers on the printed board and identify How to inspect and test it. 9-Using a Zener Diode as a voltage regulator circuit On the board Print and learn how Checked and tested. 10- Construct a transistor amplifier circuit On the printed board and identification n how to examine and test it (based on tical common emitter amplifier circuit. 11- Construct a two-stage amplifier circuit Printed board and learn how Checked and tested. 12- Build a push-pull amplifier circuit printed board and learn how to inspect and test it. Build an RC Oscillator circuit on rinted board and learn how to examine and test it. 14- Build a Hartley circuit a printed board and learn how Checked and tested. 15- Build a circuit with a riable DC voltage supply on the printed board Learn how to check it and Test it.		

13. Course Structure:

Electronics (first stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours 4 hours	Introducing the student to: Electronic components manufactured from semiconductors of various types - composition - properties - uses In circles Electronic applications and analysis Its electronic circuits. Giving the student an idea	1- Semiconductor theory- Atomic structure-levels Energy-Crystals-Conduction in Crystals - gap current - how to Move gaps. 2- Grafting-positive crystal type -type N-current negative crystal Electrons and gap current -Total resistance. 3-4- Semiconductor diodes- N connection—Evacuation zone configuration -Barrier Voltage- Power Hill- Thermal Effects - Duo Biased-biasForward-biased Inverse-isotropy curves in orward and reverse directions - crossing current - ephemeral current Minority carriers – permissive leakage current Breaking voltage - breakdown voltage - is greatest rward current - greatest reverse urrent - equivalent circuit of the diode. 5- The diode as a curren nifier - a half-wave unifier - the ue - the continuous value of the rrent and its calculation - the fective - the output frequency 6- Full-wave unification ng a center-branch transformer ntry combiner - calculating the tinuous and effective values of oltages and currents - output equency. Comparison between half-wave and full-wave fication - comparison between full-wave unifiers.	**lecture And the laboratory**	**Oral and written tests**

		about optoelectronics, its components, integrated circuits, and simplified applications for an amplifier Processes .	7- Filters - filtering using plitude - (LC) and (RC) filters - tput voltages - ripple - voltage ultipliers - trimming circuits - positive trimming - negative mming - compound trimming - eak-to-peak detector - positive and negative clamps. 8-9 - The zener diode – its ucture - its symbol - its forward and reverse properties - akdown and breaking voltages - er impedance - power tolerance - temperature effects - zener proximation - constant voltage ulation - constant voltage source uit - variable capacitance diode and its applications. 10-11- Bipolar transistor – ucture - symbol - properties - as - definition (Bdc) - definition (Cdc) - e relationship between them - definition of important areas On the characteristic curves. nsistor bias circuits - base bias - emitter bias - collector bias. - pproximation in the transistor and the equivalent circuit. Transistor characteristic curves ork areas-Definition of Icbo and Iceo-Current gain curve-The tionship between Icbo and Icbo 13-Transistor bias circuits- Base bias-emitter bias. 14-15- The collector's bias Self-biasing back feed – oltage divider bias—practical examples.		
Vacation			**second course**		
1	4 hours		1- Action points - rest point - applied examples.		
2	4 hours		- The continuous equivalent circuit of the transistor - the continuous load line -.		
3	4 hours		3- Using the transistor to amplify small signals - the quivalent alternating circuit - rent gain - voltage gain - power . - ideal approximation - hybrid stants - equivalent circuit using n coefficients - voltage gain - rrent gain - power gain - input and output resistors - signal mplifiers Small-base market-emitter market.		
4	4 hours				
5	4 hours				
6	4 hours				
7	4 hours				
8	4 hours				
9	4 hours				
10	4 hours				
11	4 hours				
12	4 hours				
13	4 hours				
14	4 hours				
15	4 hours		4- Using a transistor to regulate oltage-series regulator-parallel regulator - onstant voltage source circuit. 5- Field effect transistor – structure - MOSFET curve - E-MOSFETD-MOSFET –		

			Wicker Curve- Effort Curves row Vgs, Idss, Vp - Comparison between BJT, JFET - working theory - FET bias circuits - constant ent source bias - working point lf-bias - FET equivalent circuit - using FET in small signal amplification - comparison tween types of FET - (MOSFET, FET). (BJT) 7- Light dependent resistor – ıt-emitting diode - photodiode - ototransistor - breakout board Seven - its composition and applications. 8-9-10-11-12- Controlled silicon modules current (thyristor) - installation ypes - Properties - Theory of ction - Triaks - Dayaks - Their Symbol - Their Properties -Theory of their operation- mparison between thyristors, DACs and TRIACs-Thyristor protection om a change in voltage, from a change in current). 13-14-15- egrated circuits - its meaning - dvantages and disadvantages - comparison between it and iscrete components - an idea ut its manufacture - operational mplifier 741 - its symbol - its ninals - its uses - applications of rational amplifiers - small signal olification - addition of signals - otraction of signals - examples.		

14. Course Structure:

Engineering and electrical drawing(first stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4	3 hours 3 hours 3 hours 3 hours	1- Student training On the cor foundations engineering draw	1- Advantages of computer awing, basic components of the Auto CAD program And turn it on. 2- How to activate and run a program	**lecture** **And the**	**Oral and** **written tests**

5 **6** **7** **8** **9** **10** **11** **12** **13** **14** **15**	3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours	drawing and read electronic and electr maps. Train the student a make him able to: a-Using engineer drawing equipment a tools, understand maps, and drawing th engineering views a projections. b-Distinguishing between electro components, read projecting and draw electrical maps Electronic circuits.	uto CAD, program interface, Hide bars, activate bars, ide an icon, activate an icon. A detailed explanation of the components of a bar Draw Tools Bar, Modify Tools Bar, Status Tools Bar 4- Learn about the types of drawing lines in the Auto CAD program and how to download the types of lines and create lines 5- How to draw Line, Circle, Arc in their different ways. 6- How to draw Polygon, Rectangle, Multilin, Polyline 7- Add dimensions and texts in uto CAD program in its ways different. 8- Carrying out engineering operations, drawing triangle with its three sides, straight drawing Parallel to a known straigh t line at a given distance Draw a circle that passes ough the vertices of a triangle is known that drawing a circle touching sides Known triangle. 9- Dividing a straight line to a number of equal sections, wing a five-sided polygon with a known radius, fitting two pendicular lines to an internal c of known radius, fitting two ight lines that make an acute or use angle with each other to an arc of known radius. 10- Projections, how to draw projections, v to implement projections in a program Auto CAD 11-12-13-14- actical applications on project drawing 15- How to draw and create 3D graphics in a program	**laboratory**	
Vacation			**.....** **second course**		
1 **2** **3** **4** **5** **6** **7**	3 hours 3 hours 3 hours 3 hours 3 hours		1-2-3-4- How to draw and create 3D drawings in Auto CAD Electrical symbols, electronic ymbols, general appearance 6-Block, Attribute Block,Insert		

8 **9** **10** **11** **12** **13** **14** **15**	3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours		- How to insert electrical and ectronic symbols into the Auto CAD program interface. 8- Connecting electrical and ctronic symbols using lines and practical applications. 9-10-11-12- ictical applications for drawing electrical circuits. 13-14-15- ictical applications for drawing electronic circuits		

15. Course Structure:

Human Rights Chapter One

Occupational safety, second semester (first stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 **2** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12** **13** **14** **15**	3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours	The purpose of the rights article Human: He Providing the possibility of development The individual ar society Complete development	1- Human rights - their definitio their goals 2- The roots of human rights an their development in human history - human rights in ancien and medieval times. 3- Human rights in civilizations Ancient, especially the Wadi civilization Mesopotamia. 4- Human rights in divine laws, with a focus on human rights in Islam. 5- Human rights in the Middle A Human rights in doctrines, scho and political theories - Human rights On corporations, their declarations, revolutions, and constitutions (English documen American Revolution - French Revolution - Russian Revolution man rights in contemporary -6 modern history - international ognition of human rights since World War I and beyond - the (United Nations) 7- Regional recognition of huma rights - the European Conventio on Human Rights 1950 - the American Convention on Huma Rights 1969 - the African Charte on Human Rights 1981 - the Ara Charter on Human Rights 1994. 8- Non-governmental organizat	**lecture** **And the**	**Oral and** **written tests**

			and human rights (Internationa Committee of the Red Cross - Amnesty International - Human Rights Watch) 9 National human rights organizations 10- Human rights in Iraqi constitutions between theory ar reality 11-12- The relationship betwee human rights and Public freedoms: * 1- In the Universal Declaration Rights Human. * 2- In regional charters and national constitutions. 13- Necessary human rights and collective human rights. -Economic, social and cultural ıan rights and civil and political human rights 15-Modern human rights: facts in development - the right to a clean environment - the right to true solidarity ..... The second choleric		
Vacation					
1	3 hours		1- Occupational safety - its necessity - Its goals - its returns 2- Occupational safety in terms of its impact On the person, family, department and Establishment, society and national economy 3- Occupational safety, why, the essential factor, law enforcement, skills preservation, economic factor 4- Maintenance organizations, comparison between them, how to perform preventive and curative systems 5- Maintenance regulations, comparison between them, how to perform preventive and curative systems 6-Formations of occupational health and safety departments 7-8- General occupational health and safety program: protecting the work site, protecting work methods, protecting the worker 9- Occupational health and safety programme, specialization, traffic accident prevention, accident statistics 10- Firefighting and fire equipment 11- Causes of industrial		
2	3 hours				
3	3 hours				
4	3 hours				
5	3 hours				
6	3 hours				
7	3 hours				
8	3 hours				
9	3 hours				
10	3 hours				
11	3 hours				
12	3 hours				
13	3 hours				
14	3 hours				
15	3 hours				

			accidents, the importance and reasons for registering occupational accidents 12- Encouraging interest in occupational health and safety, mechanical risks 13- Electrical accidents, ways to prevent electrical accidents 14- Chemical risks, and ways to prevent chemical accidents 15-Protective and personal equipment		

16. Course Structure:

Electronic circuits (second stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 vacation 16 17 18 19 20 21 22 23 24 25	3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours	: Definition of the student Basic electronic circuits, methods of designing them Use it in Practical applications many.	-1-2-3- Class A power amplifiers Class B power amplifiers Class C power amplifiers 4- Power equipment 5- Using voltage regulators ariable resistor, Zener diode, eries and parallel transistor, Darlington 6- Thyristor Ways to turn n and off the thyristor Ways to n on the gate in an (AC) circuit, (DC), pulses, pplications for silicon modules 7-8 - Oscillators and their efinition - back feed and their es, drawing their diagrams and finding the mathematical relationships for the final amplification of the system rward gain - back gain - return uit) - conditions of oscillation - mples of oscillator circuits (LC scillator - Hartley oscillator - lbits oscillator - shift oscillator phase) 9-10-11 - The transistor as a switch - Specifications of its operation on the load line - Its response to a rectangular input wave, transformation times - rators and their different types (unstable, unstable - bistable) Mathematical relationships - lector and base resistors - Input and output waveforms, their	lecture And the laboratory	Oral and written tests

26 27 28 29 30 vacation	3 hours 3 hours 3 hours 3 hours 3 hours		circuits - Their idea - Idea Its ration - protection - overcoming ossible distortions in the output signals - pulse width control. 12-13 – Operationa amplifier - Typical diagram - emplate input - Non-template ıt - Input impedance - Template mplifier circuit output - Non- nplate amplifier gain - Voltage ɔwer and amplification equation Host - Equation for adding N mber of inputs - Non-template host. 14-15 - The inverter collector rcuit and the output equation - non-inverting collector circuit and the output equation - Mathematical examples. 16- Subtractor circuit and lculation equations to subtract ut voltages VO=V2-V1 - applied circuit. 17- Applications of the operational amplifier - The integrator and its circuit - vation of its equation - Example ıserting a square wave into the tegrator circuit and finding its ɔut wave - Example - Inserting a ulse wave into the integrator uit and finding the output wave - Example - The effect of the integrator voltage - Solving exercises. 18- The comparator - its ircuit - the idea of the work - roducing a triangle wave to the gular input and connecting the ɔn-standard input to ground - roducing a triangle wave to the rmal input and connecting the n-standard input to a positive reference voltage. 19- Nonlinear applications of the op-amp - the rectifier mple - the idea of using the op- amp in rectifier circuits - its vantages over circuits without op-amp a comparison between ideal and non-ideal properties ıe rectifier - the ideal half-wave ectifier circuit - the idea of its rk - the ideal full-wave rectifier circuit - the idea the job. 20- Schmidt switch - False nsformation in the comparator and how to prevent it from appening - Example - Schmidt switch circuit, drawing its ıversion properties - Example - troducing a random wave into ıe Schmidt switch circuit and drawing the output voltage - Solving exercises 21- Wave generators using an op-amp - square wave		

			erator - its circuit - derivation of e equation for the frequency of output wave - modulating the uit to give a rectangular wave - example - circuit design. 22- Monostable vibrating pulse generator, its circuit - orking idea - drawing waves - rivation of the equation for the utput pulse width - example - circuit design. 23- Triangle wave generator ircuit - working idea - drawing es - derivation of the equations for this - derivation of the quency equation for the output wave 24- The analog calculator - design - solved examples - timer - its construction - diagrams for use in vibrators - equations for alculating pulse width time - solved examples. 25- Effective RC filters – eir advantages - properties - - HPF-LPF- atures - Properties - Equations - sponse Curves - Mathematical Examples) 26- Effective RC filters- - BSFBPF their advantages- properties- - atures - properties - equations - sponse curves - mathematical examples 27- Basic methods for nufacturing integrated circuits ngle-crystalline, thin-film and thick-film) 28-29-30- Manufacture of integrated circuit for an NPN transistor - Manufacture of grated resistors and capacitors Manufacture of an integrated ircuit for a simple electronic circuit		

17. Course Structure:

Microcomputers (second stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3	3 hours 3 hours 3 hours	1- Student training On the correct foundations of	1- Introducing the abulary of the academic subject nd distributing exam grades - merical systems - the decimal	lecture	Oral and

4	3 hours	engineering drawin	stem - the binary system - the ctal system - the hexadecimal ystem and its importance for icrocomputers - conversions between systems. 2- Introducing crocomputers, their types, and their relationship to other electronic computers. 3- Definitions of microcomputer terms: -Byte-Nible-Word-Instruction- ram-Software-Structures-Level Languages Higher-low-level languages- assembly language-machine language. 4- Microcomputer rchitecture - block diagram - t unit - keyboard - mouse - two es of mouse and a comparison between them - input port. 5- Transport system – data carrier - carrier Addresses - lines of command and control - the usefulness of each - Compare them. 6- The output unit – the een - the difference between a nputer screen and a TV screen - the output port. 7- Memory - main emory - read-only memory - d-write memory - comparison veen them - auxiliary memories d the difference between them and main memory. 8- The central processing nit - the microprocessor - its definition - a block diagram owing the architecture of the microprocessor - the 8085 croprocessor - a diagram of the minals and its block diagram - ata bus buffers - address bus fers and a comparison between them. 9- Public Records – Register A (Accumulator) - ithmetic and Logic Unit - Flags Record - 5 microprocessor notification - Computational example o determine the status of each flag and its interpretation tatus-Utility of Flags Register. 10- The information of the Z-80 microprocessor and its parison with the information of the 8085 microprocessor - arithmetic example - the PC rogram counter, the SP stack nter - the instruction register - he instruction decoder - the control unit. 11- Instructions for the	**And the laboratory**	**written tests**
5	3 hours	drawing and readin			
6	3 hours	electronic and			
7	3 hours	electrical maps.			
8	3 hours				
9	3 hours	Train the student			
10	3 hours	and make him able			
11	3 hours	to:			
12	3 hours	1-Using engineering			
13	3 hours	drawing equipment			
14	3 hours	and tools,			
15	3 hours	understanding map			
vacation		and drawing their			
	3 hours	engineering views			
16	3 hours	and projections.			
17	3 hours	2-Distinguishing			
18	3 hours	between electronic			
19	3 hours	components,			
20	3 hours	reading, projecting			
21	3 hours	and drawing			
22	3 hours	electrical maps			
23	3 hours	Electronic circuits.			
24	3 hours				
25	3 hours				
26	3 hours				
27	3 hours				
28	3 hours				
29	3 hours				
30	3 hours				

			8085-Z80 microprocessor - nemonic codes used - machine nguage - comparison between hem - how to extract codes in machine language from the instruction table. 12- Data transfer group nstructions and their types - olving examples - writing an application program. 13- Input and output tructions and their relationship ata transfer group instructions - examples Applied. 14- A group of arithmetic nstructions and their types - pplied examples - their use in lifying the digital signal with an applied example. A group of logical instructions their types - applied examples - nd their use in solving digital circuits. 15- A group of branching nstructions and their types - onditional and unconditional and their dependence on lags - applied examples - the importance of these Group in writing programs. 16- A group of control tructions - their relationship to operating keys - and how they er from the rest of the previous instructions. 17-18- Programs for performing mathematical rations: addition - subtraction - ltiplication - division - what is ant by addressing and its types in the 8085 processor 19- The stages of executing n instruction - the instruction ycle - the machine cycle - the iming chart for executing an ruction (an instruction to store contents of the accumulator in a emory location, for example) - the microprocessor reads data in memory. 20- Configure repetition ps - time delay loops - one loop - loops - three loops - application programs for each of them. 21- Generating pulses with equired frequency and a known luty cycle compared to pulse enerators that use integrated circuits. 22- Practical examples wing how to exploit time delay ops in industrial and domestic fields. 23- Write a program for an nding counter - with an applied example.		

			24- Write a program for a ntdown timer - with an applied example. 25- Write a program for an cending/descending counter - with an applied example. 26- Microprocessor 8086 - pecifications - architecture - terminal diagram. 27- Types of addressing for ıe 8086 microprocessor - data transfer instructions - multiplication and division structions - examples of other instructions. 28- A comparison between ght-threaded microprocessors (such as the 8085 (Z80) and een-threaded ones, such as the 8086. 29- Microprocessors with ranks and their most prominent ecifications - microprocessors used in Pentium computers. 30- A general review of the curriculum vocabulary.		

18. Course Structure:

communications (second stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 vacation 16 17	3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours	-: Providing the student with basic information about telecommunications systems. 2-Systems and structures of radio, television and telephone systems. 3-Methods of transferring information in	1- BSF)-(RC))- (LPF)-(HPF)-(BPF) Filters 2-(BSF) - LPF))-(HPF)-(BPF Active filters 3- Modulation,types,AM modulation,wave analysis 4- Spectrum frequency,power distributed,calculate modulation index 5- Types of AM with its spectrum 6- Types of modulation used to generate AM 7- Detector of AM-disturtion in demodulation circuits-Envelope Detector – Synchronous Detector - ((AGC 8- Block diagram for transmiting and receiving AM-sensitivity of receiving .device	**lecture** **And the** **laboratory**	**Oral and** **written tests**

18 **19** **20** **21** **22** **23** **24** **25** **26** **27** **28** **29** **30**	3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours	communications systems, their specifications, features, and the operations that take place on them.	9- FM modulation-PM modulation-mathematic analysis for modulated waves-modulaion ratio-.frequency deviation 10- The width of spectrum frequency for FM and PM 11- Types of FM generation-(Secttreo FM)- Stero 12- Some types of Detector of FM 13- Coding-Sampling-Quantization-coding .transform 14- PM-PCM-PPM-PDM and PAM 15- Multiplexing) –(FDM) –(TDM) 16- PSK-FSK-ASK modulation 17- Transmission information- signal to noise ratio-noise 18- Mobile-FDMA-TDMA-CDMA 19- Teleprinters-telegraph 30- FaximileTransmission) –(Fas-Receiver)-(Telex) 21- Optic fiber-types-properties 22- Types of antenna-fundamentals of antenna-factor of antenna 23- Propogation of radio signal 24- Some types of antenna 25- Using of Microwave in communications 26- Satallite-properties and advances-receiving and transmiting-orbits of satellite-multiple access 27- Microwaves-generations-frequency spectrum 28- Mobile-introduction-principles-technics-wireless technics 29- GSM-functions-structure 30- Thuraya device		

19. Course Structure:

Electronic measuring devices (second stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 vacation 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours	Student acquisition Skill in the field Use of devices Measurement e And electrical different. And knowledge Basic ingredients for these devices And how Use it In the correct way And away from the risks in working on it. And get to know How to calibrate Measuring devices Analogue And digital. And also Recognition Factors affecting reading accuracy and how Device selection appropriate to measure So that the student can use the devices Different measurements after graduation with a picture Correct in work fields different.	1- Metrology - the ternational system of units of neasurement - basic units of easurement - derived units of asurement - decimal multiples and parts of multiples - easurement errors - examples 2- The galvanometer - sensitivity of the galvanometer he final deviation - the kinetic havior - the decay mechanism. Examples 3- Classification of neasuring devices - Indicating ices and the foundations relied n - Types of effective torques - ection torque - Control torque - Decreasing torque 4- Moving coil measuring evices – installation – working nciple – moment equations – – advantages – disadvantages easuring devices with a moving n - attractive type - repulsive type - installation - working principle - advantages - disadvantages. 6- Types of resistors in ms of their values - Methods of easuring electrical resistance - meter and voltmeter method - mmeter device - Series type - Parallel type - Examples 7- The micrometer evice for measuring insulation and high-value resistances - omponents - electrical circuit diagram - working principle 8- Direct current lges - Whetstone direct current bridge to measure unknown sistance - working principle - te of equilibrium - unbalance - derivation of the equilibrium ation for the bridge - examples - double Kelvin bridge 9- Direct current meter - resistance in parallel - derivation of the equation for culating resistance in parallel - multi-range ammeter - safety asures when using - examples 10 - Direct current voltmeter - series resistance - derivation of the equation for ulating series resistance - multi- ge voltmeter - safety measures when using - examples 11- A multimeter – a erential diagram - a circuit for a urrent and voltage meter - a	**lecture** **And the** **laboratory**	**Oral and** **written tests**

			rcuit for a single-range direct urrent, voltage and resistance er - calibration of direct current vices - calibration of voltmeters and ammeters. 12- Wayne bridge to easure frequency, unbalance ses, how to balance the bridge 13- Devices for easuring alternating current, ctrodynamometer, structures, moment equation 14- Mobile steel measuring devices, structures, moment equations, advantages and disadvantages. 15- Uniform type measuring ces - full-wave integrator - half-wave integrator - examples. 16- T he use of trodynamometers in measuring le-phase power, structures, and he deflection angle equation. 17- Frequency scale, compositions and working principle 18- Thermal devices, thermocouple device 0 for easuring non-granular shapes. 19- Signal oscilloscope, block diagram, cathode ray diode, assembly, screen, factors for ecting screens, types of screens, optical grid. 20- Vertical deflection system, ctional diagram, input function, nuator, vertical amplifier, delay ne, function and types of delay line. 21-22- Horizontal deflection ystem, basic sweep generator, ep synchronization, mug sweep, horizontal amplifier, signal cilloscope figures, passive and ctive voltage figures, current figures, high voltage figures, ajous shapes, phase calculation, frequency calculation 23- The dual-beam signal naker, your head is the signal keeper. 24- Electronic measuring ices, electronic voltmeter, basic transistor circuit. 25- Considerations for osing an analog voltmeter, input edance, voltage range, decibels, ensitivity, versus tape width, measuring current. 26-27- Digital voltmeter, neral specifications, regression e, integration type, continuous uilibrium type, and successive approximation type. 28-29-30- Simple frequency ounter, display counters, time e, signal processing, measuring		

			ıe expansion of the frequency ınge of the counter, automatic counters and calculators.		

20. Course Structure:

Audio and visual devices (second stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours	1-: Student education Fundamentals and theory Broadcast television signal with Providing him with a comprehensive idea of broadcast systems Transmission and reception And regarding the stages of the future, In addition to Providing him with information about video recording. 2-: Teaching the student: the principle of broadcast transmission Visual and stages Broadcasting offices and Its international systems, and Dealing with signal components before transmission. Stages of the device Reception and processing of the received signal	1- How to use the measuring ievices used in the audiology laboratory 2- Identifying the stages the television set (reading the ıp) and placing the dots on the television set 3-4-5-6--The power supply stage (measuring the ıpply voltage to operate the TV - w to convert it from AC to DC - lrawing signals at inspection ıoints using an oscilloscope - suring the voltages entering the illator - measuring the voltages ming out of the power supply - awing the signals Out of phase using the oscilloscope Osloscope 7-8- Horizontal deflection ıase. Measurement of voltages ntering and exiting the phase 9-10- The vertical eflection phase measures the ltages entering and exiting the phase 11-12- Drawing the signals ering and exiting the horizontal vertical stages using the signal oscilloscope device 13- Create an RF stage for e stage and measure the input tages and plot the input signals ng a signal oscilloscope device. 14- Create an RF stage for the stage and measure the utgoing voltages and plot the ıcoming signals using a signal	**lecture** **And the** **laboratory**	**Oral and** **written tests**

vacation **16** **17** **18** **19** **20** **21** **22** **23** **24** **25** **26** **27** **28** **29** **30**	 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours	To be regenerated, signals examined and learned Control methods and Control and organization Picture and sound information	cilloscope and an oscilloscope device. 15- Make an IF stage for e stage and measure the input tages and plot the input signals ng a signal oscilloscope device. 16- Make an IF phase (for the ase) and measure the outgoing oltages and plot the incoming nals using a signal oscilloscope. 17- Create an AGC stage for stage and measure the input vol ages and plot the input signals ng a signal oscilloscope device. 18- Create an AGC phase or the phase and measure the utgoing voltages and plot the coming signals using a signal oscilloscope. 19-20- The stage of image ontrol operations, measuring ut input voltages and plotting signals entering the stage using a signal oscilloscope and an oscilloscope device. 21-22- The stage of image trol operations, measuring the tput voltages of the equipment plotting the signals coming out of the stage using a signal oscilloscope device. 23-24 - Sound stage, easuring the input and output oltages of the equipment, and tting the signals using a signal lloscope, an oscilloscope device. 25-26- Color amplifiers, neasuring supply voltages for nput and output, and plotting signals using an oscilloscope. 27-28- How to control the tensity of lighting. Measure the upply voltages for input and put while plotting signals using a signal oscilloscope. 29-30- Identifying modern evices and keeping up with the velopment taking place in them in terms of installation		

21. Course Structure:

PLC subject, first semester

Control systems subject, Chapter Two (second stage)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours	The purpose of PLC material 1-:General objective: Definition of student With Hawakam components Programmed and how Programming and uses. Special objective:- Recognition On the controllers Digital retractable Programmable (PLC) And how to deal With it and programmed.	1- Introduction 2-3- Sensors with programmable controller(he pressure,motion ..etc) 4- Electrical switch, electrica contact 5- Introduction of ladder language 6- Logic ciruit (AND,OR,NOT,etc.) using lad language 7- Timers and its types- simulation using ladder language 8- The signal in ladder langu 9- Digital counter in ladder language with examples. 10- Example of (changeover circuit) using ladder languag 11- Example of traffic light 12- Application example for open and close the door usin motion sensor. 13- Operating circuit of singl phase motor by swith (moto starter) using ladder languag 14- Operating circuit of three phase motor(delta-star) 15-Application example for electrical lift	**lecture And the laboratory**	**Oral and written tests**

vacation **16** **17** **18** **19** **20** **21** **22** **23** **24** **25** **26** **27** **28** **29** **30**	 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours 3 hours	The purpose of the material Control systems 2-: General goal: The student will be able Provided that: 1-Distinguish between different control systems. 2- It occupies a number of people Devices and machines used in control systems. 3-Deals with control systems in factories and production plants. 4- Establishes and builds some control circles. The specific goal: 1-The student understands methods of control in sites the job. 2-Learn about various control systems.	The second choleric 1- Introduction to control systems 2- Open-circuit and closed-circuit control systems 3- Converting electrical signa into mechanical ones and vic versa, converting electrical signals into pneumatic ones vice versa. 4- Error sensing devices use control, their types lectrical components to -5 control motors - electric - ickup - timer - switches - usher - specific switches . 6- The four variables (temperature - pressure - flo level measurement) in contr systems 7- Controlling the switching and off of a single phase induction motor using 1-electromagnetic pickup B-thyristor-TRIAC) 8- Complementing the applie systems 9- Digital systems in control 10- Methods of measuring temperature, pressure, flow level 11- The various elements of pneumatic control systems 12- Applied systems in pneumatic control 13- Use the analog calculator control 14- How to represent digital circuits in control\ The use of electronic -15 lculators in applied control .systems		

1. Course Evaluation

Distribution as follows:
Any subject in which theory and practical are the same, whether in the first or second stage, the distribution of grades is as follows
Example: The first stage
1- Digital Circuits: 50% = 20 practical + 20 theoretical + 10 year's work + final exam 50% = 40 n + 10 n.
2- Electrical Circuits and Measurements 50% = 20 practical + 20 theoretical + 10 year's work + final exam 50% = 40 n + 10 n.
3- Laboratories/electronic workshop Continuous evaluation: 50% electronic workshop and 50% electrical workshop
4- The course fee is 50% = the mid-term exam is 30% + the year's work is 20% = the final exam is 50%
*There are subjects that end with the first semester and begin with another subject

2. Learning and Teaching Resources

1- Electrical Technology(Edward Hughes). **2- Basic Circuit(A.M.Brooks).pergaman press** **3- Introduction To Electric Circuit (M.Romanwltz) John Willey .** **4- Basic Electrical Engineering(Fitzgerald& RIgginbothan).Graw**	
1- Programmable Controllers Theory a Implementation, Second Edition, by L. Bryan & E. A. Bryan, © 1988, 1997	

Industrial Text Company Published Industrial Text Company. 2- MITSUBISHI ELECTRIC, FX-TRN-BE E, USER'S MANUAL, Manual numb JY997D02901 Manual revision: E, Ju 2015.	
1- التأسيسات الصناعية تأليف : (سلطان حسين- جاسم عصري) D.C Motors speed control By :Servo system	
https://www.academicinfo.net/subject-guides https://dcaclab.com/ http://electrical-engineering-portal.com/	