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

Academic Program and Course Description Guide

2025

Academic Program Description Template

University Name: Northern Technical University

College/Institute: Hawija Technical Institute

Scientific Department: Mechanical Technologies

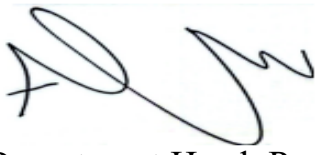
Name of academic or professional program: Diploma in Mechanical Technologies

Final Certificate Name: Diploma in Mechanical Engineering

Study system: Courses

Description prepared on: 1/10/2025

Date the description was filled: 1/10/2025



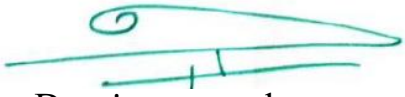
Department Head: Prof. Dr. Ahmed Hassan Ahmed
Date: **1/10/2025**



Assistant Dean for Scientific Affairs: Dr. Mohammed Ali Fares
Date: **1/10/2025**



The file was reviewed by
Quality Assurance and University Performance Division
:Name of the Director of the Quality Assurance and University Performance Division
Mr. Ahmed Abdel Khalaf
Date: **1/10/2025**



Dean's approval
Prof. Dr. Omar Khalil

1.Program overview

Leading in preparing competent mechanical technical personnel who meet the requirements of the labor market and contribute to sustainable development.

2.Program Message

Providing an integrated technical education program in the field of mechanical technologies, combining the theoretical and applied aspects, in accordance with quality standards and academic accreditation

3.Program Objectives

1. Preparing technicians who possess professional and practical skills in the .mechanical field
2. .To provide students with modern applied knowledge
3. .Promoting professional ethics and teamwork
4. .Keeping up with the needs of the labor market

4.Program accreditation

Application for program accreditation has been submitted

5. Other external influences

1.Linking the program to the labor market or the community

A. Linking the department to the job market

.Establishing partnerships with the public and private sectors -

.Mandatory summer training program -

. Involving the industrial sector in curriculum development -

.Hosting experts and professional lectures -

B. Mandatory summer training program

.Opening the department's workshops to serve the community -

Conducting short training .Graduation projects that serve the local environment - courses

c. Establishing a graduate follow-up unit

.Creating a database of graduates -

.Communicating with companies to find out their needs-

.Monitoring employment rates -

.Providing job opportunities through a platform specific to the department

2. Financial, logistical, or training support

A- Material support (financial and logistical)

Equipping -
laboratories and workshops
.Providing consumable materials -
.Establishing a student support fund -
.Proposed sources of funding -

B. Logistical support

.Providing transportation for training -
.Infrastructure maintenance -
.Equipment management system -

C- Training support

. Developing the skills of teachers -
. Courses for students within the institute -
. Field training inside factories -

3. Facilitating employment and practical training

A- Facilitating practical training

Making the training a mandatory graduation -
.requirement
.Creating a register of accredited training providers -
.Involving companies within the institute -
Signing memoranda of understanding with operational -
entities

B. Facilitating employment after graduation

.Establishing an industrial liaison and recruitment unit -
.Annual career day -
.Training students in employment skills -
.Adopting a training system that leads to employment -

c) Aligning the curriculum with the labor market

Updating curricula according to the needs of local -
.companies
.Increase the number of working hours -
.Introducing modern design and operating software -
Focus on practical maintenance skills, not just -
. theoretical ones

D- Supporting entrepreneurship
.Encouraging the opening of small private workshops -
.Training in small business management -
.Linking them to affordable loan programs -

4. Ongoing program guidance
A- Forming a permanent follow-up steering committee consisting of
Head of Department -
.A number of instructors-
.Representative of the Institute's administration -
.A representative of the students -
.Representatives from the industrial sector -

B- Periodic review of the curriculum
.Annual update -
. Labor market surveys -

C- A continuous performance evaluation system
Evaluating students based on their practical skills, commitment, professional -
.conduct, and problem-solving abilities
The evaluation of instructors is done through continuous professional development -
. by participating in specialized courses to update teaching methods

D- Follow-up with graduates
Creating a database of graduates .
Knowing where they work .
Measuring the employment rate annually
To benefit from their opinions in developing the progra

E - Academic and career guidance for students
Regular meetings with students to explain job opportunities
Guiding them to choose specific specialization paths
Supporting outstanding students with advanced training opportunities

And - periodic reports to management
Level of academic achievement
Workshop and laboratory needs
Employment and training rates
Improvement suggestions

6.Program Structure

Program structure	Number of courses	Study unit	Percentage	comments
Institution (university) requirements	10	20	%18.018	**essential optional**
College requirements	3	10	%9.009	
Department requirements	23	80	%72.07	
Summer training	There is	–	–	
Other	–	–	–	

7.Program Description				
Credit Hours		Course name	Course code	Year/Level
practical	theoretical			
-	2	Properties of Materials 1	METP12 4	Level One
2	2	Mechanics 1	METP120	
1	1	computer	NTU102	
2	2	Mechanics 2	METP121	
-	2	/Mathematics1	TIHA110	
-	2	/Mathematics2	TIHA111	
-	2	English language	NTU101	
-	2	Democracy and rights man	NTU100	
-	2	Sports	NTU104	
2	2	Manufacturing processes 1	METP122	
2	2	Manufacturing processes 2	METP123	
3	-	Engineering drawing 1	METP126	
3	-	Engineering drawing 1	METP127	
3	-	coefficient1	TIHA112	
2	1	electrical technology	METP129	
-	2	Arabic	NTU103	
-	-	Summer training	METP131	
3	-	coefficient2	METP128	
-	2	Materials 2	METP125	
1	1	computer	NTU201	

-	2	English language	NTU200	Level Two
-	2	Ba'ath Party crimes in Iraq	NTU202	
-	3	Machine Parts Technology 1	METP210	
2	2	manufacturing 3 processes	METP212	
3		coefficient 3	METP214	
2	2	Minerals 1	METP216	
3		Industrial drawing 1	METP218	
-	2	Industrial Management	METP222	
-	2	Professional ethics	NTU201	
-	3	Machine Parts Technology 2	METP211	
2	2	manufacturing 4 processes	METP213	
3	-	coefficient 4	METP215	
2	2	Metals 2	METP217	
3		Industrial drawing 2	METP219	
-	2	Arabic	NTU201	

8.Expected learning outcomes of the program

Knowledge

1. Understanding the fundamentals of mechanical engineering, such as the principles of motion, energy, and mechanical systems
2. Knowledge of engineering materials, their properties, and their use in various mechanical applications

3. Familiarity with the basics of manufacturing and processing operations such as turning, welding and production methods

4. Knowledge of measurement tools, engineering drawing, and reading mechanical drawings accurately

Skills

1. The ability to use mechanical tools and equipment in laboratories and workshops correctly and safely

2. Conducting mechanical measurements and tests using various measuring devices

3. Diagnosing simple mechanical faults and the ability to maintain and repair some parts

4. Applying practical skills in the work environment and linking theoretical knowledge with practical application in the field of mechanics

Values

1. Adherence to professional ethics and working with a spirit of responsibility and discipline

2.Adherence to occupational safety rules within laboratories and workshops

3.Working as a team and cooperating with colleagues to accomplish technical tasks

4.Maintaining equipment and respecting the work environment and public property

9. Teaching and learning strategies

Firstly: Learning strategies

The educational process relies on an integrated mix of theoretical and practical :methods and includes

- Theoretical lectures

Introducing basic concepts in mechanics such as dynamics, heat transfer, and properties of materials

(educational videos ,PowerPoint) Use modern presentation tools

- Discussion and dialogue

.Involving students in asking questions and analyzing problems

Developing critical thinking and the ability to express scientific ideas

- Practical lectures

Applying theoretical concepts within workshops and laboratories
Training students on how to use devices and equipment

- discussion panels

Students presenting specialized topics
Enhancing presentation and scientific research skills

Second: Applied learning strategies: These focus on linking theory with practical :application

- laboratories

Conducting mechanical experiments (measurements, stress, vibrations)
Analyzing the results and linking them to the theoretical aspect

- Field visits

Visiting factories and industrial companies
Getting to know the real work environment

- Summer training

Training students in industrial institutions
Gaining direct practical experience

Third: Self-learning strategies: These aim to develop the student's independence in :learning and include

- Office activities

Preparing reports and research
Using scientific sources (books, internet)

- Solve the questions and exercises

Enhance understanding through continuous application
Developing analytical and problem-solving skills

: **Fourth: Project-based learning**
Implementing a comprehensive engineering project
Applying what was learned during the school years
Developing innovation and teamwork skills

Assessment Methods .10
It depends on measuring the level of students' understanding of theoretical material and their ability to apply it practically. This is done through written tests and practical evaluation in laboratories and workshops, in addition to reports on laboratory experiments. The participation and commitment of students within the classroom and .practical training are also taken into consideration

11.Faculty

,Faculty members (list all faculty members in the academic department (including external and internal lecturers

Faculty preparation		Special requirements/skills (if any)	Specialization		Scientific rank
lecturer	angel		private	general	
	angel	PhD in Mechanical Engineering	refractories	mechanic	.Mr
	angel	PhD in Mechanical Engineering	Renewable energies	Mechanic	.Mr
	angel	Master of Engineering	refractories	Mechanical techniques	Assistant teacher
	angel	Master of Engineering	refractories	Mechanic	Assistant teacher
	angel	Master of Engineering	refractories	Mechanic	Assistant teacher
	angel	Master of Engineering	Building and construction	civilian	Assistant teacher

Professional development
Orienting new faculty members
1.Orienting new faculty members Preparing an orientation program that explains the department's system and curricula Introducing them to the teaching methods adopted within the department Engaging them with experienced instructors (supervision and guidance system) Monitoring their performance during the first year and providing the necessary suppor

2 Specialized training courses -

,Conducting training courses in the field of specialization (mechanics, operation - maintenance, design)

.Keeping up with modern developments in mechanical technologies

.Training on the use of modern devices and equipment in laboratories -

3.Courses in teaching and learning

Developing modern teaching skills (active learning, e-learning)

Using digital teaching tools (presentations, educational platforms)

Improving classroom management skills and interaction with students

4.Scientific research courses

Training faculty members on how to write and publish scientific research

Familiarization with scientific journals and publishing mechanisms

Developing skills in preparing applied research related to industry

5.Workshops and seminars

Organizing workshops within the department to exchange experiences

Hosting experts from the industrial sector

Presenting successful experiences in the engineering and educational fields

6.Linking professional development to the labor market

Cooperation with factories and companies to train instructors

Familiarity with the latest technologies used in the job market

Transferring practical experiences to students inside classrooms and laboratories

Professional development of faculty members

The Department of Mechanical Technologies is keen to support the professional development of faculty members by encouraging them to participate in training courses, workshops and scientific seminars. The department also works to develop their teaching and research skills and keep up with modern developments in the field of mechanical technologies, which contributes to improving the quality of education .and raising the efficiency of the educational process within the department

12.Admission Criteria

Students are admitted to the department according to the regulations and instructions of the Ministry of Higher Education and Scientific Research and the Technical Education Authority. Applicants must be graduates of secondary school (scientific or

industrial branch), and admission is based on grade point average and competition among students. Students are also subject to the central admissions process, taking into account the department's capacity and fulfillment of required administrative .conditions

13.Key sources of information about the program
The official website of the institute The study plan and scientific curricula of the department The institute's library and scientific references Faculty members and scientific seminars Scientific papers

Program Development Plan .14
Updating school curricula to keep pace with technological development Focusing on the practical and applied aspects for students Equipping laboratories and workshops with modern equipment and maintaining them Developing the skills of the teaching staff through continuous training courses Strengthening cooperation with the labor market (companies, factories, summer training) Using modern teaching methods (e-learning, projects) Diversifying the methods of evaluation (practical, theoretical, reports, presentations) Implementing a quality assurance system and continuous evaluation of the program Monitoring graduates and measuring their employment rate

Program Skills Plan															
Learning outcomes required from the program															
Values				Skills				Knowledge				**Essential or optional**	Course Name	Course code	/Year Level
Q4	Part 3	Part 2	Part 1	B4	B3	B2	B1	A4	A3	A2	A1				
✓	✓		✓	✓		✓	✓		✓	✓	✓	essential	Properties of Materials 2	METP125	Level One
✓		✓	✓		✓	✓	✓	✓		✓	✓	essential	Properties of Materials 1	METP124	
	✓	✓	✓	✓		✓	✓		✓	✓	✓	essential	coefficient 2	METP128	
✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	essential	Summer training	METP131	
✓		✓	✓		✓	✓	✓	✓		✓	✓	essential	Engineering Mechanics 1	METP120	
✓	✓		✓	✓	✓		✓		✓	✓	✓	essential	computer	NTU102	
	✓	✓	✓		✓	✓	✓	✓		✓	✓	essential	Engineering Mechanics 2	METP121	
✓	✓		✓	✓		✓	✓		✓	✓	✓	essential	Mathematics/1	TIHA110	
✓		✓	✓	✓	✓		✓	✓	✓	✓		essential	Mathematics/2	TIHA111	
✓	✓		✓	✓	✓	✓		✓	✓		✓	essential	English language	NTU101	
	✓	✓	✓	✓		✓	✓	✓		✓	✓	essential	Democracy and human rights	NTU100	
✓		✓	✓	✓		✓	✓	✓	✓	✓		optional	Sports	NTU104	

✓	✓	✓		✓	✓	✓		✓	✓		✓	essential	Manufacturing processes 1	METP122	
✓		✓	✓	✓	✓		✓	✓		✓	✓	essential	Manufacturing processes 2	METP123	
✓	✓		✓	✓	✓	✓		✓	✓	✓		essential	Engineering drawing 1	METP126	
	✓	✓	✓	✓	✓		✓	✓	✓		✓	essential	**Engineering drawing 1**	METP127	
✓		✓	✓	✓		✓	✓	✓	✓	✓		essential	coefficient1	TIHA112	
✓	✓		✓	✓	✓		✓	✓		✓	✓	optional	electrical technology	METP129	
	✓	✓	✓	✓	✓		✓	✓	✓		✓	essential	Arabic	NTU103	
✓		✓	✓	✓		✓	✓		✓	✓	✓	essential	computer	NTU201	Level Two
	✓	✓	✓		✓	✓	✓	✓		✓	✓	essential	English language	NTU200	
	✓	✓	✓	✓		✓	✓	✓	✓		✓	essential	Crimes of the Ba'ath regime in Iraq	NTU202	
✓		✓	✓	✓	✓	✓		✓	✓	✓		essential	Machine Parts Technology 1	METP210	
	✓	✓	✓	✓		✓	✓		✓	✓	✓	essential	manufacturing 3 processes	METP212	
✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	essential	coefficient 3	METP214	
✓	✓		✓		✓	✓	✓	✓	✓		✓	essential	Minerals 1	METP216	
	✓	✓	✓	✓		✓	✓	✓		✓	✓	essential	Industrial Drawing 1	METP218	

✓	✓	✓		✓	✓	✓		✓	✓		✓	essential	Industrial Management	METP222	
✓		✓	✓		✓	✓	✓	✓	✓	✓		essential	Professional ethics	NTU201	
✓	✓		✓	✓		✓	✓	✓		✓	✓	essential	Machine Parts Technology 2	METP211	
	✓	✓	✓	✓	✓		✓	✓	✓		✓	essential	manufacturing 4 processes	METP213	
✓	✓		✓		✓	✓	✓		✓	✓	✓	essential	coefficient 4	METP215	
	✓	✓	✓	✓	✓	✓		✓	✓	✓		essential	Metals 2	METP217	
✓		✓	✓	✓		✓	✓	✓		✓	✓	essential	Industrial drawing 2	METP219	
✓		✓	✓	✓	✓	✓		✓	✓		✓	essential	Arabic	NTU201	

COURSE DESCRIPTION

First Level – First Semester

1. Course Name

Engineering Mechanics I

2. Course Code

METP120

3. Semester / Academic Year

First Semester / 2025–2026

4. Date of Preparing the Description

01/10/2025

5. Available Attendance Modes

- In-person
- Electronic (Online)

6. Total Credit Hours / Total Units

- **30 theoretical hours + 30 practical hours**
- **4 credit units**

7. Course Coordinator

Name: Jaber Zain Al-Abideen Saqi

Email: jabersaqee@ntu.edu.iq

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8. Course Objectives

Upon completion of this course, students will be able to:

- Understand the principles of equilibrium of forces acting on bodies.
- Analyze forces and moments in mechanical systems.
- Solve practical engineering problems related to mechanics.

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9. Teaching and Learning Strategies

- Simplified theoretical lectures supported with progressive examples.
- Step-by-step problem-solving during class.

- Combination of theoretical and practical lectures.
- Use of drawings and diagrams to illustrate force systems.

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10. Course Structure

Week	Hours	Intended Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Fundamental Concepts	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
2	4	Knowledge and application	Analysis of Forces	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
3	4	Knowledge and application	Moment of a Force	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
4	4	Knowledge and application	Couple	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
5	4	Knowledge and application	Couple	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
6	4	Knowledge and application	Resultant of Non-Collinear Coplanar Forces	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
7	4	Knowledge and application	Equilibrium	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
8	4	Knowledge and application	Equilibrium	Whiteboard, PowerPoint	Reports, written, oral

Week	Hours	Intended Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
				slides, practical demonstrations	and theoretical examinations
9	4	Knowledge and application	Friction	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
10	4	Knowledge and application	Friction	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
11	4	Knowledge and application	Resultant of Forces in Three Dimensions	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
12	4	Knowledge and application	Center of Mass and Centroid	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
13	4	Knowledge and application	Center of Mass and Centroid	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
14	4	Knowledge and application	Moment of Inertia (Second Moment of Area of Regular Sections)	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations
15	4	Knowledge and application	Moment of Inertia (Second Moment of Area of Regular Sections)	Whiteboard, PowerPoint slides, practical demonstrations	Reports, written, oral and theoretical examinations

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11. Course Assessment

- Student reports and activities.
- Oral examinations.

- Written examinations.
- Practical examinations.

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12. Learning and Teaching Resources

Required Textbooks

- Fundamentals of Engineering Mechanics
- Kinematics and Dynamics
- Kinematics and Mechanical Vibrations

Main References

- Fundamentals of Engineering Mechanics
- Kinematics and Dynamics
- Kinematics and Mechanical Vibrations

Recommended References

- Scientific journals and technical reports.

Electronic References

- Relevant engineering websites and online educational resources.

COURSE DESCRIPTION

First Level – First Semester

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1. Course Name

Computer

2. Course Code

NTU102

3. Semester / Academic Year

First Semester / 2025–2026

4. Date of Preparing the Course Description

01/10/2025

5. Available Attendance Modes

- In-person
- Online

6. Total Credit Hours / Total Units

- **15 theoretical hours + 15 practical hours**
- **2 credit units**

7. Course Coordinator

Name: Hussam Hamad Ali

Email:

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- **Operate a computer efficiently and understand its basic functions.**
- **Understand the principles of computer hardware, software, and Internet applications related to their field of study.**
- **Learn Microsoft Windows and Microsoft Word.**
- **Develop practical skills in using computer software that will support their academic and professional work in future years.**

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9. Teaching and Learning Strategies

- **Simplified theoretical lectures supported by live demonstrations.**
- **Practical laboratory sessions for every topic.**
- **Cooperative learning and teamwork inside the computer laboratory.**

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10. Course Structure

Week	Hours	Unit / Topic	Teaching Method	Assessment
1	2	Introduction to computers, computer generations, hardware and software, system software and application software	Lecture, PowerPoint, laboratory practice	Reports, assignments, oral and written examinations

Week	Hours	Unit / Topic	Teaching Method	Assessment
2	2	MS-DOS operating system, file system, directories, internal and external commands	Lecture and laboratory	Reports and examinations
3	2	Internal DOS commands (DIR, DEL, TIME, DATE, CLS, RD, CD, MD, ECHO, REN, COPY, VOL, VER, PATH)	Practical laboratory	Reports and examinations
4	2	Windows operating system, desktop, icons, taskbar, Start menu, mouse functions, shutting down Windows	Lecture and laboratory	Reports and examinations
5	2	Windows interface, windows, desktop icons (My Computer, My Documents, Recycle Bin)	Practical laboratory	Reports and examinations
6	2	Managing drives, folders, files, formatting disks, copying files, Cut & Paste, file properties, Recycle Bin	Practical laboratory	Reports and examinations
7	2	Control Panel, Display settings, Mouse settings, screen saver, Add/Remove Programs	Practical laboratory	Reports and examinations
8	2	Using the **Run** command and switching to the MS-DOS command prompt	Practical laboratory	Reports and examinations
9	2	Using Windows Media Player to play multimedia files	Practical laboratory	Reports and examinations
10	2	Windows Accessories (Calculator)	Practical laboratory	Reports and examinations
11	2	Microsoft Paint: creating, editing, saving, and opening drawings	Practical laboratory	Reports and examinations
12	2	NotePad and WordPad: creating, saving, editing, formatting, and printing text	Practical laboratory	Reports and examinations
13	2	Windows Help system and methods of obtaining assistance	Practical laboratory	Reports and examinations
14	2	Computer viruses, virus types, infection methods, antivirus software	Practical laboratory	Reports and examinations
15	2	Using the Recycle Bin to delete and restore files	Practical laboratory	Reports and examinations

11. Course Assessment

- Student reports
- Homework assignments
- Classroom activities
- Oral examinations
- Written examinations
- Practical examinations

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12. Learning and Teaching Resources

Required Textbooks

- *Structure and Interpretation of Computer Programs*
  Harold Abelson, Gerald Jay Sussman & Julie Sussman (1985)
- *Introduction to the Theory of Computation*
  Michael Sipser (1996)

Main References

- *Computer Organization and Design: The Hardware/Software Interface*
  David A. Patterson & John L. Hennessy
- *Operating System Concepts*
  Abraham Silberschatz, Peter B. Galvin & Greg Gagne

Recommended References

- Scientific journals and technical reports related to computer science.

Electronic Resources

- Microsoft Windows Official Website
  https://www.microsoft.com/software-download/windows11

COURSE DESCRIPTION

Second Level – First Semester

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1. Course Name

English Language

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2. Course Code

NTU202

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- **In-person**
- **Online**

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6. Total Credit Hours / Total Units

- **30 theoretical hours**
- **2 credit units**

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7. Course Coordinator

Name: Hussam Hamad Ali

Email:

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- **Develop intermediate and advanced English language skills for academic and engineering purposes.**
- **Enhance reading, writing, listening, and speaking abilities using technical and scientific materials.**
- **Expand engineering vocabulary and technical terminology related to mechanical engineering.**
- **Improve technical writing and oral communication skills.**
- **Strengthen students' ability to understand and communicate effectively in professional engineering environments.**

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9. Teaching and Learning Strategies

- **Interactive lectures supported by multimedia resources.**
- **Reading and analysis of engineering and scientific texts.**
- **Classroom discussions and oral presentations.**
- **Grammar, vocabulary, and technical writing exercises.**
- **Continuous assessment through assignments, presentations, and quizzes.**

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	2	Knowledge and application	Course introduction and review of English Language I	Interactive lecture and classroom discussion	Reports, assignments, written and oral examinations
2	2	Knowledge and application	Advanced grammar: Verb tenses and sentence patterns	Grammar exercises and classroom activities	Reports and examinations
3	2	Knowledge and application	Passive voice and technical writing	Interactive lecture and writing exercises	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
4	2	Knowledge and application	Modal verbs and professional communication	Classroom discussions	Reports and examinations
5	2	Knowledge and application	Reading and comprehension of engineering texts	Guided reading and comprehension activities	Reports and examinations
6	2	Knowledge and application	Technical vocabulary in manufacturing and mechanical engineering	Vocabulary-building exercises	Reports and examinations
7	2	Knowledge and application	Technical report writing	Writing workshop	Reports and examinations
8	2	Knowledge and application	Formal correspondence and email writing	Practical writing exercises	Reports and examinations
9	2	Knowledge and application	Listening skills using technical presentations	Audio and video learning activities	Reports and examinations
10	2	Knowledge and application	Oral presentations and public speaking	Classroom presentations	Reports and examinations
11	2	Knowledge and application	Translation of engineering texts (Arabic–English / English–Arabic)	Translation exercises	Reports and examinations
12	2	Knowledge and application	Technical discussions and teamwork communication	Group activities	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
13	2	Knowledge and application	Presentation of engineering topics	Student presentations	Reports, presentations, and examinations
14	2	Knowledge and application	Comprehensive language review	Classroom revision sessions	Reports and examinations
15	2	Knowledge and application	Final review and comprehensive examination	Written and oral assessment	Final written and oral examinations

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11. Course Assessment

Assessment methods include:

- **Homework assignments**
- **Student reports**
- **Classroom participation**
- **Quizzes**
- **Oral presentations**
- **Written examinations**
- **Oral examinations**
- **Mid-term examination**
- **Final examination**

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12. Learning and Teaching Resources

Required Textbooks

- **Technical English for Engineering**
- **English for Mechanical Engineering**

Main References

- **Oxford English for Careers: Engineering**
- **Cambridge English for Engineering**
- **Essential Grammar in Use – Raymond Murphy**

Recommended References

- **Engineering journals and technical magazines published in English.**
- **Engineering communication and technical writing manuals.**
- **Technical dictionaries and glossaries.**

Electronic Resources

- **British Council – LearnEnglish**
- **Cambridge English Learning Resources**
- **Oxford University Press – English Language Learning**
- **Online Technical English learning platforms**
- **University digital learning resources**

COURSE DESCRIPTION

First Level – First Semester

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1. Course Name

Mathematics I

2. Course Code

TIHA110

3. Semester / Academic Year

First Semester / 2025–2026

4. Date of Preparing the Course Description

01/10/2025

5. Available Attendance Modes

- In-person

- Online

6. Total Credit Hours / Total Units

- **30 theoretical hours**
- **2 credit units**

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7. Course Coordinator

Name: Ahmed Hasan Ahmed

Email: ahmedhasan_hwj@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand the fundamental principles of engineering mathematics.
- Develop mathematical thinking and analytical problem-solving skills.
- Apply algebraic, trigonometric, and calculus concepts to engineering problems.
- Build a solid mathematical foundation for advanced engineering courses.

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9. Teaching and Learning Strategies

- Interactive lectures supported by examples.
- Step-by-step explanation of mathematical concepts.
- Classroom exercises and tutorials.
- Continuous assignments and quizzes.
- Encouraging students to solve engineering-related mathematical problems.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	2	Knowledge and application	Review of basic mathematics	Lecture, whiteboard, PowerPoint	Reports, assignments, written and oral examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
2	2	Knowledge and application	Real numbers and algebraic operations	Lecture, classroom exercises	Reports and examinations
3	2	Knowledge and application	Indices and logarithms	Lecture and exercises	Reports and examinations
4	2	Knowledge and application	Equations and inequalities	Lecture and exercises	Reports and examinations
5	2	Knowledge and application	Functions and their properties	Lecture and exercises	Reports and examinations
6	2	Knowledge and application	Trigonometric functions	Lecture and exercises	Reports and examinations
7	2	Knowledge and application	Trigonometric identities and equations	Lecture and exercises	Reports and examinations
8	2	Knowledge and application	Matrices and determinants	Lecture and exercises	Reports and examinations
9	2	Knowledge and application	Systems of linear equations	Lecture and exercises	Reports and examinations
10	2	Knowledge and application	Limits	Lecture and exercises	Reports and examinations
11	2	Knowledge and application	Continuity	Lecture and exercises	Reports and examinations
12	2	Knowledge and application	Differentiation	Lecture and exercises	Reports and examinations
13	2	Knowledge and application	Applications of derivatives	Lecture and exercises	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
14	2	Knowledge and application	Integration	Lecture and exercises	Reports and examinations
15	2	Knowledge and application	Applications of integration and final review	Lecture and exercises	Reports, assignments, and examinations

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11. Course Assessment

Assessment methods include:

- Homework assignments
- Student reports
- Classroom participation
- Quizzes
- Oral examinations
- Written examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- *Engineering Mathematics*
- *Advanced Engineering Mathematics*

Main References

- Erwin Kreyszig, *Advanced Engineering Mathematics*
- B. S. Grewal, *Higher Engineering Mathematics*

Recommended References

- Scientific journals related to mathematics and engineering applications.
- Supplementary lecture notes.

Electronic Resources

- Online engineering mathematics resources.
- Digital educational platforms and university learning management systems.

COURSE DESCRIPTION

First Level – First Semester

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1. Course Name

Human Rights and Democracy

2. Course Code

NTU100

3. Semester / Academic Year

First Semester / 2025–2026

4. Date of Preparing the Course Description

01/10/2025

5. Available Attendance Modes

- **In-person**
- **Online**

6. Total Credit Hours / Total Units

- **30 theoretical hours**
- **2 credit units**

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7. Course Coordinator

Name: ***Raad Awad Hamza***

Email: ***raadawad_hwj@ntu.edu.iq***

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- **Understand the concepts and principles of human rights and democracy.**
- **Recognize the importance of human rights in society.**

- **Explain the relationship between democracy, freedom, and equality.**
- **Develop awareness of civil rights and responsibilities.**
- **Promote the values of justice, tolerance, and respect for diversity.**

---

9. Teaching and Learning Strategies

- **Interactive lectures supported by presentations.**
- **Classroom discussions and dialogue.**
- **Practical activities and student participation.**
- **Assignments, reports, and presentations.**
- **Encouraging critical thinking on issues related to human rights and democracy.**

---

10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	2	Knowledge	Introduction to Human Rights: concept, characteristics, and development	Whiteboard, PowerPoint presentations, discussions	Reports, assignments, written and oral examinations
2	2	Knowledge	Sources and classifications of human rights	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
3	2	Knowledge	International Human Rights instruments and conventions	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
4	2	Knowledge	Civil and political rights	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
5	2	Knowledge	Economic, social, and cultural rights	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
6	2	Knowledge	Collective rights and environmental rights	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
7	2	Knowledge	Economic and Social Freedoms: Freedom to work, freedom of ownership, freedom of trade and industry	Whiteboard, PowerPoint presentations	Reports, assignments, examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
8	2	Knowledge	Social security, health care, and democratic rights	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
9	2	Knowledge	Democracy in Iraq	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
10	2	Knowledge	Elections and the Iraqi Transitional National Assembly	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
11	2	Knowledge	Objectives and principles of democracy	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
12	2	Knowledge	Forms of democracy: direct and indirect democracy	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
13	2	Knowledge	Public participation in the legislative process: popular initiative and referendum	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
14	2	Knowledge	Types of referendums and their political implications	Whiteboard, PowerPoint presentations	Reports, assignments, examinations
15	2	Knowledge	Course review and final examination	Whiteboard, PowerPoint presentations	Reports, written, oral, and final examinations

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11. Course Assessment

Assessment methods include:

- **Student reports**
- **Homework assignments**
- **Classroom activities**
- **Oral examinations**
- **Written examinations**
- **Mid-term examination**
- **Final examination**

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12. Learning and Teaching Resources

Required Textbooks

- **Public Freedoms and Democracy – Al-Mustansiriyah University Lectures**
- **University of Babylon Lecture Notes**

Main References

- **Democracy and Human Rights (2015) –** ***Ahmed Al-Sayyid Atta***
- **Human Rights and Democracy in the Arab World (2010) –** ***Hatem Al-Meligy***
- **Human Rights in Islam and International Humanitarian Law (2007) –** ***Mohammed Al-Shaibah***

Recommended References

- **Scientific journals and academic reports related to democracy and human rights.**

Electronic Resources

- **Official websites of international organizations concerned with human rights and democracy.**
- **University digital libraries and educational platforms.**

COURSE DESCRIPTION

First Level – First Semester

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1. Course Name

Engineering Drawing I

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2. Course Code

METP126

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- **In-person**
- **Online**

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6. Total Credit Hours / Total Units

- **45 practical hours**
- **3 credit units**

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7. Course Coordinator

Name: Assistant Lecturer Wafaa Abbas Hassan

Email: wafaa_hwj@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- **Develop the skills required to perform fundamental engineering drawing operations using AutoCAD, following established engineering standards and technical specifications.**
- **Apply drawing and editing commands to solve engineering problems and produce accurate technical drawings.**
- **Improve practical drafting skills through laboratory exercises and engineering drawing projects.**

---

9. Teaching and Learning Strategies

- **Interactive lectures combined with practical demonstrations using AutoCAD.**
- **Hands-on laboratory exercises to reinforce engineering drawing concepts.**
- **Practical projects designed to enhance drafting accuracy and engineering design skills.**
- **Continuous practice through engineering drawing assignments.**

---

10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	3	Knowledge and application	Introduction to engineering drawing and the use of AutoCAD	Whiteboard, PowerPoint presentations, practical laboratory sessions	Reports, written, oral, and practical examinations
2	3	Knowledge and application	Basic drawing commands for simple engineering constructions	Practical demonstration using AutoCAD	Reports, assignments, and examinations
3	3	Knowledge and application	Drawing lines, angles, circles, arcs, and their engineering applications	AutoCAD laboratory	Reports and examinations
4	3	Knowledge and application	Editing and modification commands for engineering drawings	Practical laboratory	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
5	3	Knowledge and application	Drawing regular and irregular polygons and geometric shapes	AutoCAD laboratory	Reports and examinations
6	3	Knowledge and application	Engineering construction applications (tangent, division, and bisector constructions)	Practical exercises	Reports and examinations
7	3	Knowledge and application	Using absolute, relative, and polar coordinate systems in engineering drawing	AutoCAD laboratory	Reports and examinations
8	3	Knowledge and application	Complex engineering constructions using drawing and editing commands	Practical laboratory	Reports and examinations
9	3	Knowledge and application	Layer management, object properties, and drawing organization	AutoCAD laboratory	Reports and examinations
10	3	Knowledge and application	Orthographic projection drawings and engineering applications	Practical laboratory	Reports and examinations
11	3	Knowledge and application	Hatching, dimensioning, symbols, and engineering annotations	Practical laboratory	Reports and examinations
12	3	Knowledge and application	Advanced engineering construction exercises	AutoCAD laboratory	Reports and examinations
13	3	Knowledge and application	Integrated engineering drawing projects using AutoCAD	Practical laboratory	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
14	3	Knowledge and application	Mini engineering drawing project	Practical laboratory	Reports, project evaluation, and examinations
15	3	Knowledge and application	Comprehensive review and final practical examination	Practical laboratory	Final practical and written examinations

---

11. Course Assessment

Assessment methods include:

- **Laboratory reports**
- **Homework assignments**
- **Practical exercises**
- **Classroom participation**
- **Oral examinations**
- **Written examinations**
- **Practical examinations**
- **Mid-term examination**
- **Final practical examination**

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12. Learning and Teaching Resources

Required Textbook

- **Engineering Drawing**
    - **Prepared by Abdul Rasool Abdul Hussein**

Main References

- **Standard textbooks on engineering drawing and technical drafting.**
- **AutoCAD user manuals and instructional guides.**

Recommended References

- **Scientific journals related to engineering graphics and computer-aided design (CAD).**

- **Technical reports and engineering drawing standards.**

Electronic Resources

- **Autodesk AutoCAD official documentation.**
- **Online engineering drawing tutorials and CAD learning platforms.**
- **Digital educational resources in engineering graphics.**

COURSE DESCRIPTION

First Level – First Semester

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1. Course Name

Manufacturing Processes I

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2. Course Code

METP122

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours + 30 practical hours**
- **4 credit units**

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7. Course Coordinator

Name: Zeyad Khalaf Hamad

Email: zeyad_hwj@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand the fundamental concepts of manufacturing processes.
- Develop practical skills in using engineering tools and workshop machines.
- Integrate theoretical knowledge with practical applications in manufacturing.
- Perform basic measurement and inspection techniques accurately.

---

9. Teaching and Learning Strategies

- Theoretical lectures introducing manufacturing concepts.
- Practical laboratory and workshop sessions.
- Hands-on learning using real measuring instruments and workshop equipment.
- Practical exercises on engineering measurements and dimensional inspection.

---

10. Course Structure

W.	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Introduction to measurement and its applications	Whiteboard, PowerPoint presentations, practical experiments	Reports, written, oral, and practical examinations
2	4	Knowledge and application	Measuring instruments; direct and indirect measuring devices	Whiteboard, PowerPoint, practical experiments	Reports and examinations
3	4	Knowledge and application	Proper use of measuring instruments with practical examples	Whiteboard, PowerPoint, laboratory practice	Reports and examinations
4	4	Knowledge and application	Sources of measurement errors	Whiteboard, PowerPoint, practical experiments	Reports and examinations

W.	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
5	4	Knowledge and application	Measurement errors and methods of minimizing them	Whiteboard, PowerPoint, laboratory practice	Reports and examinations
6	4	Knowledge and application	Scientific systems of measurement and the importance of measurement	Whiteboard, PowerPoint, laboratory practice	Reports and examinations
7	4	Knowledge and application	Vernier caliper: definition, components, and operation	Whiteboard, PowerPoint, practical experiments	Reports and examinations
8	4	Knowledge and application	Types of Vernier calipers and dimensional measurements	Whiteboard, PowerPoint, laboratory practice	Reports and examinations
9	4	Knowledge and application	Accuracy calculation with numerical examples and exercises	Whiteboard, PowerPoint, practical exercises	Reports and examinations
10	4	Knowledge and application	Types of gauges	Whiteboard, PowerPoint, laboratory practice	Reports and examinations
11	4	Knowledge and application	Applications of gauges and dimensional inspection techniques	Whiteboard, PowerPoint, practical experiments	Reports and examinations
12	4	Knowledge and application	Micrometer: components, types, and applications	Whiteboard, PowerPoint, laboratory practice	Reports and examinations
13	4	Knowledge and application	Micrometer reading examples and precision calculations	Whiteboard, PowerPoint, practical exercises	Reports and examinations
14	4	Knowledge and application	Optical profile projector and its engineering applications	Whiteboard, PowerPoint, laboratory practice	Reports and examinations
15	4	Knowledge and application	Final practical and theoretical examination	Whiteboard, PowerPoint, practical assessment	Reports, written, oral, practical, and final examinations

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11. Course Assessment

Assessment is based on:

- Student reports

- Practical activities
- Homework assignments
- Written examinations
- Oral examinations
- Practical examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Manufacturing Processes I** – *Mohammed Mardhi*
- **Metal Manufacturing Processes** – *Ali Ibrahim Al-Mousawi*

Main References

- Standard textbooks on manufacturing processes and engineering metrology.
- Workshop technology manuals.

Recommended References

- Scientific journals in manufacturing engineering.
- Engineering metrology references.
- Technical reports related to manufacturing technology.

Electronic Resources

- Engineering education websites.
- Online manufacturing technology resources.
- Digital learning platforms related to manufacturing engineering.

COURSE DESCRIPTION

First Level – First Semester

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1. Course Name

Properties of Materials I

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2. Course Code

METP124

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours**
- **2 credit units**

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7. Course Coordinator

Name: Zeyad Khalaf Hamad

Email: zeyad_hwj@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand the fundamental concepts of materials science and engineering materials.
- Explain the atomic structure and engineering structure of materials.
- Classify engineering materials according to their physical and mechanical properties.
- Relate the microstructure of materials to their engineering applications.
- Develop a solid foundation for advanced studies in metallurgy and materials engineering.

---

9. Teaching and Learning Strategies

- Simplified theoretical lectures supported by illustrative examples.
- Laboratory experiments, including **tensile** and **hardness** tests.
- Use of models, diagrams, and illustrations to explain material structures.
- Linking theoretical concepts with practical workshop applications.

---

10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	2	Knowledge and application	Introduction to materials science and engineering materials	Whiteboard, PowerPoint presentations, laboratory demonstrations	Reports, assignments, written and oral examinations
2	2	Knowledge and application	Classification of engineering materials and metals	Whiteboard, PowerPoint, laboratory activities	Reports and examinations
3	2	Knowledge and application	Atomic structure of elements	Whiteboard, PowerPoint presentations	Reports and examinations
4	2	Knowledge and application	Atomic bonding and types of chemical bonds	Whiteboard, PowerPoint presentations	Reports and examinations
5	2	Knowledge and application	Crystal structure of metals	Whiteboard, PowerPoint presentations, laboratory demonstrations	Reports and examinations
6	2	Knowledge and application	Unit cells and crystal systems	Whiteboard, PowerPoint presentations	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
7	2	Knowledge and application	Point defects and line defects in crystal structures	Whiteboard, PowerPoint presentations	Reports and examinations
8	2	Knowledge and application	Dislocations and their influence on material properties	Whiteboard, PowerPoint presentations	Reports and examinations
9	2	Knowledge and application	Slip and twinning mechanisms	Whiteboard, PowerPoint presentations	Reports and examinations
10	2	Knowledge and application	Diffusion in metals	Whiteboard, PowerPoint presentations	Reports and examinations
11	2	Knowledge and application	Physical properties of metals	Whiteboard, PowerPoint presentations	Reports and examinations
12	2	Knowledge and application	Mechanical properties of engineering materials	Whiteboard, PowerPoint presentations	Reports and examinations
13	2	Knowledge and application	Stress and strain	Whiteboard, PowerPoint presentations	Reports and examinations
14	2	Knowledge and application	Stress–strain curve	Whiteboard, PowerPoint presentations	Reports and examinations
15	2	Knowledge and application	Tensile testing of metals	Whiteboard, PowerPoint presentations, laboratory experiment	Reports, written, oral, and practical examinations

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11. Course Assessment

Assessment methods include:

- Student reports
- Homework assignments
- Classroom participation
- Laboratory activities
- Oral examinations
- Written examinations

- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbook

- **Modern Physical Metallurgy and Materials Engineering**

Main Reference

- **A Textbook of Material Science and Metallurgy**

Recommended References

- Wiley publications in Materials Science and Metallurgy.
- Springer publications in Materials Science.
- Recent scientific journals in materials engineering and physical metallurgy.

Electronic Resources

- Online materials science databases.
- Engineering education websites.
- Digital libraries and e-learning platforms.
- Professional resources on physical metallurgy and materials engineering.

COURSE DESCRIPTION

First Level – First Semester

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1. Course Name

Electrical Technology

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2. Course Code

METP129

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **15 theoretical hours + 30 practical hours**
- **3 credit units**

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7. Course Coordinator

Name: Wafaa Abbas Hassan

Email: zeyad_hwj@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Select appropriate electrical components for various engineering applications based on their electrical characteristics.
- Analyze and interpret the behavior of electrical circuits under different operating conditions.
- Understand the effects of voltage and current variations on circuit performance.
- Apply fundamental electrical principles in engineering and industrial applications.
- Develop practical skills in analyzing and constructing basic electrical circuits.

---

9. Teaching and Learning Strategies

- Simplified theoretical lectures supported by practical examples.
- Laboratory experiments and hands-on activities.
- Problem-solving sessions involving electrical circuits.
- Relating electrical concepts to industrial and engineering applications.

---

10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	3	Knowledge and application	Introduction to electrical terminology, Ohm's Law, and direct current (DC)	Whiteboard, PowerPoint presentations, laboratory demonstrations	Reports, assignments, written, oral, and practical examinations
2	3	Knowledge and application	Solving numerical problems using Ohm's Law and unit conversions	Classroom exercises and laboratory practice	Reports and examinations
3	3	Knowledge and application	Relationship between voltage, current, and resistance; detailed explanation of Ohm's Law	Whiteboard, PowerPoint presentations	Reports and examinations
4	3	Knowledge and application	Electrical circuits and electric motors	Whiteboard, PowerPoint presentations, laboratory practice	Reports and examinations
5	3	Knowledge and application	Open electrical circuits with practical examples	Laboratory demonstrations	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
6	3	Knowledge and application	Closed electrical circuits with practical examples	Laboratory demonstrations	Reports and examinations
7	3	Knowledge and application	Series circuits and their characteristics	Practical laboratory sessions	Reports and examinations
8	3	Knowledge and application	Parallel circuits and their characteristics	Practical laboratory sessions	Reports and examinations
9	3	Knowledge and application	Combined series–parallel circuits with numerical examples	Practical laboratory exercises	Reports and examinations
10	3	Knowledge and application	Mid-term examination covering previous topics	Written and practical assessment	Mid-term examination
11	3	Knowledge and application	Alternating current (AC) and its major applications	Whiteboard, PowerPoint presentations, laboratory practice	Reports and examinations
12	3	Knowledge and application	AC circuits and AC power sources	Laboratory demonstrations	Reports and examinations
13	3	Knowledge and application	Advantages, disadvantages, and phases of alternating current	Whiteboard, PowerPoint presentations	Reports and examinations
14	3	Knowledge and application	Three-phase alternating current systems	Laboratory demonstrations	Reports and examinations
15	3	Knowledge and application	Comprehensive review and final examination	Written and practical assessment	Final written, oral, and practical examinations

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11. Course Assessment

Assessment methods include:

- Student reports
- Homework assignments
- Laboratory activities
- Classroom participation
- Oral examinations

- Written examinations
- Practical examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- Fundamentals of Electrical Technology
- Basic Electrical Circuits

Main References

- Introductory textbooks on electrical engineering and circuit analysis.
- Laboratory manuals for electrical technology.

Recommended References

- Scientific journals in electrical engineering.
- Technical reports on electrical systems and industrial applications.
- Engineering standards related to electrical installations and safety.

Electronic Resources

- Online educational platforms for electrical engineering.
- Digital resources on electrical circuits and electrical machines.
- Engineering simulation software and instructional websites.

COURSE DESCRIPTION

First Level – First Semester

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1. Course Name

Workshop I

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2. Course Code

TIHA112

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- **In-person**

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6. Total Credit Hours / Total Units

- **45 practical hours**
- **3 credit units**

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7. Course Coordinator

Name: Sarah Burhan Ezzat

Email: sarah_burhan@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Identify the tools and equipment used in mechanical workshops and understand their applications.

- Apply occupational health and safety regulations within the workshop environment.
- Perform fundamental welding operations correctly and safely.
- Use hand tools for filing and manual measuring instruments accurately.
- Develop practical skills, precision, and craftsmanship in mechanical workshop operations.
- Work effectively as part of a team while demonstrating responsibility and professional ethics in the workshop.

---

9. Teaching and Learning Strategies

- Direct practical instruction inside the workshop.
- Hands-on learning through continuous practice.
- Demonstration of workshop models and practical experiments.
- Training students to solve simple technical and workshop-related problems.
- Continuous supervision and performance evaluation during laboratory sessions.

---

10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	3	Knowledge and application	Introduction to the workshop and occupational safety	Practical workshop instruction, demonstrations, PowerPoint presentations	Reports, practical performance, oral and written examinations
2	3	Knowledge and application	Fundamentals of welding	Practical workshop training	Reports and practical assessment
3	3	Knowledge and application	Shielded Metal Arc Welding (SMAW)	Practical welding exercises	Reports and practical assessment
4	3	Knowledge and application	Types of welding electrodes and their applications	Practical demonstrations	Reports and examinations
5	3	Knowledge and application	Performing basic welding joints	Practical workshop exercises	Reports and practical assessment

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
6	3	Knowledge and application	Welding defects and corrective techniques	Practical demonstrations	Reports and examinations
7	3	Knowledge and application	Practical welding applications	Hands-on workshop practice	Reports and practical assessment
8	3	Knowledge and application	Introduction to metal filing	Practical workshop instruction	Reports and examinations
9	3	Knowledge and application	Measurement and marking-out techniques	Practical laboratory exercises	Reports and practical assessment
10	3	Knowledge and application	Manual cutting operations	Practical workshop training	Reports and examinations
11	3	Knowledge and application	Flat filing techniques	Practical workshop exercises	Reports and practical assessment
12	3	Knowledge and application	Angular filing techniques	Practical workshop exercises	Reports and practical assessment
13	3	Knowledge and application	Drilling and finishing operations	Practical workshop exercises	Reports and examinations
14	3	Knowledge and application	Fabrication of a practical workshop project	Project-based practical work	Reports, project evaluation, and practical assessment
15	3	Knowledge and application	Comprehensive review and final practical examination	Practical examination	Final practical, oral, and written examinations

---

11. Course Assessment

Assessment methods include:

- Practical workshop performance
- Student reports
- Homework assignments

- Laboratory activities
- Continuous practical evaluation
- Oral examinations
- Written examinations
- Practical examinations
- Final practical examination

---

12. Learning and Teaching Resources

Required Textbooks

- **Fundamentals of Engineering Workshops and Mechanical Laboratories**
- **Principles of Practical Welding and Metal Filing**

Main References

- Books on **Welding Technology and Metalworking**
- **Mechanical Workshop Practice** manuals
- Engineering workshop laboratory guides

Recommended References

- Scientific journals in manufacturing and welding engineering
- Technical reports on occupational safety in engineering workshops
- Applied research in machining and manufacturing processes

Electronic Resources

- Engineering and technical education websites
- Online resources on welding technology and workshop practices
- Digital learning platforms for manufacturing engineering
- Occupational health and safety training resources

COURSE DESCRIPTION

First Level – Second Semester

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1. Course Name

Properties of Materials II

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2. Course Code

METP125

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3. Semester / Academic Year

Second Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours**
- **2 credit units**

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7. Course Coordinator

Name: Zeyad Khalaf Hamad

Email: zeyad_hwj@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Explain the principles and applications of mechanical testing of engineering materials.
- Perform and interpret common mechanical tests used to evaluate material properties.
- Analyze the relationship between a material's microstructure and its mechanical behavior.
- Understand the significance of mechanical testing in material selection and engineering design.
- Develop practical knowledge of laboratory techniques used in materials characterization.

---

9. Teaching and Learning Strategies

- **Theoretical instruction:** Presentation of fundamental concepts using lectures and visual aids.
- **Practical instruction:** Laboratory experiments, including hardness testing, tensile testing, and metallographic examination.
- **Interactive learning:** Classroom discussions, problem-solving activities, and student participation.
- Integration of theoretical knowledge with laboratory practice.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	2	Knowledge and application	Hardness testing and its types	Whiteboard, PowerPoint presentations, laboratory demonstrations	Reports, assignments, written, oral, and practical examinations
2	2	Knowledge and application	Impact testing and material toughness	Whiteboard, PowerPoint presentations, laboratory experiments	Reports and examinations
3	2	Knowledge and application	Fatigue testing	Whiteboard, PowerPoint presentations, laboratory experiments	Reports and examinations
4	2	Knowledge and application	Creep testing of metals	Whiteboard, PowerPoint presentations, laboratory demonstrations	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
5	2	Knowledge and application	Metallographic examination of metals	Whiteboard, PowerPoint presentations, microscopic laboratory work	Reports and examinations
6	2	Knowledge and application	Preparation of metallic specimens for metallographic examination	Laboratory demonstrations and practical exercises	Reports and practical assessment
7	2	Knowledge and application	Grinding and polishing techniques for metallographic specimens	Practical laboratory sessions	Reports and examinations
8	2	Knowledge and application	Chemical etching methods and microstructural observation	Laboratory practice	Reports and examinations
9	2	Knowledge and application	Identification and analysis of microstructures of engineering materials	Practical laboratory exercises	Reports and examinations
10	2	Knowledge and application	Heat treatment processes and their effects on material properties	Whiteboard, PowerPoint presentations, laboratory demonstrations	Reports and examinations
11	2	Knowledge and application	Annealing and normalizing processes	Practical laboratory demonstrations	Reports and examinations
12	2	Knowledge and application	Hardening and tempering processes	Practical laboratory demonstrations	Reports and examinations
13	2	Knowledge and application	Relationship between heat treatment and mechanical properties	Whiteboard, PowerPoint presentations	Reports and examinations
14	2	Knowledge and application	Laboratory applications and review of mechanical testing methods	Practical laboratory sessions	Reports, practical assessment, and discussions
15	2	Knowledge and application	Comprehensive review and final examination	Written and practical assessment	Final written, oral, and practical examinations

11. Course Assessment

Assessment methods include:

- Student reports
- Homework assignments
- Classroom participation
- Laboratory activities
- Oral examinations
- Written examinations
- Practical examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Modern Physical Metallurgy and Materials Engineering**
- **Materials Science and Engineering: An Introduction**

Main References

- **Callister, W. D. & Rethwisch, D. G.**
  Materials Science and Engineering: An Introduction.
- **Smith, W. F.**
  Foundations of Materials Science and Engineering.

Recommended References

- Scientific journals in materials science and metallurgy.
- Technical reports on mechanical testing and heat treatment.
- Laboratory manuals for materials characterization.

Electronic Resources

- Online databases in materials science and engineering.

- Digital libraries and educational platforms.
- Professional resources on metallurgy, heat treatment, and materials testing.

COURSE DESCRIPTION

First Level – Second Semester

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1. Course Name

Manufacturing Processes II

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2. Course Code

METP123

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3. Semester / Academic Year

Second Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **15 theoretical hours + 15 practical hours**
- **4 credit units**

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7. Course Coordinator

Name: Zeyad Khalaf Hamad

Email: zeyad_hwj@ntu.edu.iq

8. Course Objectives

Upon successful completion of this course, students will be able to:

- Acquire fundamental knowledge of **casting and welding processes**.
- Safely and effectively use casting and welding tools and equipment.
- Identify common defects encountered in casting and welding operations and apply appropriate corrective methods.
- Understand the principles of manufacturing processes used in engineering production.
- Develop practical skills in metal casting and welding technologies.

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9. Teaching and Learning Strategies

- Interactive theoretical lectures introducing manufacturing concepts.
- Practical laboratory and workshop sessions.
- Demonstration of casting and welding equipment.
- Hands-on training in manufacturing operations.
- Practical exercises integrated with theoretical instruction.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Introduction to casting processes and manufacturing methods	Whiteboard, PowerPoint presentations, practical demonstrations	Reports, written, oral, and practical examinations
2	4	Knowledge and application	Patterns and pattern materials	Practical demonstrations and laboratory work	Reports and examinations
3	4	Knowledge and application	Molding materials and molding sand	Laboratory practice	Reports and examinations
4	4	Knowledge and application	Mold preparation techniques	Practical workshop sessions	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
5	4	Knowledge and application	Melting furnaces and metal melting operations	Practical demonstrations	Reports and examinations
6	4	Knowledge and application	Pouring techniques in casting	Laboratory practice	Reports and examinations
7	4	Knowledge and application	Casting defects and their causes	Practical demonstrations	Reports and examinations
8	4	Knowledge and application	Methods for preventing and correcting casting defects	Practical exercises	Reports and examinations
9	4	Knowledge and application	Inspection and quality control of cast products	Laboratory applications	Reports and examinations
10	4	Knowledge and application	Types of casting processes and their engineering applications	Whiteboard and laboratory demonstrations	Reports and examinations
11	4	Knowledge and application	Casting operations and production of cast components	Practical workshop training	Reports and examinations
12	4	Knowledge and application	Cleaning and finishing castings	Practical laboratory exercises	Reports and examinations
13	4	Knowledge and application	Cleaning procedures for cast products	Practical workshop sessions	Reports and examinations
14	4	Knowledge and application	Inspection and evaluation of castings	Practical demonstrations	Reports and examinations
15	4	Knowledge and application	Final review and comprehensive examination	Written and practical assessment	Final written, oral, and practical examinations

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11. Course Assessment

Assessment methods include:

- Student reports
- Homework assignments

- Practical workshop activities
- Oral examinations
- Written examinations
- Practical examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbook

- **Manufacturing Processes for Engineering Materials** — *Serope Kalpakjian*

Main References

- Textbooks on **Foundry Engineering** and **Metal Forming Processes**.

Recommended References

- Scientific journals related to casting technology and metallurgy.
- Technical reports on foundry engineering and manufacturing processes.

Electronic Resources

- **ASM International**
- **The Metal Casting** educational resources

COURSE DESCRIPTION

First Level – Second Semester

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1. Course Name

Engineering Mechanics II

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2. Course Code

METP121

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3. Semester / Academic Year

Second Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours + 30 practical hours**
- **4 credit units**

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7. Course Coordinator

Name: Jaber Zain Al-Abideen Saqi

Email: jabersaqee@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand the principles of **engineering dynamics** and the motion of particles and rigid bodies.
- Apply Newton’s laws of motion to solve engineering problems.
- Analyze the kinematics and kinetics of particles and rigid bodies.
- Evaluate the effects of force, work, energy, impulse, and momentum on mechanical systems.
- Develop analytical and problem-solving skills applicable to engineering practice.

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9. Teaching and Learning Strategies

- Interactive theoretical lectures supported by engineering examples.
- Classroom problem-solving sessions.
- Practical laboratory demonstrations and simulations.
- Continuous assignments and tutorial exercises.
- Integration of theoretical concepts with engineering applications.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Introduction to engineering dynamics and particle motion	Whiteboard, PowerPoint presentations, practical demonstrations	Reports, written, oral, and practical examinations
2	4	Knowledge and application	Rectilinear kinematics of particles	Classroom lectures and problem-solving	Reports and examinations
3	4	Knowledge and application	Curvilinear motion of particles	Classroom lectures and engineering examples	Reports and examinations
4	4	Knowledge and application	Newton's Second Law of Motion	Whiteboard, PowerPoint presentations	Reports and examinations
5	4	Knowledge and application	Applications of Newton's laws	Classroom exercises and demonstrations	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
6	4	Knowledge and application	Work and energy principles	Whiteboard, PowerPoint presentations	Reports and examinations
7	4	Knowledge and application	Conservation of energy	Classroom lectures and numerical problems	Reports and examinations
8	4	Knowledge and application	Impulse and momentum	Whiteboard, PowerPoint presentations	Reports and examinations
9	4	Knowledge and application	Conservation of linear momentum	Classroom exercises	Reports and examinations
10	4	Knowledge and application	Rotation of rigid bodies	Practical demonstrations	Reports and examinations
11	4	Knowledge and application	Plane motion of rigid bodies	Classroom lectures	Reports and examinations
12	4	Knowledge and application	Kinetics of rigid bodies	Whiteboard, PowerPoint presentations	Reports and examinations
13	4	Knowledge and application	Mechanical vibrations (Introduction)	Classroom lectures and demonstrations	Reports and examinations
14	4	Knowledge and application	Engineering applications of dynamics	Practical problem-solving	Reports and examinations
15	4	Knowledge and application	Comprehensive review and final examination	Written and practical assessment	Final written, oral, and practical examinations

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11. Course Assessment

Assessment methods include:

- Homework assignments
- Student reports
- Classroom participation
- Tutorial exercises

- Oral examinations
- Written examinations
- Practical examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Engineering Mechanics: Dynamics** – *R. C. Hibbeler*
- **Vector Mechanics for Engineers: Dynamics** – *Beer, Johnston, Mazurek & Cornwell*

Main References

- **Engineering Mechanics: Dynamics** – *J. L. Meriam & L. G. Kraige*
- **Vector Mechanics for Engineers: Dynamics** – *Beer & Johnston*

Recommended References

- Scientific journals in mechanics and mechanical engineering.
- Engineering dynamics laboratory manuals.
- Technical reports related to applied mechanics.

Electronic Resources

- Online engineering mechanics learning platforms.
- Digital libraries for mechanical engineering.
- Engineering simulation software and educational websites.

COURSE DESCRIPTION

First Level – Second Semester

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1. Course Name

Mathematics II

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2. Course Code

TIHA111

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3. Semester / Academic Year

Second Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours**
- **2 credit units**

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7. Course Coordinator

Name: *Ahmed Hasan Ahmed*

Email: ahmedhasan_hwj@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Develop advanced mathematical skills required for engineering applications.
- Apply differential and integral calculus to engineering problems.
- Solve ordinary differential equations commonly encountered in engineering.
- Understand the principles of vector algebra and analytical geometry.
- Strengthen analytical and problem-solving abilities through mathematical modeling.

---

9. Teaching and Learning Strategies

- Interactive lectures supported by worked examples.
- Classroom discussions and problem-solving sessions.
- Regular tutorials and homework assignments.
- Continuous assessment through quizzes and examinations.
- Application of mathematical concepts to engineering case studies.

---

10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	2	Knowledge and application	Review of differentiation and integration	Whiteboard, PowerPoint presentations, classroom exercises	Reports, assignments, written and oral examinations
2	2	Knowledge and application	Techniques of integration	Lectures and problem-solving sessions	Reports and examinations
3	2	Knowledge and application	Applications of definite integrals	Classroom exercises	Reports and examinations
4	2	Knowledge and application	Partial differentiation	Whiteboard, PowerPoint presentations	Reports and examinations
5	2	Knowledge and application	Applications of partial derivatives	Classroom exercises	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
6	2	Knowledge and application	Multiple integrals	Lectures and numerical examples	Reports and examinations
7	2	Knowledge and application	Applications of multiple integrals	Classroom exercises	Reports and examinations
8	2	Knowledge and application	Ordinary differential equations: first-order equations	Whiteboard, PowerPoint presentations	Reports and examinations
9	2	Knowledge and application	Higher-order differential equations	Classroom exercises	Reports and examinations
10	2	Knowledge and application	Engineering applications of differential equations	Lectures and practical examples	Reports and examinations
11	2	Knowledge and application	Vector algebra	Whiteboard, PowerPoint presentations	Reports and examinations
12	2	Knowledge and application	Vector operations and applications	Classroom exercises	Reports and examinations
13	2	Knowledge and application	Analytical geometry in two and three dimensions	Whiteboard, PowerPoint presentations	Reports and examinations
14	2	Knowledge and application	Engineering applications of vectors and analytical geometry	Classroom exercises	Reports and examinations
15	2	Knowledge and application	Comprehensive review and final examination	Written assessment	Final written and oral examinations

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11. Course Assessment

Assessment methods include:

- Homework assignments
- Student reports
- Classroom participation
- Quizzes

- Oral examinations
- Written examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Advanced Engineering Mathematics** – *Erwin Kreyszig*
- **Higher Engineering Mathematics** – *B. S. Grewal*

Main References

- **Engineering Mathematics** – *K. A. Stroud*
- **Advanced Engineering Mathematics** – *Dennis G. Zill*

Recommended References

- Scientific journals in applied mathematics and engineering.
- University lecture notes and tutorial manuals.
- Engineering mathematics reference books.

Electronic Resources

- MIT OpenCourseWare – Engineering Mathematics
- Khan Academy – Calculus and Differential Equations
- Online engineering mathematics learning platforms
- University digital learning resources

COURSE DESCRIPTION

Second Level – First Semester

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1. Course Name

Manufacturing Processes III

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2. Course Code

METP212

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours + 30 practical hours**
- **4 credit units**

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7. Course Coordinator

Name: Ayad Abd Ramedan

Email: dr.ayad.a.ramadhan@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand advanced metal forming and machining processes used in modern manufacturing.
- Analyze machining operations and optimize cutting parameters.
- Select appropriate manufacturing processes based on material properties and product specifications.
- Understand the principles of machine tools and production systems.
- Develop practical skills in machining and manufacturing technology.

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9. Teaching and Learning Strategies

- Interactive lectures supported by engineering case studies.
- Practical workshop and laboratory sessions.
- Demonstrations using machine tools and manufacturing equipment.
- Individual and group practical exercises.
- Continuous assessment through laboratory reports and practical projects.

---

10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Introduction to advanced manufacturing processes	Whiteboard, PowerPoint presentations, workshop demonstrations	Reports, assignments, written, oral, and practical examinations
2	4	Knowledge and application	Fundamentals of metal cutting	Interactive lectures and laboratory practice	Reports and examinations
3	4	Knowledge and application	Cutting tool materials and tool geometry	Practical demonstrations	Reports and examinations
4	4	Knowledge and application	Cutting fluids and cooling systems	Laboratory experiments	Reports and examinations
5	4	Knowledge and application	Lathe machine operations	Practical workshop training	Reports and examinations
6	4	Knowledge and application	Milling machine operations	Practical workshop training	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
7	4	Knowledge and application	Drilling, boring, and reaming operations	Practical laboratory sessions	Reports and examinations
8	4	Knowledge and application	Grinding processes and abrasive machining	Practical demonstrations	Reports and examinations
9	4	Knowledge and application	Surface finishing and polishing processes	Practical workshop exercises	Reports and examinations
10	4	Knowledge and application	Machining parameters and tool-life analysis	Classroom discussions and numerical examples	Reports and examinations
11	4	Knowledge and application	Production planning and machining economics	Interactive lecture	Reports and examinations
12	4	Knowledge and application	Non-traditional machining processes (EDM, ECM, Laser Machining)	Multimedia presentation and laboratory demonstration	Reports and examinations
13	4	Knowledge and application	Automation in manufacturing systems	Practical demonstrations	Reports and examinations
14	4	Knowledge and application	Integrated machining project	Project-based workshop activities	Reports, project evaluation, and examinations
15	4	Knowledge and application	Comprehensive review and final examination	Written and practical assessment	Final written, oral, and practical examinations

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11. Course Assessment

Assessment methods include:

- Student reports
- Homework assignments
- Practical workshop activities
- Laboratory exercises
- Classroom participation
- Oral examinations
- Written examinations

- Practical examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Manufacturing Engineering and Technology** – *Serope Kalpakjian & Steven R. Schmid*
- **Fundamentals of Modern Manufacturing** – *Mikell P. Groover*

Main References

- **Machining Fundamentals** – *John R. Walker*
- **Manufacturing Processes for Engineering Materials** – *Serope Kalpakjian*

Recommended References

- Scientific journals in manufacturing engineering.
- Technical reports on machining and production engineering.
- ISO standards related to machining and manufacturing.

Electronic Resources

- ASM International Digital Library
- Society of Manufacturing Engineers (SME)
- Online manufacturing engineering platforms
- University digital learning resources
- CAD/CAM educational websites

COURSE DESCRIPTION

Second Level – First Semester

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1. Course Name

Materials2

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2. Course Code

METP 217

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours + 30 practical hours**
- **4 credit units**

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7. Course Coordinator

Name: ***Ayad Abd Ramaden***

Email: dr.ayad.a.ramadhan@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand the classification, structure, and properties of engineering materials.
- Explain the relationship between microstructure, processing, and material performance.
- Select suitable engineering materials for manufacturing and mechanical applications.
- Analyze the mechanical, physical, and thermal properties of engineering materials.
- Develop practical skills in testing and evaluating engineering materials.

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9. Teaching and Learning Strategies

- Interactive theoretical lectures supported by multimedia presentations.
- Laboratory experiments for testing engineering materials.
- Practical demonstrations of material characterization techniques.
- Group discussions and engineering case studies.
- Continuous assessment through laboratory reports and assignments.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Introduction to engineering materials and material classification	Whiteboard, PowerPoint presentations, laboratory demonstrations	Reports, assignments, written, oral, and practical examinations
2	4	Knowledge and application	Crystal structures and atomic bonding	Interactive lectures and laboratory practice	Reports and examinations
3	4	Knowledge and application	Mechanical properties of engineering materials	Laboratory demonstrations	Reports and examinations
4	4	Knowledge and application	Physical and thermal properties of materials	Practical laboratory sessions	Reports and examinations
5	4	Knowledge and application	Ferrous materials: classification and applications	Whiteboard, PowerPoint presentations	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
6	4	Knowledge and application	Non-ferrous materials and their engineering applications	Practical demonstrations	Reports and examinations
7	4	Knowledge and application	Heat treatment of steels	Laboratory experiments	Reports and examinations
8	4	Knowledge and application	Phase diagrams and iron–carbon equilibrium diagram	Interactive lectures	Reports and examinations
9	4	Knowledge and application	Corrosion and corrosion prevention methods	Laboratory demonstrations	Reports and examinations
10	4	Knowledge and application	Polymers and engineering plastics	Practical laboratory sessions	Reports and examinations
11	4	Knowledge and application	Ceramics and composite materials	Classroom discussions	Reports and examinations
12	4	Knowledge and application	Material selection for engineering design	Engineering case studies	Reports and examinations
13	4	Knowledge and application	Failure analysis of engineering materials	Practical demonstrations	Reports and examinations
14	4	Knowledge and application	Laboratory project on engineering materials	Project-based laboratory work	Reports, project evaluation, and examinations
15	4	Knowledge and application	Comprehensive review and final examination	Written and practical assessment	Final written, oral, and practical examinations

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11. Course Assessment

Assessment methods include:

- Laboratory reports
- Homework assignments
- Classroom participation
- Practical laboratory activities

- Oral examinations
- Written examinations
- Practical examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Materials Science and Engineering: An Introduction** – *William D. Callister Jr. & David G. Rethwisch*
- **Foundations of Materials Science and Engineering** – *William F. Smith*

Main References

- **Modern Physical Metallurgy and Materials Engineering** – *R. E. Smallman & R. J. Bishop*
- **Engineering Materials 1** – *Michael F. Ashby & David R. H. Jones*

Recommended References

- Scientific journals in materials science and engineering.
- Technical reports on engineering materials and material testing.
- ASTM and ISO standards for materials testing.

Electronic Resources

- ASM International Digital Library
- Materials Project Database
- Engineering Village
- University digital libraries
- Online materials science learning platforms

COURSE DESCRIPTION
Second Level – First Semester

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1. Course Name

Machine Parts Technology1

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2. Course Code

METP210

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours + 30 practical hours**
- **4 credit units**

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7. Course Coordinator

Name: Sarah Burhan Ezzat

Email: *sarah_burhan@ntu.edu.iq*

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand the fundamental principles of **Strength of Materials**.
- Analyze stresses, strains, and deformations in engineering components.

- Evaluate the behavior of structural members under different loading conditions.
- Apply theories of stress and strain to engineering design problems.
- Develop practical skills in material testing and structural analysis.

---

9. Teaching and Learning Strategies

- Interactive lectures supported by engineering examples.
- Problem-solving sessions and numerical exercises.
- Laboratory experiments on the mechanical behavior of materials.
- Demonstrations using testing equipment and engineering models.
- Continuous assessment through assignments and laboratory reports.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Introduction to Strength of Materials and engineering stress	Whiteboard, PowerPoint presentations, laboratory demonstrations	Reports, assignments, written, oral, and practical examinations
2	4	Knowledge and application	Stress and strain relationships	Interactive lectures and laboratory practice	Reports and examinations
3	4	Knowledge and application	Elasticity, Hooke's Law, and Poisson's ratio	Classroom lectures and numerical examples	Reports and examinations
4	4	Knowledge and application	Axial loading and deformation	Practical demonstrations	Reports and examinations
5	4	Knowledge and application	Torsion of circular shafts	Laboratory demonstrations	Reports and examinations
6	4	Knowledge and application	Shear force and bending moment diagrams	Classroom problem-solving sessions	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
7	4	Knowledge and application	Bending stress in beams	Practical applications	Reports and examinations
8	4	Knowledge and application	Beam deflection	Numerical exercises and demonstrations	Reports and examinations
9	4	Knowledge and application	Combined loading	Interactive lectures	Reports and examinations
10	4	Knowledge and application	Column buckling and stability	Classroom discussions	Reports and examinations
11	4	Knowledge and application	Thin-walled pressure vessels	Laboratory demonstrations	Reports and examinations
12	4	Knowledge and application	Mohr's Circle for stress analysis	Numerical problem-solving	Reports and examinations
13	4	Knowledge and application	Failure theories for ductile and brittle materials	Engineering case studies	Reports and examinations
14	4	Knowledge and application	Laboratory applications and engineering analysis project	Practical laboratory sessions	Reports, project evaluation, and examinations
15	4	Knowledge and application	Comprehensive review and final examination	Written and practical assessment	Final written, oral, and practical examinations

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11. Course Assessment

Assessment methods include:

- Homework assignments
- Student reports
- Laboratory reports

- Classroom participation
- Oral examinations
- Written examinations
- Practical examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Mechanics of Materials** – *R. C. Hibbeler*
- **Strength of Materials** – *Ferdinand L. Singer & Andrew Pytel*

Main References

- **Mechanics of Materials** – *James M. Gere & Barry J. Goodno*
- **Strength of Materials** – *S. Ramamrutham*

Recommended References

- Scientific journals in solid mechanics and structural engineering.
- Technical reports on material testing and structural analysis.
- ASTM and ISO standards related to mechanical testing.

Electronic Resources

- MIT Open Course Ware – Mechanics of Materials
- NPTEL Engineering Mechanics Courses
- Engineering Toolbox
- University digital libraries
- Online learning platforms for mechanics and structural analysis

COURSE DESCRIPTION

Second Level – First Semester

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1. Course Name

Workshop II

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2. Course Code

METP225

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person

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6. Total Credit Hours / Total Units

- **60 practical hours**
- **4 credit units**

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7. Course Coordinator

Name: *Omer Khalil Ahmed*

Email: *omerahmed@ntu.edu.iq*

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Develop advanced practical skills in mechanical workshop operations.
- Operate machine tools and workshop equipment safely and efficiently.

- Perform machining processes including turning, milling, drilling, and grinding.
- Apply occupational health and safety standards in workshop environments.
- Manufacture and inspect mechanical components according to engineering drawings and specifications.
- Enhance teamwork, problem-solving, and professional workshop practices.

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9. Teaching and Learning Strategies

- Hands-on practical training in engineering workshops.
- Demonstrations using machine tools and manufacturing equipment.
- Supervised machining and fabrication exercises.
- Project-based learning through practical manufacturing tasks.
- Continuous evaluation of practical performance and workshop skills.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Workshop safety regulations and machine shop orientation	Practical workshop instruction and demonstrations	Practical performance, reports, written and oral examinations
2	4	Knowledge and application	Introduction to machine tools and workshop equipment	Practical demonstrations	Reports and practical assessment
3	4	Knowledge and application	Lathe machine setup and basic turning operations	Hands-on workshop practice	Reports and practical assessment
4	4	Knowledge and application	Facing, straight turning, and taper turning	Practical machining exercises	Reports and examinations
5	4	Knowledge and application	Thread cutting and knurling operations	Workshop training	Reports and practical assessment
6	4	Knowledge and application	Drilling, boring, and reaming operations	Practical workshop exercises	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
7	4	Knowledge and application	Milling machine setup and basic milling operations	Practical workshop training	Reports and examinations
8	4	Knowledge and application	Slotting, keyway cutting, and gear cutting	Practical machining exercises	Reports and practical assessment
9	4	Knowledge and application	Grinding machine operations	Workshop demonstrations	Reports and examinations
10	4	Knowledge and application	Precision measurement and dimensional inspection	Practical laboratory activities	Reports and examinations
11	4	Knowledge and application	Surface finishing and quality control	Practical workshop exercises	Reports and examinations
12	4	Knowledge and application	Maintenance of workshop machines and equipment	Demonstrations and practical exercises	Reports and examinations
13	4	Knowledge and application	Manufacturing a mechanical component based on an engineering drawing	Project-based practical work	Reports, project evaluation, and practical assessment
14	4	Knowledge and application	Completion and inspection of the workshop project	Practical workshop	Reports, project evaluation, and examinations
15	4	Knowledge and application	Comprehensive review and final practical examination	Practical assessment	Final practical, written, and oral examinations

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11. Course Assessment

Assessment methods include:

- Practical workshop performance
- Laboratory and workshop reports
- Homework assignments
- Classroom participation
- Oral examinations

- Written examinations
- Practical examinations
- Mid-term examination
- Final practical examination

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12. Learning and Teaching Resources

Required Textbooks

- **Machine Shop Practice** – *Karl H. Moltrecht*
- **Workshop Technology** – *W. A. J. Chapman*

Main References

- **Technology of Machine Tools** – *Steve F. Krar & Albert F. Check*
- **Manufacturing Engineering and Technology** – *Serope Kalpakjian & Steven R. Schmid*

Recommended References

- Scientific journals in manufacturing and production engineering.
- Technical manuals on machining operations and workshop practices.
- ISO and OSHA standards for workshop safety and machining.

Electronic Resources

- Society of Manufacturing Engineers (SME)
- ASM International Digital Library
- Online machining and manufacturing training platforms
- University digital learning resources
- CNC and machine tool educational websites

COURSE DESCRIPTION

Second Level – First Semester

1. Course Name

English Language II

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2. Course Code

NTU 200

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours**
- **2 credit units**

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7. Course Coordinator

Name: Hussam Hamad Ali

Email:

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Develop intermediate and advanced English language skills for academic and engineering purposes.

- Enhance reading, writing, listening, and speaking abilities using technical and scientific materials.
- Expand engineering vocabulary and technical terminology related to mechanical engineering.
- Improve technical writing and oral communication skills.
- Strengthen students' ability to understand and communicate effectively in professional engineering environments.

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9. Teaching and Learning Strategies

- Interactive lectures supported by multimedia resources.
- Reading and analysis of engineering and scientific texts.
- Classroom discussions and oral presentations.
- Grammar, vocabulary, and technical writing exercises.
- Continuous assessment through assignments, presentations, and quizzes.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	2	Knowledge and application	Course introduction and review of English Language I	Interactive lecture and classroom discussion	Reports, assignments, written and oral examinations
2	2	Knowledge and application	Advanced grammar: Verb tenses and sentence patterns	Grammar exercises and classroom activities	Reports and examinations
3	2	Knowledge and application	Passive voice and technical writing	Interactive lecture and writing exercises	Reports and examinations
4	2	Knowledge and application	Modal verbs and professional communication	Classroom discussions	Reports and examinations
5	2	Knowledge and application	Reading and comprehension of engineering texts	Guided reading and comprehension activities	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
6	2	Knowledge and application	Technical vocabulary in manufacturing and mechanical engineering	Vocabulary-building exercises	Reports and examinations
7	2	Knowledge and application	Technical report writing	Writing workshop	Reports and examinations
8	2	Knowledge and application	Formal correspondence and email writing	Practical writing exercises	Reports and examinations
9	2	Knowledge and application	Listening skills using technical presentations	Audio and video learning activities	Reports and examinations
10	2	Knowledge and application	Oral presentations and public speaking	Classroom presentations	Reports and examinations
11	2	Knowledge and application	Translation of engineering texts (Arabic–English / English–Arabic)	Translation exercises	Reports and examinations
12	2	Knowledge and application	Technical discussions and teamwork communication	Group activities	Reports and examinations
13	2	Knowledge and application	Presentation of engineering topics	Student presentations	Reports, presentations, and examinations
14	2	Knowledge and application	Comprehensive language review	Classroom revision sessions	Reports and examinations
15	2	Knowledge and application	Final review and comprehensive examination	Written and oral assessment	Final written and oral examinations

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11. Course Assessment

Assessment methods include:

- Homework assignments
- Student reports
- Classroom participation

- Quizzes
- Oral presentations
- Written examinations
- Oral examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Technical English for Engineering**
- **English for Mechanical Engineering**

Main References

- **Oxford English for Careers: Engineering**
- **Cambridge English for Engineering**
- **Essential Grammar in Use** – Raymond Murphy

Recommended References

- Engineering journals and technical magazines published in English.
- Engineering communication and technical writing manuals.
- Technical dictionaries and glossaries.

Electronic Resources

- British Council – LearnEnglish
- Cambridge English Learning Resources
- Oxford University Press – English Language Learning
- Online Technical English learning platforms
- University digital learning resources

COURSE DESCRIPTION

Second Level – First Semester

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1. Course Name

Manufacturing Processes IV

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2. Course Code

METP212

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours + 30 practical hours**
- **4 credit units**

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7. Course Coordinator

Name: *Ayad Abd Ramaden*

Email: dr.ayad.a.ramadhan@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand the principles and applications of modern welding technologies.
- Identify and operate various welding processes and equipment safely.
- Select appropriate welding methods according to material type and engineering requirements.
- Evaluate weld quality and identify welding defects using standard inspection methods.
- Develop practical skills in welding operations and quality control.

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9. Teaching and Learning Strategies

- Interactive lectures supported by multimedia presentations.
- Practical welding laboratory sessions.
- Demonstrations of welding equipment and safety procedures.
- Hands-on welding practice and inspection exercises.
- Continuous assessment through practical work, reports, and projects.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Introduction to welding technology and welding safety	Whiteboard, PowerPoint presentations, welding laboratory	Reports, assignments, written, oral, and practical examinations
2	4	Knowledge and application	Welding power sources and welding equipment	Practical laboratory demonstrations	Reports and examinations
3	4	Knowledge and application	Shielded Metal Arc Welding (SMAW)	Practical welding exercises	Reports and practical assessment
4	4	Knowledge and application	Gas Metal Arc Welding (GMAW/MIG)	Welding laboratory	Reports and examinations
5	4	Knowledge and application	Gas Tungsten Arc Welding (GTAW/TIG)	Practical welding sessions	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
6	4	Knowledge and application	Flux-Cored Arc Welding (FCAW)	Laboratory demonstrations	Reports and examinations
7	4	Knowledge and application	Oxy-fuel gas welding and cutting	Practical workshop exercises	Reports and examinations
8	4	Knowledge and application	Welding metallurgy and heat-affected zone (HAZ)	Interactive lectures and laboratory practice	Reports and examinations
9	4	Knowledge and application	Welding defects and failure analysis	Practical demonstrations	Reports and examinations
10	4	Knowledge and application	Non-destructive testing (NDT) of welded joints	Laboratory demonstrations	Reports and examinations
11	4	Knowledge and application	Destructive testing of weldments	Practical laboratory activities	Reports and examinations
12	4	Knowledge and application	Welding procedure specifications (WPS) and welding symbols	Classroom lectures and practical exercises	Reports and examinations
13	4	Knowledge and application	Welding quality control and inspection	Practical laboratory sessions	Reports and examinations
14	4	Knowledge and application	Practical welding project	Project-based workshop activities	Reports, project evaluation, and practical assessment
15	4	Knowledge and application	Comprehensive review and final practical examination	Written and practical assessment	Final written, oral, and practical examinations

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11. Course Assessment

Assessment methods include:

- Laboratory reports
- Practical welding performance
- Homework assignments
- Classroom participation

- Oral examinations
- Written examinations
- Practical examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Welding: Principles and Applications** – *Larry Jeffus*
- **Modern Welding Technology** – *Howard B. Cary & Scott C. Helzer*

Main References

- **Welding Metallurgy** – *Sindo Kou*
- **AWS Welding Handbook** – *American Welding Society (AWS)*

Recommended References

- Scientific journals in welding engineering and manufacturing technology.
- AWS and ISO welding standards.
- Technical reports on welding processes and quality assurance.

Electronic Resources

- American Welding Society (AWS) Learning Resources
- TWI (The Welding Institute) Technical Resources
- ASM International Digital Library
- Online welding engineering learning platforms
- University digital learning resources

COURSE DESCRIPTION

Second Level – First Semester

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1. Course Name

Machine parts technology2

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2. Course Code

METP211

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours + 30 practical hours**
- **4 credit units**

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7. Course Coordinator

Name: *Sarah Burhan Ezzat*

Email: *sarah_burhan@ntu.edu.iq*

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand the principles and methodology of machine design.

- Apply stress and failure theories in the design of machine elements.
- Select appropriate engineering materials and standard machine components for mechanical applications.
- Design simple machine elements to satisfy strength, safety, and functional requirements.
- Develop analytical and practical skills in mechanical design using engineering standards and design procedures. (engineeringcollege.uoanbar.edu.iq)

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9. Teaching and Learning Strategies

- Interactive lectures supported by engineering examples.
- Problem-solving sessions and numerical exercises.
- Practical laboratory demonstrations and design activities.
- Engineering case studies and design projects.
- Continuous assessment through assignments, reports, and presentations.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Introduction to machine design and the engineering design process	Whiteboard, PowerPoint presentations, classroom discussions	Reports, assignments, written, oral, and practical examinations
2	4	Knowledge and application	Design considerations, factor of safety, and design standards	Interactive lectures and numerical examples	Reports and examinations
3	4	Knowledge and application	Static loading and failure theories	Classroom problem-solving sessions	Reports and examinations
4	4	Knowledge and application	Variable loading and fatigue failure	Engineering case studies	Reports and examinations
5	4	Knowledge and application	Stress concentration and fatigue analysis	Practical examples and discussions	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
6	4	Knowledge and application	Design of bolted and threaded fasteners	Classroom lectures and design calculations	Reports and examinations
7	4	Knowledge and application	Permanent joints: welding, riveting, and adhesive bonding	Practical demonstrations	Reports and examinations
8	4	Knowledge and application	Keys, splines, and shaft couplings	Engineering examples	Reports and examinations
9	4	Knowledge and application	Shaft design under combined loading	Numerical exercises	Reports and examinations
10	4	Knowledge and application	Springs: types, applications, and design principles	Classroom lectures	Reports and examinations
11	4	Knowledge and application	Bearings: selection and design considerations	Interactive lectures	Reports and examinations
12	4	Knowledge and application	Lubrication and friction in machine elements	Practical demonstrations	Reports and examinations
13	4	Knowledge and application	Integrated machine element design project	Project-based learning	Reports, project evaluation, and examinations
14	4	Knowledge and application	Design review, optimization, and engineering documentation	Student presentations and discussions	Reports and examinations
15	4	Knowledge and application	Comprehensive review and final examination	Written and practical assessment	Final written, oral, and practical examinations

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11. Course Assessment

Assessment methods include:

- Homework assignments

- Student reports
- Design assignments
- Classroom participation
- Oral examinations
- Written examinations
- Practical/design examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Machine Design** – *R. S. Khurmi & J. K. Gupta*
- **Machine Design** – *Paul H. Black*

Main References

- **Shigley's Mechanical Engineering Design** – *Richard G. Budynas & J. Keith Nisbett*
- **Schaum's Outline of Machine Design** – *Hall, Holowenko & Laughlin*

Recommended References

- Scientific journals related to machine design and mechanical engineering.
- Technical reports on mechanical component design.
- ISO and ASME standards for machine elements and mechanical design.

Electronic Resources

- ASME Digital Collection
- Machine Design educational websites
- Engineering design software documentation
- University digital learning resources
- Online platforms for mechanical design and machine elements

COURSE DESCRIPTION

Second Level – First Semester

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1. Course Name

Industrial Drawing I

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2. Course Code

METP 218

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **45 practical hours**
- **3 credit units**

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7. Course Coordinator

Name: Mehdi Qahraman Fakhr al-Din

Email:

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand the fundamentals of industrial and machine drawing as the universal language of engineering.
- Read and interpret mechanical engineering drawings accurately.
- Produce standard machine drawings in accordance with engineering drawing standards.
- Develop practical skills in sketching, orthographic projection, dimensioning, and sectional drawing.
- Prepare detailed drawings of machine components and simple assemblies.
- Improve technical communication skills through engineering graphics.

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9. Teaching and Learning Strategies

- Practical drawing sessions supported by demonstrations.
- Interactive lectures introducing engineering drawing standards.
- Individual drafting exercises.
- Continuous drawing assignments and practical projects.
- Application of engineering drawing principles to mechanical components.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	3	Knowledge and application	Introduction to industrial (machine) drawing and engineering drawing standards	Whiteboard, practical demonstrations, drawing exercises	Reports, assignments, written and practical examinations
2	3	Knowledge and application	Drawing instruments, line types, lettering, and sheet layout	Practical drawing exercises	Reports and examinations
3	3	Knowledge and application	Orthographic projection principles	Classroom demonstrations	Reports and examinations
4	3	Knowledge and application	Multi-view drawing of simple machine parts	Practical drawing sessions	Reports and examinations
5	3	Knowledge and application	Dimensioning methods and engineering conventions	Drawing exercises	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
6	3	Knowledge and application	Sectional views and cutting planes	Practical drafting	Reports and examinations
7	3	Knowledge and application	Auxiliary views	Practical drawing exercises	Reports and examinations
8	3	Knowledge and application	Isometric drawing of machine components	Practical demonstrations	Reports and examinations
9	3	Knowledge and application	Conventional representation of threads, bolts, nuts, and fasteners	Practical drafting	Reports and examinations
10	3	Knowledge and application	Keys, pins, shafts, bearings, and standard machine elements	Practical exercises	Reports and examinations
11	3	Knowledge and application	Assembly drawings and parts lists	Drawing laboratory	Reports and examinations
12	3	Knowledge and application	Working drawings and production drawings	Practical drafting	Reports and examinations
13	3	Knowledge and application	Industrial drawing project	Project-based learning	Reports, project evaluation, and examinations
14	3	Knowledge and application	Completion and presentation of drawing project	Practical assessment	Reports and examinations
15	3	Knowledge and application	Comprehensive review and final practical examination	Practical examination	Final written and practical examinations

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11. Course Assessment

Assessment methods include:

- Practical drawing assignments
- Student reports
- Homework assignments
- Classroom participation
- Practical examinations
- Written examinations

- Mid-term examination
- Final practical examination

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12. Learning and Teaching Resources

Required Textbooks

- **Machine Drawing** – *N. D. Bhatt*
- **Technical Drawing** – *Frederick E. Giesecke et al.*

Main References

- **Machine Drawing** – *P. S. Gill*
- **Engineering Drawing and Design** – *David A. Madsen*

Recommended References

- Scientific journals related to engineering graphics and mechanical design.
- ISO standards for technical drawing.
- Engineering drafting manuals and technical reports.

Electronic Resources

- Engineering graphics learning platforms.
- CAD and technical drawing educational websites.
- University digital libraries.
- Online resources for machine drawing and engineering graphics.

COURSE DESCRIPTION

Second Level – First Semester

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1. Course Name

Industrial Management

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2. Course Code

METP222

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours**
- **2 credit units**

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7. Course Coordinator

Name: Jaber Zain Al-Abideen Saqi

Email: jabersaqee@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand the principles and functions of production planning and control.
- Apply forecasting, scheduling, and inventory management techniques in manufacturing systems.
- Analyze production processes to improve efficiency and productivity.
- Develop production plans that optimize the use of resources, time, and cost.

- Understand quality control and continuous improvement techniques in industrial production.

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9. Teaching and Learning Strategies

- Interactive lectures supported by multimedia presentations.
- Case studies on manufacturing and production systems.
- Classroom discussions and problem-solving sessions.
- Individual and group assignments.
- Continuous assessment through reports, quizzes, and presentations.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	2	Knowledge and application	Introduction to production planning and control	Whiteboard, PowerPoint presentations, classroom discussions	Reports, assignments, written and oral examinations
2	2	Knowledge and application	Production systems and manufacturing processes	Interactive lectures	Reports and examinations
3	2	Knowledge and application	Demand forecasting techniques	Classroom exercises and case studies	Reports and examinations
4	2	Knowledge and application	Capacity planning	Interactive lectures and numerical examples	Reports and examinations
5	2	Knowledge and application	Aggregate production planning	Classroom discussions	Reports and examinations
6	2	Knowledge and application	Master Production Schedule (MPS)	Practical examples	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
7	2	Knowledge and application	Material Requirements Planning (MRP)	Problem-solving sessions	Reports and examinations
8	2	Knowledge and application	Inventory management and control	Classroom activities	Reports and examinations
9	2	Knowledge and application	Production scheduling and sequencing	Interactive lectures	Reports and examinations
10	2	Knowledge and application	Shop floor control	Case studies	Reports and examinations
11	2	Knowledge and application	Quality control in production systems	Classroom discussions	Reports and examinations
12	2	Knowledge and application	Lean manufacturing and Just-in-Time (JIT) production	Interactive lectures	Reports and examinations
13	2	Knowledge and application	Productivity improvement techniques	Case studies and practical applications	Reports and examinations
14	2	Knowledge and application	Integrated production planning project	Project-based learning	Reports, project evaluation, and examinations
15	2	Knowledge and application	Comprehensive review and final examination	Written assessment	Final written and oral examinations

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11. Course Assessment

Assessment methods include:

- Homework assignments
- Student reports

- Classroom participation
- Quizzes
- Oral presentations
- Written examinations
- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Production and Operations Management** – *William J. Stevenson*
- **Operations Management** – *Jay Heizer, Barry Render & Chuck Munson*

Main References

- **Manufacturing Planning and Control for Supply Chain Management** – *F. Robert Jacobs, William L. Berry, D. Clay Whybark & Thomas E. Vollmann*
- **Operations Management** – *Nigel Slack, Alistair Brandon-Jones & Robert Johnston*

Recommended References

- Scientific journals in production engineering and operations management.
- APICS publications and production planning manuals.
- ISO standards related to quality management and production systems.

Electronic Resources

- APICS (Association for Supply Chain Management) Learning Resources
- Society of Manufacturing Engineers (SME)
- Online production and operations management platforms
- University digital learning resources
- Manufacturing and supply chain management educational websites

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COURSE DESCRIPTION

Second Level – First Semester

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1. Course Name

Industrial Drawing II

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2. Course Code

METP219

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **45 practical hours**
- **3 credit units**

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7. Course Coordinator

Name: Mehdi Qahraman Fakhr al-Din

Email:

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Develop advanced skills in machine drawing and industrial drafting.

- Prepare detailed assembly and working drawings of mechanical systems.
- Interpret and produce engineering drawings according to ISO and international standards.
- Apply dimensional tolerances, geometric dimensioning and tolerancing (GD&T), and surface finish symbols.
- Use Computer-Aided Design (CAD) software to produce professional engineering drawings.
- Enhance technical communication through engineering graphics and documentation.

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9. Teaching and Learning Strategies

- Practical drafting sessions using drawing boards and CAD software.
- Interactive lectures on engineering drawing standards.
- Hands-on drawing assignments and laboratory exercises.
- Individual and group design projects.
- Continuous assessment through practical work, reports, and presentations.

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10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	3	Knowledge and application	Review of Machine Drawing I and introduction to advanced industrial drawing	Whiteboard, CAD laboratory, practical demonstrations	Reports, assignments, written and practical examinations
2	3	Knowledge and application	Advanced orthographic projection and sectional drawings	Practical drafting exercises	Reports and examinations
3	3	Knowledge and application	Detailed assembly drawings	Practical laboratory sessions	Reports and examinations
4	3	Knowledge and application	Exploded assembly drawings and parts lists	CAD laboratory	Reports and examinations
5	3	Knowledge and application	Limits, fits, and tolerances	Interactive lectures and drawing exercises	Reports and examinations
6	3	Knowledge and application	Geometric Dimensioning and Tolerancing (GD&T)	Practical CAD exercises	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
7	3	Knowledge and application	Surface roughness and machining symbols	Practical drawing sessions	Reports and examinations
8	3	Knowledge and application	Standard machine elements in assembly drawings	CAD laboratory	Reports and examinations
9	3	Knowledge and application	Drawing of gears, bearings, shafts, and couplings	Practical drafting exercises	Reports and examinations
10	3	Knowledge and application	Hydraulic and pneumatic schematic drawings	Interactive lectures and practical exercises	Reports and examinations
11	3	Knowledge and application	Introduction to 3D CAD modeling	Computer laboratory	Reports and examinations
12	3	Knowledge and application	Generation of 2D engineering drawings from 3D models	CAD laboratory	Reports and examinations
13	3	Knowledge and application	Industrial drawing project	Project-based learning	Reports, project evaluation, and examinations
14	3	Knowledge and application	Completion and presentation of the drawing project	Practical assessment	Reports and examinations
15	3	Knowledge and application	Comprehensive review and final practical examination	Practical examination	Final written and practical examinations

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11. Course Assessment

Assessment methods include:

- Practical drawing assignments
- CAD laboratory exercises
- Student reports
- Homework assignments
- Classroom participation
- Practical examinations
- Written examinations

- Mid-term examination
- Final practical examination

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12. Learning and Teaching Resources

Required Textbooks

- **Machine Drawing** – *N. D. Bhatt*
- **Engineering Drawing and Design** – *David A. Madsen*

Main References

- **Technical Drawing with Engineering Graphics** – *Frederick E. Giesecke et al.*
- **Engineering Drawing** – *K. L. Narayana & P. Kannaiah*

Recommended References

- ISO standards for technical drawing and geometric tolerancing.
- Scientific journals in engineering graphics and mechanical design.
- CAD software user manuals and drafting guides.

Electronic Resources

- Autodesk AutoCAD Learning Resources
- Autodesk Inventor Tutorials
- SolidWorks Education Resources
- University digital learning resources
- Online engineering graphics and CAD platforms

COURSE DESCRIPTION

Second Level – First Semester

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1. Course Name

Manufacturing Processes V

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2. Course Code

METP 213

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3. Semester / Academic Year

First Semester / 2025–2026

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4. Date of Preparing the Course Description

01/10/2025

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5. Available Attendance Modes

- In-person
- Online

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6. Total Credit Hours / Total Units

- **30 theoretical hours + 30 practical hours**
- **4 credit units**

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7. Course Coordinator

Name: *Ayad Abd Ramaden*

Email: dr.ayad.a.ramadhan@ntu.edu.iq

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8. Course Objectives

Upon successful completion of this course, students will be able to:

- Understand advanced manufacturing technologies and modern production methods.
- Apply advanced machining techniques and automation in manufacturing.
- Analyze manufacturing systems to improve quality, productivity, and efficiency.

- Select suitable manufacturing processes for industrial applications.
- Develop practical skills in advanced manufacturing operations and process optimization.

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9. Teaching and Learning Strategies

- Interactive lectures supported by multimedia presentations.
- Practical laboratory and workshop sessions.
- Demonstrations using advanced manufacturing equipment.
- Case studies and engineering problem-solving activities.
- Continuous assessment through laboratory reports, assignments, and projects.

---

10. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	Knowledge and application	Introduction to advanced manufacturing systems	Whiteboard, PowerPoint presentations, laboratory demonstrations	Reports, assignments, written, oral, and practical examinations
2	4	Knowledge and application	Automation in manufacturing processes	Interactive lectures and laboratory activities	Reports and examinations
3	4	Knowledge and application	Flexible Manufacturing Systems (FMS)	Practical demonstrations	Reports and examinations
4	4	Knowledge and application	Computer Integrated Manufacturing (CIM)	Computer laboratory	Reports and examinations
5	4	Knowledge and application	Advanced CNC machining technologies	Practical laboratory sessions	Reports and examinations
6	4	Knowledge and application	Robotics in manufacturing	Practical demonstrations	Reports and examinations
7	4	Knowledge and application	Additive manufacturing (3D printing)	Interactive lectures and laboratory practice	Reports and examinations

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
8	4	Knowledge and application	Laser machining and advanced cutting technologies	Practical demonstrations	Reports and examinations
9	4	Knowledge and application	Precision machining and surface engineering	Laboratory exercises	Reports and examinations
10	4	Knowledge and application	Computer-aided process planning (CAPP)	Computer laboratory	Reports and examinations
11	4	Knowledge and application	Lean manufacturing and continuous improvement	Classroom discussions	Reports and examinations
12	4	Knowledge and application	Smart manufacturing and Industry 4.0	Multimedia presentations and case studies	Reports and examinations
13	4	Knowledge and application	Integrated manufacturing project	Project-based learning	Reports, project evaluation, and examinations
14	4	Knowledge and application	Completion and presentation of manufacturing project	Practical assessment	Reports and examinations
15	4	Knowledge and application	Comprehensive review and final examination	Written and practical assessment	Final written, oral, and practical examinations

11. Course Assessment

Assessment methods include:

- Homework assignments
- Laboratory reports
- Practical workshop activities
- Student reports
- Classroom participation
- Oral examinations
- Written examinations
- Practical examinations

- Mid-term examination
- Final examination

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12. Learning and Teaching Resources

Required Textbooks

- **Manufacturing Engineering and Technology** – *Serope Kalpakjian & Steven R. Schmid*
- **Fundamentals of Modern Manufacturing** – *Mikell P. Groover*

Main References

- **Automation, Production Systems, and Computer-Integrated Manufacturing** – *Mikell P. Groover*
- **Advanced Manufacturing Technology** – *P. N. Rao*

Recommended References

- Scientific journals in manufacturing engineering and production technology.
- Technical reports on advanced manufacturing systems.
- ISO standards related to manufacturing processes and quality systems.

Electronic Resources

- Society of Manufacturing Engineers (SME)
- ASM International Digital Library
- Autodesk Manufacturing Learning Resources
- Online advanced manufacturing platforms
- University digital learning resources
