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

٢٠٢٤-٢٠٢٥

Academic Program Description Form

University Name: ..... Southern Technical University.....

Faculty/Institute: ..... Technical Institute of Amara.....

Scientific Department: ..... Mechanical Techniques.....

Academic or Professional Program Name: Diploma Mechanical Techniques

Final Certificate Name: Diploma Mechanical Techniques

Academic System: ..... quarterly .....

Description Preparation Date: ٢٠٢٥/٦/٦

File Completion Date: ٢٠٢٥/٦/١٥

Signature: Dr. Asaad Kadhim Eqal

Head of Department Name:

Date:

Signature:Dr. Jehad Kadhum Mohammed

Scientific Associate Name:

Date: 10, 7, 2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 10/7/2025

Signature: **Dr. Akram Karim Khader**

Approval of the Dean

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

1. Program Vision

The Department of Mechanics is one of the main departments of specialization, and the department is moving towards the department as the base of technical education and its modern applications, to be an initiative in providing innovative technology and the spirit of competition in cooperation with the complex.

2. Program Mission

The Department of Mechanics adopts a general message based in its general form on the framework of technical education in Iraq, a message that it seeks to achieve every year to highlight the distinction of the department. The general objectives are focused on graduating national technical cadres at a level of education and training capable of absorbing technology systems and supporting the process of technical development to keep pace with rapid global technical developments.

• The special message includes the following: -

1- Using computer and Internet technologies in education and training.
2- Activating the relationship with the private sector in the areas of training.
3- Follow up on the development of training plan curricula and then update laboratories and workshops.
4- Interaction with the labor market and society's needs for qualification and training.

3. Program Objectives

1- Embodying the vision, mission and goals of the department, and applying the best educational practices with a focus on ensuring and enhancing quality and performance.
2- Preparing specialized cadres capable of serving the community and preparing for the preparation of future specializations.
3- Paying attention to intellectual, cultural and professional building through openness to the experiences of other countries.
4- Preparing and qualifying specialized technicians to meet the requirements of the labor market in the private and public sectors in the field of mechanics through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems.
5- The ability to work as a team.
6- Know and understand the principles of mechanics.
7- Working on various metal working and shaping machines (lathe, milling, welding, etc.).
8- Participation and implementation of emergency and periodic maintenance of machines and machines that fall within his jurisdiction.
9- Focus on the educational and moral aspect of the student and instill a spirit of dedication, tolerance and commitment.

4. Program Accreditation

nothing

5. Other external influences

1- Labor market requirements
2- The need of departments and state institutions

6. Program Structure				
Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	20	59	100%	Basic course
College Requirements	20	59		
Department Requirements	20	59		
Summer Training	nothing	60 day		
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
The first stage, the first semester		Manufacturing Processes \1	**2**	**2**
		Properties of materials\1	**2**	**-**
		Workshops \1	-	**6**
		Engineering Static Mechanics	**2**	**3**
		Mathematics \1	**2**	**-**
		Engineering Drawing \1	**-**	**3**
		Electricity Technology \1	**1**	**2**
		English language \1	**2**	**-**
The first stage, the second semester		Manufacturing Processes \2	**2**	**2**
		Properties of materials\2	**2**	**-**
		Workshops \1	**-**	**6**
		Engineering Dynamic	**2**	**3**

		Mechanics		
		Mathematics \2	**2**	**-**
		Computer Fundamentals \ 1	**-**	**2**
		Engineering Drawing \1	**-**	**3**
		Electricity Technology \1	**1**	**2**
		Human Rights and Democracy	**2**	**-**
The second stage is the annual system		Machinery parts technology	**3**	**-**
		Machining Processes	**2**	**2**
		Metallurgy	**2**	**2**
		Specialized Workshops	**-**	**6**
		Graduation Project	**-**	**2**
		Industrial Drawing	**-**	**3**
		Occupational management and safety	**2**	**-**
		English language	**2**	**-**
		Computer Fundamentals	**–**	**2**

8. Expected learning outcomes of the program

Knowledge

1- Enabling students to obtain the necessary knowledge in standard specifications
2- Understanding and analyzing mechanical theories and knowing all engineering symbols and terminology.
3- Conduct design calculations for the parts of the place and know the factors affecting them and how to connect the parts together.
4- Writing scientific reports.

Skills

1- Knowledge of the mechanical properties of materials.
2- Knowledge of the composition, types and uses of metallic and non-metallic materials.
3- Drawing simple and complex assembled mechanical parts and drawing

programs such as AutoCAD.

4- Identify the various metal cutting machines, the operations that take place on them, and how to use and maintain them.

Ethics

1- Working within one team and spreading the spirit of cooperation.
2- Urging students to deal ethically with each other on campus.
3- Maintaining and maintaining laboratory equipment and machines.
4- Preserving laboratories from fires.

9. Teaching and Learning Strategies

1- Theoretical lectures
2- Practical lectures
3- Homework assignments
4- Scientific visits
5- Class activities and extra-curricular activities
6- Weekly reports
7- Electronic lectures
8- Graduation project
9- Daily exams

10. Evaluation methods

Daily evaluation - written tests - weekly reports - mid-term exam - final exam

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Assistant Professor	Production and metallurgical engineering	Production and minerals			Staff	
assistant teacher	Mechanical Engineering	Applied mechanics			Staff	
assistant teacher	Materials engineering	Materials engineering			Staff	
assistant teacher	general mechanic	Mechanical				Lecturer
assistant teacher	Calculators	Calculators				Lecturer

Professional Development
Mentoring new faculty members
1. General courses 2. Specialized courses
Professional development of faculty members
1. Seminars 2. Workshops 3. Deposits

12. Acceptance Criterion

1- Central admission - for the two branches (scientific and vocational) - for morning studies.

2- According to the rate and competition.

13. The most important sources of information about the program

1- Websites of Iraqi and foreign universities.
2- Workshops held by the Ministry of Higher Education in addition to the Ministry's standards.
3- Holding internal courses and workshops is decided by the deanship and the department.
4- Adding and deleting materials according to the need of the labor market.
5- Virtual library.
6- Central Library.

14. Program Development Plan

1- Updating the vocabulary of some curricula to keep pace with developments in the labor market.
2- Adding new courses.
3- Changing the name of some courses.
4- Equipping workshops with new equipment and 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
2022-2023 The first stage		Manufacturing Processes \1			•						•				•
		Properties of materials\1		•						•				•	
		Workshops \1		•						•				•	
		Engineering Static Mechanics			•						•				•
		Mathematics \1			•						•				•
		Engineering Drawing \1		•						•				•	

		Electricity Technology \1			•						•				•
		English language \1			•						•				•
		Human Rights and Democracy		•						•				•	
					•						•				•
2022-2023 The second stage		Machinery parts technology						•				•			
		Machining Processes						•				•			
		Metallurgy						•				•			
		Specialized Workshops						•				•			
		Graduation Project		•						•				•	

		Industrial Drawing						•			•			
		Occupational management and safety		•						•				•	
		English language		•						•				•	
		Computer Fundamentals		•						•				•	

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

Course Description Form

1. Course Name:
Mathematics 1
2. Course Code:
3. Semester / Year:
Quarterly system
4. Description Preparation Date:
2022/09/22
5. Available Attendance Forms:
My presence only
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hours annually. 2 hours per week
7. Course administrator's name (mention all, if more than one name)
Name: Email:
8. Course Objectives
Introducing the student to the use of mathematics in other scientific topics and increasing his ability to think logically when solving exercises, as well as increasing his ability to develop and how to link data with his information to obtain a solution to the problem.
9. Teaching and Learning Strategies
1- Theoretical lectures. 2- Daily exams. 3- Homework assignments. 4- Class activities and extra-curricular activities.
10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

first second	Th2	Determinants and their properties, solving simultaneous equations using the determinant method (Cramer).		Theoretical	The distribution is as follows: 20 marks for the first semester exam - 20 marks for the second semester exam - 10 marks for the year's work - and 50 marks for the final exam.
third fourth Fifth	Th2	Differentiation, algebra of derivatives, multiple functions		Theoretical	
sixth Seventh eighth	Th2	Trigonometric, logarithmic and exponential functions and their derivatives and implicit functions, the chain rule.		Theoretical	
Ninth tenth eleventh	Th2	Drawing functions, drawing trigonometric functions and maximum and minimum limits.		Theoretical	
twelfth Thirteenth	Th2	Physical calculus applications, velocity and acceleration and engineering calculus applications.		Theoretical	
fourteenth	Th2	Integration, laws,		Theoretical	

Fifteenth		and its relationship to differentiation, definite and indefinite integration.			

11.Course Evaluation

The distribution is as follows: 20 marks for the first semester exam - 20 marks for the second semester exam - 10 marks for the year's work - and 50 marks for the final exam.

12.Learning and Teaching Resources

Source:

Calculus

1. Course Name:

Engineering Drawing

2. Course Code:

3. Semester / Year:

yearly

4. Description Preparation Date:

2022/09/22

5. Available Attendance Forms:

My presence only

6. Number of Credit Hours (Total) / Number of Units (Total)

90 hours annually. 3 hours per week

7. Course administrator's name (mention all, if more than one name)

Name: Riyadh jabbar mohan AL-Bazooni
Email: riyadh.jabbar@stu.edu.iq

8. Course Objectives

Objective of the course: Introducing the student to the importance of engineering drawing and its relationship to other engineering subjects - Developing and developing the student's mental and motor abilities in drawing simple and complex shapes and expanding the horizons of his imagination of geometric shapes and assemblies to identify their components, parts, mechanics and principle of operation, organizing the student's thought to develop a specific and sequential strategy for drawing, assembling and disassembling geometric shapes.

9. Teaching and Learning Strategies

1- Practical lectures.
2- Daily exams.
3- Homework.
4- Classroom activities and extracurricular activities

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
first	P3	The importance of engineering	Engineering Drawing	practical	The

		drawing, using the computer (AutoCAD program) for drawing, drawing board sizes, drawing engineering shapes			distribution is as follows: 15 marks for the first semester exam, 15 marks for the second semester exam, 20 marks for the year's work, and 50 marks for the final exam.
second	P3	Graphics modifications, computer drawing aids (AutoCAD program)	Engineering Drawing	practical	
third	P3	Types of lines for engineering drawing, engineering operations, setting dimensions	Engineering Drawing	practical	
fourth	P3	Perspective drawing	Engineering Drawing	practical	
Fifth					
sixth	P3	Projection theory, drawing simple projections	Engineering Drawing	practical	
Seventh					
eighth					
Ninth	P3	Free hand drawing of paintings on waterfalls	Engineering Drawing	practical	
tenth	P3	Principal projections, even angle	Engineering Drawing	practical	
eleventh					
twelfth	P3	The importance of engineering drawing, using the	Engineering Drawing	practical	
Thirteenth					
fourteenth					

Fifteenth		computer (AutoCAD program) for drawing, drawing board sizes, drawing geometric shapes			
sixteenth seventeenth	P3	Draw the main projections with even angles	Engineering Drawing	practical	
eighteenth nineteenth	P3	Conclusion of the third project from the two projects	Engineering Drawing	practical	
twentieth Twenty one	P3	Inferring perspective from two or three projections	Engineering Drawing	practical	
twenty tow twenty third	P3	Cuts, shapes of cutting lines according to the type of material	Engineering Drawing	practical	
twenty fourth Twenty-fifth	P3	Drawing projections cut from one projection	Engineering Drawing	practical	
twenty-sixth Twenty-seventh	P3	Partially cropped projection drawing	Engineering Drawing	practical	
Twenty-eighth twenty-ninth thirty	P3	Drawing a half-cut projection, drawing zigzag sections	Engineering Drawing	practical	

11.Course Evaluation

The distribution is as follows: 15 marks for the first semester exam, 15 marks for the second semester exam, 20 marks for the year's work, and 50 marks for

the final exam.

12.Learning and Teaching Resources

The authors' methodological book:

1- Engineer Hashim Abboud Al-Moussawi (teacher).

2- Engineer Youssef Hussein Al-Radi (teacher).

1. Course Name:

Manufacturing processes

2. Course Code:
3. Semester / Year:
Quarterly system
4. Description Preparation Date:
2022/09/22
5. Available Attendance Forms:
My presence only
6. Number of Credit Hours (Total) / Number of Units (Total)
120 hours annually. 4 hours per week
7. Course administrator's name (mention all, if more than one name)
Name: marwa ali hareb Email: marwah.ali@stu.edu.iq
8. Course Objectives
Graduating an intermediate cadre capable of working in the fields of manufacturing and production to contribute to the following work: 1- The ability to analyze processes into operating components. 2- Preparing the technological path between production units. 3- Preparing operating cards and orders for each unit and each machine, and calculating operating time elements and loading programs for the units. 4- Determine the elements of quality control and quality control. 5- Conduct preliminary calculations of operating costs.
9. Teaching and Learning Strategies
1- Theoretical lectures. 2- Practical lectures. 3- Homework assignments. 4- Scientific visits. 5- Class activities and extra-curricular activities. 6- Weekly reports. 7- Daily exams.
10. Course Structure

Week	Hours	Required	Unit or	Learning	Evaluation

		Learning Outcomes	subject name	method	method
first	Th2+p2	Drilling and grinding, types of drills, types of primers, types of primers, how to perform the drilling and grinding process.	Manufacturing processes	Theoretical and practical	The distribution is as follows: 20 marks for the theoretical mid-semester exam - 20 marks for the practical, and the evaluation is 10 marks depending on the student's behavior and attendance - 40 marks for the theoretical end-semester exam and 10 marks for the practical.
second	Th2+p2	Models, their types, wood used in their manufacture, and the conditions that must be met in the model.	Manufacturing processes	Theoretical and practical	
third	Th2+p2	Tools and devices used in making the model, box molds, and how to design a simple model.	Manufacturing processes	Theoretical and practical	
fourth	Th2+p2	Plumbing, historical overview, main methods of plumbing (cast casting, sand casting, metal mold casting, other methods of plumbing) Advantages of the plumbing process.	Manufacturing processes	Theoretical and practical	
Fifth	Th2+p2	Plumbing sand, plumbing sand specifications, components, plumbing sand, devices used and additives to plumbing sand.	Manufacturing processes	Theoretical and practical	

sixth	Th2+p2	Pulp, its types, pulp sand, mixture ratios and materials added to it, stages of its work (mixing sand and preparing it, making balls, drying it), the benefit of the drying process, ovens or methods of drying balls and their equipment.	Manufacturing processes	Theoretical and practical	
Seventh	Th2+p2	Casting with metal molds, its types, centrifugal casting, and its types.	Manufacturing processes	Theoretical and practical	
eighth	Th2+p2	Lost wax plumbing, continuous plumbing, shell plumbing.	Manufacturing processes	Theoretical and practical	
Ninth	Th2+p2	Welding, foundations of metal welding, clarification of the main methods of welding (pressure welding, electric arc fusion welding, other methods of fusion welding, flash welding and caustic welding), types of welding joints.	Manufacturing processes	Theoretical and practical	
tenth	Th2+p2	Hot pressure welding, including (electrical	Manufacturing processes	Theoretical and practical	

		resistance welding, including spot and line welding, flash welding), cold pressure welding, pressure welding using explosives, and pressure welding using ultrasonic waves.			
eleventh	Th2+p2	Fusion welding and gas welding, oxy-hydrogen welding and oxy-acetylene welding, types of flame, right-hand welding and left-hand welding, cutting with oxy-acetylene.	Manufacturing processes	Theoretical and practical	
twelfth	Th2+p2	Arc welding, welding current, direct and reverse polarity method, types of electrodes, packaging of metal electrodes and their types.	Manufacturing processes	Theoretical and practical	
Thirteenth	Th2+p2	Atomic hydrogen arc welding, arc welding, fusion welding.	Manufacturing processes	Theoretical and practical	
fourteenth	Th2+p2	Temperature welding, caustic welding (mortar welding, plumbing welding) and some modern types of welding	Manufacturing processes	Theoretical and practical	

		(laser welding, electron beam welding).			
Fifteenth	Th2+p2	Welding defects, welding tests.	Manufacturi processes	Theoretical a practical	

11.Course Evaluation

The distribution is as follows: 20 marks for the theoretical mid-semester exam - 20 marks for the practical, and the evaluation is 10 marks depending on the student's behavior and attendance - 40 marks for the theoretical end-semester exam and 10 marks for the practical.

12.Learning and Teaching Resources

1- Introduction to production engineering

Written by – Hassan Hussein Fahmy, Jalal Shawqi (1966)

2- Principles of metal casting

Translation – Dr. Salah al-Din Muhammad al-Muhanni

3- Methods of forming metals

Written by - Dr. Anwar Abdul Wahid (1963).

4- Manufacturing methods

Written by - Dr. Arif Abu Safia, Dr. Abdul Razzaq Ismail Khadr

5- Ignition of metals - technological foundations

Written by: Abdel Moneim Akef (1977).

6- Principles of milling operations

Written by - Afrutin, translated by - Muhammad Abdel Hamid Al-Rifai

1. Course Name:

Machine Parts

2. Course Code:

3. Semester / Year:

yearly

4. Description Preparation Date:

2022/09/22

5. Available Attendance Forms:

My presence only

6. Number of Credit Hours (Total) / Number of Units (Total)

90 hours annually. 3 hours per week

7. Course administrator's name (mention all, if more than one name)

Name: marwa ali hareb

Email: marwah.ali@stu.edu.iq

8. Course Objectives

Objective of the course: machine parts aims to explain the role of mechanical pa through machine System , the relation links them , how to conduct some calculatic to design these parts and to specify all factors that are affected

9. Teaching and Learning Strategies

1- Theoretical lectures.
2- Homework assignments.
3- Scientific visits.
4- Class activities and extra-curricular activities.
5- Daily exams.

0. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
first		Th3	Review of Strength of Materials	Theoretical	

Second-third		Th3	Riveted Joints. Types of Riveted Joints ,Design of Riveted Joints, Efficiency of Riveted Joints .	Theoretical	
Fourth-Fifth		Th3	Welded Joints Types of welding Joints ,Design of welding Joints	Theoretical	
Sixth-Seventh		Th3	Screwed Joints, Design of Bolts for Fastening , Design of Bolts for Power Transition .	Theoretical	
Eighth-Ninth		Th3	Keyed Joints , Types of Key , Design of Sunk Key .	Theoretical	
Tenth-eleventh		Th3	Frictional Clutches, Type of Frictional Clutches , Design of Frictional Clutches.	Theoretical	
Twelfth-Thirteenth		Th3	Types of Springs , Design of Springs	Theoretical	
Fourteenth-Fifteenth		Th3	Types of Belts , Design of Belts.	Theoretical	
Sixteenth-seventeenth		Th3	Design of Shafts	Theoretical	
Eighteenth-nineteenth		Th3	Design of Journal Bearings	Theoretical	
twentieth		Th3	Selection of Ball Bearings	Theoretical	

Twenty one-twenty tow		Th3	Design of Gears by Lewis Equation	Theoretical	
twenty third-twenty fourth		Th3	Gears Trains	Theoretical	
Twenty fifth-Twenty sixth		Th3	Design of Simple Gears Box	Theoretical	
Twenty seventh-Twenty eighth		Th3	Worm Gears	Theoretical	
Twenty ninth-thirty		Th3	Cams	Theoretical	

11.Course Evaluation

The distribution is as follows: 20 marks for the first semester exam - 20 marks for the second semester exam - 10 marks for the year's work evaluation - 50 for the final exam.

12.Learning and Teaching Resources

Curriculum book:

MACHINE DESIGN BY R.S.KHURMI AND J.K.GUPTA

1. Course Name:

Metallurgy

2. Course Code:

3. Semester / Year:

yearly

4. Description Preparation Date:

2022/09/22

5. Available Attendance Forms:

My presence only

6. Number of Credit Hours (Total) / Number of Units (Total)

120 hours annually. 4 hours per week

7. Course administrator's name (mention all, if more than one name)

Name: asaad kadhim eqal

Email: asaad.kadhim@stu.edu.iq

8. Course Objectives

Objective of the course: Parts of Metals aims to clarify the role of metallic and ferrous materials such as steel and its alloys, their importance in industry, and knowledge of their crystalline structure and mechanical properties.

9. Teaching and Learning Strategies

1- Theoretical lectures.
2- Practical lectures
3- Homework assignments.
4- Scientific visits.
5- Class activities and extra-curricular activities.
6- Daily exams.
7- Weekly reports.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
first	Th2+p2	Introduction to mineralogy, crystallization, chimeric crystallization, and the effect of cooling rate on the structure of minerals.	Metallurgy	Theoretical and practical	The distribution is as follows: 50 marks for the pursuit - of which 20 marks for the first semester exam - 10 marks for theory and 10 marks for
second	Th2+p2	Installation of metal blocks (solidification of castings) Common	Metallurgy	Theoretical and practical	

		defects in castings.			practical - 20 marks for the second semester exam - 10 marks for theory and 10 marks for practical - and 10 marks for evaluating the year's work - 50 marks for the final exam - of which 40 One score for a theoretical exam and 10 for a practical exam.
third	Th2+p2	Atomic crowding coefficient, crystallographic directions, crystallographic levels, radicalization phenomenon.	Metallurgy	Theoretical and practical	
fourth	Th2+p2	Crystalline, point, linear lattice defects.	Metallurgy	Theoretical and practical	
Fifth	Th2+p2	Flexible forming and plastic forming (sliding, twinning)	Metallurgy	Theoretical and practical	
sixth	Th2+p2	Strain hardening, cold forming, hot forming.	Metallurgy	Theoretical and practical	
Seventh	Th2+p2	Recovery, recrystallization, crystal growth.	Metallurgy	Theoretical and practical	
eighth	Th2+p2	Tensile, stress-strain curve, fracture, types of fracture, change from ductile fracture to brittle fracture.	Metallurgy	Theoretical and practical	
Ninth	Th2+p2	Fatigue, fatigue mechanism, factors affecting the	Metallurgy	Theoretical and practical	

		fatigue limit, fatigue-resistant materials.			
tenth	Th2+p2	Creep, mechanism of creep occurrence, creep curve, method of extracting the creep limit, creep-resistant materials.	Metallurgy	Theoretical and practical	
eleventh	Th2+p2	Compound, phase, solid solution, system, equilibrium, alloy formation, mechanical mixture, eutectics.	Metallurgy	Theoretical and practical	
twelfth	Th2+p2	Thermal equilibrium diagram for a binary system that is completely dissolved in the liquid and solid states. Thermal equilibrium diagram for a binary system that is completely dissolved in the liquid state and undissolved	Metallurgy	Theoretical and practical	

		in the solid state (eutectic).			
Thirteenth	Th2+p2	Thermal equilibrium diagram for a binary system with complete solvation in the liquid state and limited solvation in the solid state.	Metallurgy	Theoretical and practical	
fourteenth	Th2+p2	Thermal equilibrium diagram for a binary system that is completely dissolved in the liquid state and forms a chemical compound when frozen.	Metallurgy	Theoretical and practical	
Fifteenth	Th2+p2	Iron, dissolution of carbon in iron, heat equilibrium diagram for the iron/carbon system, the most important reactions included in the diagram.	Metallurgy	Theoretical and practical	

sixteenth	Th2+p2	Completion of the heat equilibrium diagram for the iron/carbon system.	Metallurgy	Theoretical and practical	
seventeenth	Th2+p2	Austenite formation, mechanism of converting pearlite to austenite.	Metallurgy	Theoretical and practical	
eighteenth	Th2+p2	Austenite transformations with constant temperature and transformations by continuous cooling.	Metallurgy	Theoretical and practical	
nineteenth	Th2+p2	Thermal treatments (annealing, equalization, standardization)	Metallurgy	Theoretical and practical	
twentieth	Th2+p2	Completion of thermal coefficients (standardization and revision), sub-zero thermal coefficients, aging.	Metallurgy	Theoretical and practical	

Twenty one	Th2+p2	Surface hardening (carburization of all types and the thermal treatments that follow it) Al-Tahwah, Al-Sanaida.	Metallurgy	Theoretical and practical	
twenty tow	Th2+p2	Alloy steel, the effect of alloying elements on the properties of steel.	Metallurgy	Theoretical and practical	
twenty third	Th2+p2	Stainless steel, hardened steel.	Metallurgy	Theoretical and practical	
twenty fourth	Th2+p2	Cast iron production and its heat treatments.	Metallurgy	Theoretical and practical	
Twenty-fifth	Th2+p2	Supplementing the production of cast iron and its most important types.	Metallurgy	Theoretical and practical	

twenty-sixth	Th2+p2	Definition of corrosion, direct and indirect economic costs of corrosion, manifestations of corrosion, mechanism of corrosion.	Metallurgy	Theoretical and practical	
Twenty-seventh	Th2+p2	Passivity, Faraday's law general corrosion, galvanic corrosion, cavernous corrosion.	Metallurgy	Theoretical and practical	
Twenty-eighth	Th2+p2	Soil corrosion, facultative corrosion, intercrystalline corrosion, stress corrosion.	Metallurgy	Theoretical and practical	
twenty-ninth	Th2+p2	Optimum choice of material, contour softening, design and operation.	Metallurgy	Theoretical and practical	
thirty	Th2+p2	Corrosion prevention methods.	Metallurgy	Theoretical and practical	

11.Course Evaluation

The distribution is as follows: 50 marks for the pursuit - of which 20 marks for the first semester exam - 10 marks for theory and 10 marks for practical - 20 marks

for the second semester exam - 10 marks for theory and 10 marks for practical - and 10 marks for evaluating the year's work - 50 marks for the final exam - of which 40 One score for a theoretical exam and 10 for a practical exam.
12.Learning and Teaching Resources
1- -Engineering Metallurgy (part 1) Higgins (Capright 1973 R.A.H) 2- Metallurgy for Engineering – Rollason (Third Eddi 1961) 3- Engineering Physical Metallurgy Prof Y. Lnthin