

Academic Program Description Form

University Name: Al-Qadisiyah University

Faculty/Institute: College of Engineering.

Scientific Department: Materials Engineering Department

Academic or Professional Program Name: BSc Materials Engineering

Final Certificate Name: Bachelor of Science in Materials Engineering (B.Sc. Materials Engineering)

Academic System: Bologna process

Description Preparation Date: 2 -08-2026

File Completion Date: 30 -08-2026

Signature:



Head of Department

Name: Prof. Dr. Mohammed Abdul-Razzaq

Date: 23-08-2026

Signature:

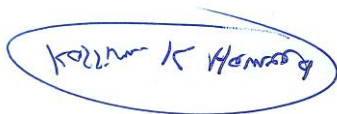


Scientific Associate Name:

Prof. Dr. Haitham Ali Badi

Date: 23-08-2026

Signature:



The file is checked by: Quality Assurance Committee

Materials Engineering Department

**Director of the Quality Assurance and University
Performance Division:**

Prof. Dr. Qasim Kadhim Hameed

Date: 23-08-2026



Approval of the Dean

**Prof. Dr. Ali Abdul-Hussein
Jaza'a Al-Khalidi**



Academic Program and Course Description Guide

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

**College of Engineering-Al-Qadisiyah University
Materials Engineering Department
2025-2026**

ACADEMIC PROGRAM DESCRIPTION

Bachelor's Degree in Materials Engineering

Materials Engineering Department

College of Engineering - Al-Qadisiyah University

University Name	Al-Qadisiyah University
College	College of Engineering
Scientific Department	Materials Engineering Department
Academic Program	Bachelor's Degree in Materials Engineering
Academic System	Four years (Eight semesters), 240 ECTS; 1 ECTS = 25 hours
Academic Year	2025-2026
Description Preparation Date	23/08/2026

Academic Year 2025-2026

Introduction

This Academic Program Description presents the Bachelor of Materials Engineering program at Al-Qadisiyah University. The program is organized over four academic years and eight semesters with a total of 240 ECTS and 6,000 student-workload hours. It defines the program vision and mission, educational objectives, graduate outcomes, curriculum structure, teaching and assessment methods, faculty profile, continuous improvement framework, curriculum mapping, and detailed course descriptions. The program is designed to provide students with a balanced foundation in mathematics, basic sciences, engineering fundamentals, materials engineering core subjects, laboratory practice, microstructural characterization, materials design, processing-structure-property relationships, professional skills, and graduation-project work relevant to modern industrial, manufacturing, and advanced technological sectors.

1. Program Vision

Leadership and excellence in materials engineering sciences and their advanced applications to serve the national industry, drive technological innovation, and achieve sustainable development.

2. Program Mission

The Department of Materials Engineering at the University of Al-Qadisiyah aspires to be a leading center for technological research and education, committed to advancing discovery, nurturing creativity, and driving innovation across the materials science field

Our primary objective is to teach our graduates with a culture of curiosity, creativity, and unwavering confidence. As a result, they will possess the essential characteristics desired by global partners, who recognize our institution as the preeminent source of highly trained, talented, and entrepreneurial employees. We are committed to providing innovative research that stretches the boundaries of knowledge and educational programs, products, and services that remain pertinent in a constantly changing world.

In addition, we aspire to be a center of technological innovation, continually generating innovative ideas and solutions to address the enormous challenges of our time. By actively pursuing collaboration with global partners, we strive to exchange knowledge, technology, and forward-thinking ideas that contribute to revolutionary advances.

3. Program Educational Objectives (PEOs)

Graduates of the Materials Engineering program at Al-Qadisiyah University are expected, within a few years of graduation, to:

PEO	Educational Objective
PEO 1 - Professional Practice	Successfully practice as professional materials engineers contributing effectively to modern manufacturing, industrial, and advanced technological sectors.
PEO 2 - Lifelong Learning	Pursue continuous professional development through graduate studies, lifelong learning, and staying updated with modern materials science and technology.
PEO 3 - Responsibility & Ethics	Adhere to professional engineering ethics, occupational health and safety standards, and environmental protection in their engineering practice and materials processing.
PEO 4 - Leadership & Teamwork	Work effectively within multidisciplinary teams and demonstrate leadership and effective communication skills.

4. Program Accreditation

The Materials Engineering program is developed and periodically reviewed in accordance with the requirements of the Ministry of Higher Education and Scientific Research and the national standards for engineering education and program accreditation. Quality-assurance practices include curriculum review, assessment of graduate outcomes, course evaluation, faculty development, stakeholder feedback, and documented continuous improvement.

5. Other External Influences

The program operates within Al-Qadisiyah University under the Ministry of Higher Education and Scientific Research, Republic of Iraq. The curriculum master and departmental documents reflect the national higher-education framework and an ECTS-based semester structure.

6. Program Structure

The curriculum comprises 61 listed modules and activities distributed over eight semesters, including one support activity with zero ECTS, for a total of 240 ECTS and 6,000 student-workload hours. Modules are classified as Basic learning activities (B), Core learning activities (C), and Support or related learning activities (S).

Module Classification	No. of Modules	ECTS	Share of 240 ECTS	SWL (hours)
Basic learning activities	11	54	22.5%	1,350
Core learning activities	25	135	56.25%	3,375
Support / related learning activity	17	51	21.25%	1,275
Total	53	240	100%	6,000

Additional graduation requirement: the curriculum master states that the student should complete 4 weeks of summer internship to fulfill the requirements of the bachelor's degree.

7. Program Description / Curriculum

The following table presents the approved study plan by academic level and semester, including course codes, course titles, ECTS credits, student workload, and module classification.

Year / Level	Semester	Course Code	Course Name	ECTS	SWL (h)	Type
First Year	1	MTE 111	Mathematics-I	6.00	150	B
First Year	1	MTE 112	Principles of Materials Science	8.00	200	C
First Year	1	MTE 113	Eng . & Mechanical Drawing	5.00	125	S
First Year	1	QU04	Computer Principles	3.00	75	S
First Year	1	MTE 115	Materials Chemistry	6.00	150	B
First Year	1	QU02	Human Rights & Democracy	2.00	50	S
First Year	2	MTE 121	Extraction Metallurgy	6.00	150	C
First Year	2	MTE 122	Physic	6.00	150	B
First Year	2	MTE 123	Programming-I	4.00	100	S
First Year	2	MTE 124	Statistics and Probability	4.00	100	S
First Year	2	MTE 125	Mathematic - II	6.00	150	B
First Year	2	QU01	English Language-I	2.00	50	S

Year / Level	Semester	Course Code	Course Name	ECTS	SWL (h)	Type
First Year	2	QU06	Arabic lanuage	2.00	50	S
First Year	3	MTE 211	Strength of Materials	6.00	150	B
Second Year	3	MTE 212	Physical Metallurgy	6.00	150	C
Second Year	3	MTE 213	Chemical Metallurgy	6.00	150	C
Second Year	3	MTE 214	Computer Aid Drawing	3.00	75	S
Second Year	3	ENG 211	Mathematics-III	3.00	75	B
Second Year	3	MTE 216	Magnetic and electronic materials	4.00	100	B
Second Year	3	QU 26	Arabic lanuage 2	2.00	50	S
Second Year	4	MTE 221	Sustainability of materials	6.00	150	B
Second Year	4	MTE 222	Metals and Alloys	7.00	175	C
Second Year	4	MTE 223	Polymer	7.00	175	C
Second Year	4	QU 24	Computer Principles 2	3.00	75	S
Second Year	4	ENG 221	Mathematics-IV	3.00	75	B
Second Year	4	QU 21	English Language 2	2.00	50	S
Second Year	4	QU08	Crims of Baath regim in Iraq	2.00	50	S
Second Year	5	MTE 311	Casting and Welding	5.00	125	C
Second Year	5	MTE 312	Fracture Mechanics	5.00	125	C
Second Year	5	MTE 313	Ceramic Engineering	5.00	125	C
Second Year	5	MTE 314	Phase Transformations	4.00	100	C
Third Year	5	MTE 315	Mathematical Analysis	4.00	100	B
Third Year	5	MTE 316	Corrosion Engineering	5.00	125	C
Third Year	5	MTE 317	Engineering workshop	2.00	50	S
Third Year	6	MTE 321	Testing of Eng. Materials	5.00	125	C
Third Year	6	MTE 322	Corrosion Protection	5.00	125	C
Third Year	6	MTE 323	Machining Processes of Eng. Materials	5.00	125	C
Third Year	6	MTE 324	Heat Treatments	4.00	100	C
Third Year	6	MTE 325	Analytical Analysis	4.00	100	B
Third Year	6	MTE 326	Material and resources of renewable energy	4.00	100	C
Third Year	6	MTE 327	Programming-II	3.00	75	S
Third Year	7	MTE 411	Industrial Engineering	5.00	125	C
Third Year	7	MTE 412	Forming Processes of Eng. Materials	6.00	150	C
Third Year	7	MTE 413	Surface Engineering	6.00	150	C
Third Year	7	MTE 414	Computer Simulation	5.00	125	S
Third Year	7	MTE 415	Design & Selection of Eng. Materials I	5.00	125	S
Fourth Year	7	ENG 416	Graduation Project	3.00	75	C
Fourth Year	8	MTE 421	Nano-materials	6.00	150	C
Fourth Year	8	MTE 422	Biomaterials	7.00	175	C
Fourth Year	8	MTE 423	Design & Selection of Eng. Materials II	5.00	125	C
Fourth Year	8	MTE 424	Composite materials	7.00	175	C
Fourth Year	8	QU	Engineering Ethics	2.00	50	S

Year / Level	Semester	Course Code	Course Name	ECTS	SWL (h)	Type
Fourth Year	8	ENG 416	Graduation Project	3.00	75	C

8. Expected Program Learning Outcomes / Graduate Outcomes

Upon graduation, students are expected to demonstrate the following approved Graduate Outcomes (GO):

GO	Graduate Outcome
GO 1	An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
GO 2	An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
GO 3	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
GO 4	An ability to communicate effectively with a range of audiences.
GO 5	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
GO 6	An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.
GO 7	An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.

Teaching and Learning Strategies

Teaching and learning are implemented through lectures, tutorials, laboratory and practical work, seminars, projects, case studies, problem-based learning, computer applications, independent study, and collaborative learning. The selected method in each course is aligned with its learning outcomes and the nature of the subject.

- Interactive theoretical lectures for foundational scientific and materials engineering concepts.
- Tutorials and structured problem-solving sessions to develop analytical and quantitative skills in microstructures and material properties.
- Laboratory and practical activities for experimental competence, materials characterization, measurement, safety, and interpretation of results.
- Problem-based and case-based learning to connect materials engineering theory with realistic technical, manufacturing, and societal problems.
- Project-based learning, including materials design tasks, failure analysis projects, and computer-based applications.
- Use of engineering software, computer laboratories, simulations, and digital/virtual learning resources for phase diagrams, thermodynamic modeling, and material behavior, where specified by the course.
- Seminars, presentations, discussions, and technical report writing to strengthen communication and professional skills.
- Cooperative learning and teamwork through group assignments and collaborative activities.
- Self-directed learning through assignments, reading, research activities, and engagement with current materials science literature.
- Four weeks of summer internship as a graduation requirement according to the curriculum master, providing practical industrial experience in manufacturing and materials processing plants.

10. Assessment Methods

Teaching and learning are implemented through lectures, tutorials, laboratory and practical work, seminars, projects, case studies, problem-based learning, computer applications, independent study, and collaborative learning. The selected method in each course is aligned with its learning outcomes and the nature of the subject.

- Written examinations, including midterm and final examinations.
- Quizzes and short tests for continuous/formative assessment.
- Onsite and online assignments, homework, and problem sets.
- Laboratory/practical performance assessments and laboratory reports.
- Projects, design tasks, and applied/computer-based activities.
- Reports, seminars, oral presentations, and classroom discussions.
- Continuous assessment of participation, teamwork, communication, and course-specific practical competencies.

11. Faculty

The Materials Engineering Department is supported by 26 full-time permanent faculty members representing a range of academic ranks and specializations relevant to the program. The faculty profile includes professors, assistant professors, lecturers, and assistant lecturers with doctoral and master degrees in Materials engineering and supporting disciplines.

Faculty Member	Highest Degree	Academic Rank	General Specialization	Specific Specialization
Ahmed Ali Shakir	PhD	Assist.Professor	Mechanical Engineering	Aerodynamics
Mohammed Abdulrazzaq Abbood	PhD	Professor	Mechanical and Materials Engineering	Materials characterization
Dhuha Falah Kleef	PhD	Assist.Professor	Materials engineering	Metallurgy/ Nanomaterial's
Marwah Ghazi Kareem	PhD	Assist. Professor	Mechanical Engineering	Applied
Aqeel Lateef Khudhair	PhD	Lecturer	Communication	Communication
Amar Jabar Albaaji	PhD	Assist.Professor	Materials engineering	Nanocomposites materials
Riyam Imad Jaddan	MSc	Lecturer	Materials engineering	Ceramic
Ahmed Hakem Jabor	Msc	Lecturer	Mechanical Engineering	Applied
Qasim Mezher Turki	MSc	Assist. Lecturer	Materials engineering	Corrosion Engineering
Qasim Saad Abdulwahid	MSc	Assist. Lecturer	Metallurgical engineering	Metaalurgy
Shamam Kadhim Mohammed	MSc	Assist. Lecturer	Electronic and IT Engineering	Electronics and Information Technology
Qahtan Adnan Youssef	PhD	Professor	Physical chemistry	Corrosion and Nanocatalysts
Mushtaq Taleb Ali	PhD	Assistant Professor	Materials engineering	polymers
Ahmed Mudhafar Hashim	PhD	Assistant Professor	Bio-composites materials	Composite materials
Laith Fadel Shaker	Msc	Lecturer	Production engineering	Production/metals cutting
Esraa Faisal Ghazi	Msc	Assistant Professor	biomaterials	Bimaterials
Khaldoon Hussein Hamzah	Msc	Lecturer	Materials engineering and technology	Powder Metallurgy
Ghufran A Alhadad	Msc	Assist. Lecturer	Electronics and Communications Engineering	Laser Applications
Maha Jasim Mohammed	PhD	Lecturer	Materials Engineering	Polymers
Mudher Naeem Yasir Khazail	Msc	Assistant Lecturer	Technological machines and equipment	Applied

Faculty Member	Highest Degree	Academic Rank	General Specialization	Specific Specialization
Haydar Swiry Rahi Alshabbani	PhD	Lecturer	Materials Engineering	Advanced materials
Saleh Jawad Hamza	PhD	Lecturer	Materials Engineering	Biomaterials
Amenah Hamzah Abdulhussein	Msc	Lecturer	Mechanical Engineering	Applied/Production
Ahmed Mousa Marhab	PhD	Lecturer	Metallurgy Engineering	Metallurgy/bio materials
Amjad Hassoon Saleh	Msc	Lecturer	Mechatronics Engineering	Mechatronics and automatic control engineering
Hasan Abdulkadhim Abbas Alhilali	PhD	Lecturer	Mechanical Engineering	Materials and nanotechnology

Faculty Summary

Indicator	Category	Count
Academic Rank	Professor	2
Academic Rank	Lecturer	12
Academic Rank	Assistant Professor	12
Academic Rank	Assistant Lecturer	5
Highest Degree	PhD	14
Highest Degree	Msc	12

12. Professional Development

Faculty professional development is supported through participation in scientific conferences, seminars, workshops, training courses, research activities, professional organizations, and academic committees. The department encourages continuous improvement in teaching methods, assessment design, laboratory safety, process simulation, digital learning tools, scientific research, academic writing, and engineering accreditation practices. Junior faculty members are integrated into course coordination, research groups, committees, and collaborative academic activities to strengthen teaching and professional competence.

13. Program Development Plan

The program development plan is based on continuous improvement and periodic review. Priorities include: (1) annual review of the curriculum and course content in relation to graduate outcomes and labor-market needs; (2) modernization of laboratories, process-simulation facilities, and digital learning resources; (3) strengthening design, safety, sustainability, and industrial-application components; (4) systematic use of student, alumni, employer, and faculty feedback; (5) continuous faculty development; (6) updating textbooks and electronic resources; and (7) documenting improvement actions and their impact on student learning and program performance.

14. Curriculum Mapping Matrix (Courses vs. Graduate Outcomes)

The curriculum mapping matrix shows the contribution of each course to the seven Graduate Outcomes (GO1-GO7). An X indicates a direct and substantial contribution of the course to the corresponding graduate outcome.

GO1	GO2	GO3	GO4	GO5	GO6	GO7
48	29	28	14	10	39	23

Number of curriculum modules mapped as substantially contributing to each Graduate Outcome. The zero-ECTS Sports activity is included where relevant to teamwork/leadership.

Semester 1 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
MTE 111	Mathematics-I	x	x					
MTE 112	Principles of Materials Science	X	x	X				
MTE 113	Engineering and Mechanical Drawing		X		x			x
QU04	Computer Principles			x			x	X
MTE 115	Materials Chemistry	x		X				
QU02	Human Rights and Democracy				X	X		

Semester 2 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
MTE 121	Extraction Metallurgy	X	X	X				
MTE 122	Physics	x	x	x				
MTE 123	Programming-I			x			X	X
MTE 124	Statistics and probability	x		X				x
MTE 125	Mathematics-II	x	x					
QU01	English Language-I				X		x	
QU06	Arabic language-I				X	x		

Semester 3 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
MTE 211	Strength of Materials	X	X	X				
MTE 212	Physical Metallurgy	X		X				x
MTE 213	Chemical Metallurgy	X	X					
MTE 214	Computer Aid Drawing		X		x			X
ENG 211	Mathematics-III	x	X					
MTE 216	Magnetic and electronic materials	X		X				
QU 26	Arabic language-II				X	x		

Semester 4 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
MTE 221	Sustainability of materials		X			X	X	
MTE 222	Mathematics-IV	x	x					
MTE 223	Metals and Alloys	X	X	X				
QU 24	Polymer	X	X					
ENG 221	Computer Principles-II			x			X	X
QU 21	English Language-II				X		x	
QU08	Crimes of the Ba'ath regime in Iraq				X	X		

Semester 5 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
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Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
MTE 311	Casting and Welding	X	X					X
MTE 312	Fracture Mechanics	X		X				
MTE 313	Ceramic Engineering	X		X				
MTE 314	Phase Transformations	X		X				
MTE 315	Mathematical Analysis	x	x					
MTE 316	Corrosion Engineering	X	X					
MTE 317	Engineering workshop		X					X

Semester 6 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
MTE 321	Testing of Engineering Materials			X				X
MTE 322	Corrosion Protection	X	X					
MTE 323	Machining Processes of Eng. Materials		X					X
MTE 324	Heat Treatments	X		X				
MTE 325	Analytical Analysis			X			x	
MTE 326	Material and resources of renewable energy		X			X	X	
MTE 327	Programming-II			x			X	X

Semester 7 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
MTE 411	Forming Processes Eng. Materials	X	X					
MTE 412	Surface Engineering	X		X				
MTE 413	Computer Simulation			X			X	X
MTE 414	Design and Selection of Eng. Materials I	X	X					
MTE 415	Industrial Engineering		X			X	X	
ENG 416	Graduation Project	X	X	X	X		X	X

Semester 8 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
MTE 421	Nano-Materials	X		X				
MTE 422	Biomaterials	X	X					
MTE 423	Design and Selection of Eng. Materials II	X	X					X
MTE 424	Composite Materials	X	X					
QU	Engineering Ethics				X	X	X	
ENG 416	Graduation Project	X	X	X	X		X	X

Graduate Outcome Legend

GO	Outcome Focus
GO1	Engineering problem solving
GO2	Engineering design
GO3	Experimentation and data
GO4	Communication
GO5	Ethics and professional responsibility
GO6	New knowledge / lifelong learning
GO7	Teamwork and leadership

15. Course Description Forms

The following Course Description Forms provide the course information, objectives, learning outcomes, teaching and learning strategies, course structure, assessment methods, and learning resources for the modules included in the Materials Engineering curriculum.

1. MTE 111- Mathematics- I

Course Name	Mathematics I
Course Code	MTE 111
Year / Semester	First Year / Semester 1
Language	English
Total Study Hours / ECTS	150 Hours / 6 ECTS
Structured / Unstructured SWL	150hours
Module Type	Basic learning activity (B)
Attendance Forms	Theory + Tutorial
Course Administrator	M. Ghufra Abdul Qader

Course Objectives

By the end of the course, students will be able to:

1. Strengthen their conceptual understanding of core mathematical topics required for Materials Engineering.
2. Apply algebraic rules and techniques to simplify expressions and solve engineering-oriented problems.
3. Demonstrate proficiency in working with functions (including exponential, logarithmic, and trigonometric functions) and their engineering applications.
4. Use differentiation to compute derivatives and interpret them geometrically and physically as rates of change.
5. Apply integration rules to calculate areas and volumes, and solve basic applied engineering problems.
6. Solve equations (linear, polynomial, and basic transcendental types) using appropriate analytical methods.
7. Develop skills in graphing functions, analyzing curve behavior, and connecting graphical features to mathematical properties.
8. Build problem-solving strategies through structured reasoning, step-by-step solutions, and verification of results.
9. Identify and correct common calculation and reasoning errors to improve accuracy and reliability in mathematical work.
10. Prepare for higher-level mathematics courses by mastering the foundational skills needed in engineering modeling.

Course Learning Outcomes

1. Enable the student to knowledge and understand the theoretical concepts of preliminaries.
2. Enable the student to knowledge and understand the Functions and Evaluate with discuss domain, range, composite Functions and shifting a Graph of a Function.
3. Enable the student to knowledge and understand Trigonometric Functions and solve Periodicity and Graphs of the Trigonometric Functions, Addition Formulas, Double-Angle Formulas, Half-Angle Formulas.

4. Enable the student to Evaluate and discuss Limits and the Continuity of functions.
5. Enable the students to knowledge and understand ideology of Differentiation, Chain Rule, and Implicit Differentiation.
6. Calculate and analyze sketch the graph of a function using the information for the first and second derivatives. Solve problems using the fundamental theorem of Calculus applications.
7. Enable the student to knowledge and understand integral, making the student familiar with the practical application of math in general.
8. Evaluate and discuss Inverse, Logarithms, Exponential, Inverse Trigonometric, Hyperbolic, and Inverse Hyperbolic Functions and Derivative and Integral of Transcendental Functions.
9. Enable the students to knowledge and understand ideology of Techniques of Integration to solve problems integral using Basic Integration Formulas by Parts, Tabular, Partial Fraction and Trigonometric Integrals.
10. Making the student familiar with the practical application of Complex Numbers to evaluate Complex Numbers using Argnd Diagrams, Euler's Formula, Products, Quotients, and Power, De Moiver's Theorem, and Roots.

Teaching and Learning Strategies

1. Lectures with guided explanations of key mathematical concepts and formulas, emphasizing their engineering relevance.
2. Active classroom discussion where students answer questions, clarify misconceptions, and contribute to problem-solving.
3. Worked examples and step-by-step demonstrations to model correct solution procedures and reasoning.
4. Problem-based learning (PBL) using short engineering-related questions to connect math concepts to real applications.
5. Tutorial sessions / recitation style practice to reinforce learning through additional practice and instructor feedback.
6. Student practice using individual and group activities, including short quizzes and collaborative solution attempts.
7. Assignments and problem sets graded regularly to improve accuracy, time management, and mathematical communication.
8. Formative assessment (e.g., quizzes, in-class checks, participation) to monitor progress and adjust teaching where needed.
9. Use of graphs and visual aids (hand-drawn or digital) to help students interpret functions, derivatives, and integrals.
10. Feedback and remediation support after assessments to correct errors and strengthen weak areas.

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2	Preliminaries: Real Numbers, Inequalities, Intervals, Absolute Value, Cartesian Coordinates, Equation of the line, Slope and Distance. Functions: Domain and Range, Graphs of Functions, Piecewise-Defined Functions, Types of functions.	Theory + Tutorial	Continuous Assessment	4	1
1,2	Even Functions and Odd Functions, Composite Functions, Shifting a Graph of a Function. Trigonometric Functions: Types and Trigonometric Relation.	Theory + Tutorial	Continuous Assessment	4	2
1,2	Periodicity and Graphs of the Trigonometric Functions, Even and Odd Trigonometric Functions, Identities, Addition Formulas, Double-Angle Formulas, Half-Angle Formulas.	Theory + Tutorial	Continuous Assessment	4	3
1,2	Limits: Limit of a Function, Calculating Limits Using the Limit Laws, One-Sided Limits, Limits at Infinity, Continuous Functions.	Theory + Tutorial	Continuous Assessment	4	4
1,2	Differentiation: Differentiation Rules, Second- and Higher-Order Derivatives, Derivative of Trigonometric, The Chain Rule, Implicit Differentiation.	Theory + Tutorial	Continuous Assessment	4	5
1,2	Functions Graph: Extreme values of function (absolute maximum and minimum value, local value), Critical Points, Increasing and Decreasing Function, Concave up and Concave down, Points of Inflection, Local Extrema, Strategy for Graphing.	Theory + Tutorial	Midterm / Test	4	6
1,2	Mid-term Exam + Newton-Raphson Method.	Theory + Tutorial	Continuous Assessment	4	7
1,2	Integral: Indefinite Integral, Basic Integration Formulas, The Substitution Rule, The Integrals of $\sin^2 x$ and $\cos^2 x$, Definite Integral, Area Under a Curve as Definite Integral, The Average or Mean Value of a Function, Total Area, Substitution and Area Between Curves.	Theory + Tutorial	Continuous Assessment	4	8
1,2	Transcendental Functions: Inverse, Logarithms (Derivative and Integral of Functions).	Theory + Tutorial	Continuous Assessment	4	9
1,2	Exponential (Derivative and Integral of Functions), General Exponential (Derivative and Integral of Functions).	Theory + Tutorial	Continuous Assessment	4	10
1,2	Inverse Trigonometric (Derivative and Integral of Functions), Hyperbolic (Derivative and Integral of Functions), Inverse Hyperbolic Functions (Derivative and Integral of Functions).	Theory + Tutorial	Continuous Assessment	4	11
1,2	Techniques of Integration: Basic Integration Formulas, Integration by Parts, Tabular Integration.	Theory + Tutorial	Continuous Assessment	4	12
1,2	Partial Fraction Integral.	Theory + Tutorial	Continuous Assessment	4	13
1,2	Trigonometric Integrals (Products Powers of Sines and Cosines, Products of Sines and Cosines).	Theory + Tutorial	Continuous Assessment	4	14
1,2	Complex Numbers: Argand Diagrams, Euler's Formula, Products, Quotients, and Power, De Moivre's Theorem, Roots.	Theory + Tutorial	Continuous Assessment	4	15
1,2	Preliminaries: Real Numbers, Inequalities, Intervals, Absolute Value, Cartesian Coordinates, Equation of the line, Slope and Distance. Functions: Domain and Range, Graphs of Functions, Piecewise-Defined Functions, Types of functions.	Theory + Tutorial	Final Examination	4	16
1,2	Preparatory week before the final Exam			4	

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	5, 10
Assignments	20%	1, 12
Report	10%	-
Midterm Exam	10%	7
Final Exam	50%	16

Learning and Teaching Resources

Resource	Details
Required Texts	Textbook: George B. Thomas “Thomas’ Calculus”, 11th Ed., Pearson international edition, (2008).
Recommended Texts	Reference: K. A. Stroud “Engineering Mathematics”, 1stEd., Macmillan and Co LTD, (1970)
Websites / Electronic Resources	https://en.wikipedia.org

2. MTE 112- Principles of Materials Science

Course Name	Principles of Materials Science
Course Code	MTE112
Year / Semester	First Year / Semester 1
Language	English
Total Study Hours / ECTS	200 Hours / 8ECTS
Structured / Unstructured SWL	200 hours
Module Type	C
Attendance Forms	Lecture + Tutorial
Course Administrator	Ahmed Mudhafar Hashim

Course Objectives

1. Understand fundamental concepts in materials science and explain the relationship between materials structure and their properties.
2. Describe basic material classes (metals, ceramics, polymers, and composites) and identify typical characteristics and applications.
3. Explain atomic structure and bonding mechanisms, and relate bonding to material behavior.
4. Apply crystallography concepts by describing unit cells, crystal structures, and basic crystallographic directions/planes.
5. Analyze imperfections in solids (defects) such as vacancies, interstitials, and dislocations and discuss their effects on properties.
6. Compute and interpret key properties including density, atomic packing factor (APF), and basic material parameters using standard formulas.
7. Relate mechanical behavior (stress–strain response, elasticity, plasticity) to microstructural features and material selection.
8. Evaluate diffusion concepts (driving force, mechanisms, and diffusion effects) and link them to heat treatment and material processing.
9. Explain phase diagrams basics and interpret simple equilibrium phase relationships relevant to real materials.
10. Develop engineering problem-solving skills through solving guided exercises, case-style questions, and short assessments with clear scientific reasoning.
11. Use basic scientific communication by presenting solutions, calculations, and explanations in a structured and accurate manner.
12. Demonstrate readiness for advanced materials courses by mastering the core vocabulary and principles required for later topics

Course Learning Outcomes

1. The ability to apply knowledge of Material science and engineering.
2. The ability to find out the properties of material based on microstructure studies, processing and design them.
3. An understanding of professional and ethical responsibility.
4. Understand the classification of materials, bonding and the crystal structure.
5. Identify and understand defects in crystals.
6. Understand the basic mechanisms of diffusion and the factors governing them.

Teaching and Learning Strategies

1. Instructor-led lectures to present key concepts of materials science with clear examples and real engineering relevance.
2. Guided discussions in class to check understanding, address misconceptions, and encourage students to explain concepts using correct terminology.
3. Problem-solving sessions (worked examples) that demonstrate how to apply formulas and principles to materials-related calculations.
4. Laboratory/Practical activities (if available) to connect theoretical concepts (e.g., structure–properties, testing basics) with observed results.
5. Case studies and mini-projects where students compare material classes and justify material selection based on structure and properties.
6. Tutorials and recitation practice to reinforce learning through short quizzes, targeted exercises, and instructor feedback.
7. Use of diagrams and visualization (e.g., crystal structures, unit cells, defect schematics, diffusion concepts) to support conceptual understanding.
8. Reading and comprehension tasks from course notes/handouts to strengthen scientific reading skills and terminology.
9. Formative assessment (in-class questioning, homework checks, quick tests) to monitor progress and guide improvement.
10. Summative assessments such as midterm/final exams and structured assignments emphasizing understanding, calculations, and scientific explanation.
11. Collaborative learning through group work for solving problems, interpreting concepts, and presenting short explanations.
12. Student support and feedback via office hours, revision sessions, and individualized feedback after assessments.
13. (If permitted) Educational technology such as simulation tools or digital resources to visualize diffusion, crystal structures, and phase relationships.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3	Overview of Engineering Materials	Lecture + Tutorial	Continuous Assessment	6	1
1,2,3	The Structure of the Atom	Lecture + Tutorial	Continuous Assessment	6	2
1,2,3	The Structure of the Atom	Lecture + Tutorial	Continuous Assessment	6	3
1,2,3	Interatomic Bonding	Lecture + Tutorial	Continuous Assessment	6	4
1,2,3	The Structure of Crystalline Solids	Lecture + Tutorial	Continuous Assessment	6	5
1,2,3	The Structure of Crystalline Solids	Lecture + Tutorial	Midterm / Test	6	6
1,2,3	The Structure of Crystalline Solids	Lecture + Tutorial	Continuous Assessment	6	7
1,2,3	The Structure of Crystalline Solids	Lecture + Tutorial	Continuous Assessment	6	8
1,2,3	Micromechanical analysis of fiber reinforced composites	Lecture + Tutorial	Continuous Assessment	6	9
1,2,3	X-Ray Diffraction: Determination of Crystal Structures	Lecture + Tutorial	Continuous Assessment	6	10
1,2,3	Imperfections in Solids	Lecture + Tutorial	Continuous Assessment	6	11
1,2,3	Diffusion of Materials	Lecture + Tutorial	Continuous Assessment	6	12
1,2,3	Properties of Materials: Mechanical Properties	Lecture + Tutorial	Continuous Assessment	6	13
1,2,3	Properties of Materials: Thermal Properties	Lecture + Tutorial	Continuous Assessment	6	14
1,2,3	Properties of Materials: Electrical and Electronic Properties	Lecture + Tutorial	Continuous Assessment	6	15
1,2,3	Preparatory week before the final Exam	Lecture + Tutorial	Final Examination	6	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Quizzes	10% (10)	5, 10
Assignments	10% (10)	2, 12
Projects / Lab.	10% (10)	Continuous
Report	10% (10)	13
Midterm Exam	10% (10)	7
Final Exam	50% (50)	16
Total assessment	100% (100 Marks)	

Learning and Teaching Resources

Resource	Details
Required Texts	William D. Callister, Jr., Fundamentals of material science and engineering - An interactive, John Wiley & Sons, Inc.
Recommended Texts	Donald R. Askeland, P.P Fulay and W.J. Wright, The science and engineering of materials, sixth edition, Cengage Learning.
Websites / Electronic Resources	https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/TEKNOLOGI%20REKAYASA%20MATERIAL%20PERTAHANAN/Materials%20Science%20and%20Engineering%20An%20Introduction%20by%20William%20D.%20Callister,%20Jr.,%20David%20G.%20Rethwisch%20(z-lib.org).pdf

3. MTE 113 - Eng . & Mechanical Drawing

Course Name	Eng . & Mechanical Drawing
Course Code	MTE 113
Year / Semester	First Year / Semester 1
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	125 hours
Module Type	S
Attendance Forms	Laboratory
Course Administrator	Prof. Dr. Musa Abdul Shuja M.M. Qasim Mazhar

Course Objectives

1. Understand the fundamentals of engineering drawing and apply standard drawing conventions used in mechanical and engineering documentation.
2. Produce accurate technical sketches and drawings following correct proportions, line types, and labeling standards.
3. Apply orthographic projection to represent 3D objects using views (top, front, side) correctly.
4. Use auxiliary views and sections to clearly show hidden features, internal geometry, and complex shapes.
5. Apply sectioning rules (cut planes, hatching, and labeling) to interpret and create sectional drawings properly.
6. Generate dimensioned drawings with appropriate scale and tolerance/clarity (as required by the syllabus).
7. Read and interpret drawing information including symbols, annotations, and basic manufacturing-related details.
8. Use basic standards for technical documentation (e.g., title blocks, borders, and proper text/numbering conventions).
9. Communicate technical ideas visually by converting simple engineering concepts into clear drawings and vice versa.
10. Develop drafting accuracy and presentation skills by completing drawings with clean workmanship, consistency, and time management.
11. Create drawings using drafting tools and/or software (if included in the course) while maintaining drawing quality and standards.

Course Learning Outcomes

1. Recognize Basic drawing principles.
2. To understand what is multiple projections.
3. Discuss the involvement of Engineering and mechanical drawing in the industry..
4. Define of projection.
5. Identify the program solid works.
6. Discuss the assembly drawing .
7. Explain the types of gears.

Teaching and Learning Strategies

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
2,4,7	Basic drawing principles	Laboratory	Continuous Assessment	4	1
2,4,7	Geometrical Constructions	Laboratory	Continuous Assessment	4	2
2,4,7	Orthographic Projections	Laboratory	Examination	4	3
2,4,7	Isometric Projection	Laboratory	Continuous Assessment	4	4
2,4,7	sections- cutting lines	Laboratory	Continuous Assessment	4	5
2,4,7	Execution of Dimensions	Laboratory	Continuous Assessment	4	6
2,4,7	screw fastenings	Laboratory	Midterm / Test	4	7
2,4,7	Solidworks program	Laboratory	Continuous Assessment	4	8
2,4,7	Bolt drawing using Solidworks	Laboratory	Continuous Assessment	4	9
2,4,7	Fits and tolerances	Laboratory	Continuous Assessment	4	10
2,4,7	Drawing of welded joints with dimensions	Laboratory	Continuous Assessment	4	11
2,4,7	Gears	Laboratory	Continuous Assessment	4	12
2,4,7	Gear drawing using Solidworks	Laboratory	Continuous Assessment	4	13
2,4,7	Detailed and assembly drawing	Laboratory	Continuous Assessment	4	14
2,4,7	Rivets and springs	Laboratory	Continuous Assessment	4	15
2,4,7	Various exercises on assembly drawing using Solid works	Laboratory	Final Examination	4	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Quizzes	10% (10)	5, 10
Assignments	10% (10)	2, 12
Report	10% (10)	13
Midterm Exam	10% (10)	7
Final Exam	50% (50)	16
Total assessment	100% (100 Marks)	

Learning and Teaching Resources

Resource	Details
Required Texts	Engineering Drawing. عبد الرسول الخفاف
Recommended Texts	Textbook of Engineering Drawing K. Venkata Reddy Prof. & HOD of Mechanical Engineering Dept. C.R. Engineering College, Tirupati - 517 506
Websites / Electronic Resources	https://www.coursera.org/ University e-learning platform, recognized academic databases, and professional educational resources.

4. QU04 - Computer

Course Name	Computer
Course Code	QU04
Year / Semester	First Year / Semester 1
Language	Arabic
Total Study Hours / ECTS	75 Hours / 3 ECTS
Structured / Unstructured SWL	75 hours
Module Type	S
Attendance Forms	Theory + Laboratory
Course Administrator	M. Amjad Hassoun

Course Objectives

1. Understand computer basics including hardware, software, data representation, and common system components.
2. Explain how computers process information (input, processing, output) and describe basic operating principles.
3. Use operating systems effectively, including file management, folders, permissions, and basic troubleshooting.
4. Apply word processing and presentation skills to create organized documents and slides with proper formatting.
5. Use spreadsheets (basic level) to perform calculations, use formulas, and present data in tables/graphs (if covered).
6. Understand the principles of algorithms and problem-solving by breaking tasks into clear steps.
7. Develop basic programming concepts (variables, conditions, loops, and simple input/output) if the course includes programming.
8. Learn fundamentals of networks and the internet, including basic concepts of connectivity and data transfer.
9. Follow cybersecurity and digital ethics practices, including password safety, privacy, and responsible use.
10. Use productivity tools and basic software utilities to solve real tasks and support academic learning.
11. Demonstrate safe and correct use of computers (lab rules, data backup, and resource management).
12. Build confidence through practical activities such as exercises, labs, and short projects aligned with course outcomes.

Course Learning Outcomes

- Identify the main components of a computer system and explain the basic role of the operating system.
- Create, edit, format, save, and print professional documents using word-processing software.
- Prepare structured presentations and apply appropriate slide design, media, and animation features.
- Create and format spreadsheets, use formulas and functions, and present data using charts.
- Create and manage basic databases and use simple tables, forms, and queries.
- Explain basic computer-network and Internet concepts and apply fundamental troubleshooting practices.
- Use digital tools safely and responsibly with awareness of privacy, security, and ethical considerations.
- Apply computer applications to academic and introductory engineering tasks.

Teaching and Learning Strategies

The course is delivered through structured lectures and interactive problem-solving sessions that encourage active student participation and critical thinking. Tutorials, examples, assignments, discussions, and practical or laboratory activities are used as appropriate to connect theoretical concepts with engineering applications and to provide continuous feedback on student progress.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
3,6,7	Operating system	Theory + Laboratory	Continuous Assessment	4	1
3,6,7	Introduction to Microsoft Word 2010	Theory + Laboratory	Continuous Assessment	4	2
3,6,7	inserting objects into Microsoft Word 2010	Theory + Laboratory	Continuous Assessment	4	3
3,6,7	Additional tasks for Microsoft Word 2010	Theory + Laboratory	Continuous Assessment	4	4
3,6,7	Introduction to Microsoft PowerPoint 2010	Theory + Laboratory	Continuous Assessment	4	5
3,6,7	Insert objects and add animations Microsoft PowerPoint 2010	Theory + Laboratory	Continuous Assessment	4	6
3,6,7	the basic functions of Microsoft Excel 2010	Theory + Laboratory	Continuous Assessment	4	7
3,6,7	Insert objects in Microsoft Excel 2010	Theory + Laboratory	Continuous Assessment	4	8
3,6,7	Create mathematical formulas in Microsoft Excel 2010	Theory + Laboratory	Continuous Assessment	4	9
3,6,7	Fourth additional tasks in Microsoft Excel 2010	Theory + Laboratory	Continuous Assessment	4	10
3,6,7	Introduction to Microsoft access 2010	Theory + Laboratory	Continuous Assessment	4	11
3,6,7	inserting objects into Microsoft access 2010	Theory + Laboratory	Continuous Assessment	4	12
3,6,7	Fundamentals of Networking and the Internet	Theory + Laboratory	Continuous Assessment	4	13
3,6,7	The Ethics of the Internet World	Theory + Laboratory	Continuous Assessment	4	14
3,6,7	Preparatory week before the final Exam Preparatory week before the final Exam Week 16	Theory + Laboratory	Final Examination	4	15

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	and software resources and provides common services for computer programs. It acts as an intermediary between users and the computer hardware, facilitating the execution of programs and managing system resources. Exam...
2	Microsoft Word. Topics covered in an introduction to Microsoft Word 2010 would typically include the user interface, basic document creation and editing, formatting options, and saving/printing documents Inserting Obj...
3	objects into their documents, such as images, tables, charts, shapes, and hyperlinks. This topic would cover how to insert and manipulate these objects within Word 2010, including resizing, formatting, and aligning th...
4	tasks in Microsoft Word 2010, such as creating headers and footers, using styles and themes, applying advanced formatting options, working with templates, collaborating on documents, and utilizing mail merge functiona...
5	software used to create and deliver visual presentations. An introduction to Microsoft PowerPoint 2010 would cover topics like creating slides, adding text and images, applying themes and transitions, and presenting s...
6	multimedia elements. It also covers adding animations and transitions to make presentations more engaging and visually appealing. Basic Functions of Microsoft Excel 2010: Microsoft Excel is a spreadsheet program used for
7	data organization, analysis, and calculation. The basic functions of Excel 2010 would include creating and formatting spreadsheets, entering data, using formulas and functions, performing calculations, and creating si...
8	and charts into spreadsheets. This topic covers how to insert and manipulate these objects, as well as formatting options specific to Excel. Create Mathematical Formulas in Microsoft Excel 2010: Excel is widely used f...
9	calculations and formula-based operations. This topic would cover how to create and use formulas and functions in Excel, including basic arithmetic operations, cell references, and common mathematical functions. Fourt...
10	features in Excel 2010, such as conditional formatting, data validation, sorting and filtering data, creating pivot tables, and using advanced formulas and functions. Introduction to Microsoft Access 2010: Microsoft A...
11	store and organize large amounts of data. An introduction to Microsoft Access 2010 would cover topics like creating databases, designing tables, entering and manipulating data, and running basic queries. Inserting Obj...
12	database forms and reports, including images, charts, and other multimedia elements. This topic covers how to insert and customize these objects within Access 2010. Fundamentals of Networking and the Internet: This to...
13	networking concepts and the internet. It covers topics such as network types, protocols, IP addressing, subnetting, network topologies, and

Week	Laboratory / Practical Content
	basic troubleshooting. Inserting Objects into Microsoft Access 2010: In Micro...
14	objects into their database forms and reports. These objects can include images, charts, buttons, and other interactive elements. This topic would cover how to insert and customize these objects within Access 2010 to ...
15	protocols (e.g., TCP/IP), IP addressing, subnetting, network devices (e.g., routers, switches), network security, and basic troubleshooting techniques. It may also touch upon topics like LANs (Local Area Networks), WA...
16	rights, cyberbullying, online harassment, digital footprint, net neutrality, and responsible online behavior. It examines the ethical implications of internet use and promotes awareness of responsible digital citizens...

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Computer
Recommended Texts	Recent textbooks, handbooks, and peer-reviewed references relevant to the course.
Websites / Electronic Resources	University e-learning platform, recognized academic databases, and professional educational resources.

5. MTE 115- Materials Chemistry

Course Name	Materials Chemistry
Course Code	MTE 115
Year / Semester	First Year / Semester 1
Language	English
Total Study Hours / ECTS	150 Hours / 6 ECTS
Structured / Unstructured SWL	150 hours
Module Type	B
Attendance Forms	Theory + Tutorial+ Lecture + Seminar
Course Administrator	Dr. Maha Jassim

Course Objectives

1. Understand core chemistry fundamentals needed for materials science, including atomic structure, bonding concepts, and periodic trends.
2. Explain chemical bonding and molecular structure and relate them to material behavior and properties.
3. Apply stoichiometry and basic reaction calculations to solve problems relevant to material synthesis and processing.
4. Use the concepts of acids, bases, and chemical equilibria to interpret reactions and concentration-related behavior in materials systems.
5. Describe electrochemistry basics (e.g., oxidation/reduction, electrochemical cells) and connect them to corrosion and metal behavior.
6. Explain thermodynamics fundamentals (e.g., energy, spontaneity, Gibbs free energy concepts at an introductory level) in the context of materials formation.
7. Identify and describe common chemical reactions used in materials processing (precipitation, dissolution, redox, and synthesis routes).
8. Understand coordination chemistry fundamentals (intro level) and relate coordination compounds to materials and functional properties.
9. Analyze and interpret basic chemical/structural data (e.g., empirical relationships, composition, and simple interpretation of chemical diagrams—if covered).
10. Develop practical problem-solving and scientific reasoning skills by completing exercises, homework, and lab-related tasks (if included).
11. Communicate chemical information clearly using proper units, notation, and step-by-step solutions.
12. Demonstrate readiness for advanced materials chemistry topics by mastering the foundational concepts and terminology required for later courses.

Course Learning Outcomes

On successful completion of the module, students should be able to:

- Explain the principles of atomic structure, electron configuration, energy quantisation, wave particle duality, molecular orbital theory and coordinate bonding
- Differentiate between types of chemical bonds and hence the final properties of elements and compounds.
- Describe the terminology of materials mechanics and explain the strength of materials in relation to their molecular structure
- Utilizing periodic table to monitor chemical and physical properties of elements.
- Understanding electrochemistry to solve corrosion problems.

Identify and describe how chemistry impacts on everyday life in such areas as the environment, sustainability & materials

Teaching and Learning Strategies

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Course Structure

The course is delivered primarily through workshop-based practical sessions. The weekly practical plan is presented below.

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Summarise key concepts of quantum mechanics.
2	Fundamentals of chemistry, atoms ,molecules , electrons protons and neutrons
3	Fundamentals of chemistry, atomic theories, Dalton theory, Thomson theory ,Rutherford's Theory, bohr theory
4	The energies of Orbitals, Quantum Numbers, Hund's Rule, Pauli Exclusion Principle
5	Shielding Effect and Effective Nuclear Charge , Term Symbols, Chemical Formulas, Molecular formula , Structural formula, Ionic formula, Empirical formula
6	Chemical bonding, Ionic Bonds ,Polarization: Covalent character in ionic compounds, Properties of Ionic Compounds, The bond dipole moment
7	Covalent Bonds, Lewis Structure, Formal Charge, Properties of Covalent Substances, hydrogen bond, Metallic Bonds, Van der Waals bond
8	Mid-term Exam
9	Basic types of chemical reactions, Balancing of Redox Reactions, Stoichiometry of reactions, Excess and Limiting Reagents, Reaction Yields
10	Periodic table, Periodic table trends, Classes of periodic elements,s – Block elements, p - block elements, Anomalous Behavior of Boron
11	Carbon family, Nitrogen family, Oxygen family, Halogens, d – block elements , f - block elements(inner transition elements)
12	Acids , bases and salts
13	Electrochemistry, electrolytic conduction, Conductance and Conductivity.
14	Factors affecting conductivity, Kohlrausch's Law, electrochemical cells.
15	Analytical chemistry,Classification of analytical chemistry by the techniques, Separation techniques,Units for Expressing Concentration
16	Molarity and Formality, Weight, Volume, and Weight-to-Volume Ratios, p-Functions

Course Evaluation

Assessment Method	Weight	Week / Notes
Quizzes	10% (10)	5, 10
Assignments	10% (10)	2, 12
Projects / Lab.	10% (10)	Continuous
Report	10% (10)	13
Midterm Exam	10% (10)	7
Final Exam	50% (50)	16

Learning and Teaching Resources

Resource	Details
Required Texts	Ebbing, D.D. and Gammon, S.D. (2015), General Chemistry. 11th ed. Australia: Brooks Cole/Cengage Learning.
Recommended Texts	W.D. Callister, "Materials Science and Engineering", 6th edition, University of Utah, John Wiley and sons. Inc., (2003).
Websites / Electronic Resources	.

6. QU02 - Democracy and Human Rights

Course Name	Democracy and Human Rights
Course Code	QU02
Year / Semester	First Year / Semester 1
Language	Arabic
Total Study Hours / ECTS	50 Hours / 2 ECTS
Structured / Unstructured SWL	50 hours
Module Type	S
Attendance Forms	Theory
Course Administrator	M.M. Hossam Aziz

Course Objectives

Introduce the concepts, characteristics and importance of human rights and democracy; explain the International Bill of Human Rights and major categories of rights; explain international and Iraqi protection mechanisms; and develop understanding of the historical foundations and core principles of democracy and the democratic structure of Iraq.

Course Learning Outcomes

- Explain the basic concepts of human rights and democracy.
- Identify the components of the International Bill of Human Rights and distinguish major categories of rights.
- Explain international and national mechanisms for protecting human rights.
- Analyze serious human-rights violations and contemporary challenges.
- Discuss democratic principles, the Iraqi constitutional context, and the role of institutions.
- Participate constructively in dialogue, teamwork, and community-oriented activities while respecting different viewpoints.

Teaching and Learning Strategies

Student-centered learning combines interactive lectures, guided discussion, case studies, problem-based learning, cooperative group work, document analysis, short presentations, and formative assessment. Activities connect human-rights and democracy concepts with Iraqi societal, constitutional, and university contexts while promoting respectful dialogue and evidence-based discussion.

Course Structure

Weekly Syllabus

Week	Material Covered
1	Introduction to human rights: concept, characteristics, importance, and relevance to professional life.
2	Historical roots and intellectual development of human rights.
3	Universal Declaration of Human Rights and its principal categories of rights.
4	International Covenant on Civil and Political Rights and International Covenant on Economic, Social and Cultural Rights.
5	Rights of women and children and related international conventions.
6	Rights of persons with disabilities and minorities.
7	International mechanisms for the protection of human rights, including the Human Rights Council and UPR.
8	National mechanisms for the protection of rights in Iraq: Constitution, judiciary, institutions, and civil society.
9	Serious human-rights violations and basic principles of international humanitarian law.
10	Introduction to democracy: concept, values, and historical development.
11	Separation of powers, rule of law, and constitutional principles.
12	Political pluralism, elections, media, and civil society in democratic systems.
13	Democratic transformation and challenges in the Iraqi context.
14	Relationship between human rights and democracy; contemporary shared challenges.
15	General review, discussion, and formative evaluation.
16	Preparatory week before the final examination.

Course Evaluation

Assessment Plan

Assessment Method	Weight	Week / Notes
Quizzes	10% (10)	5, 10
Projects		
Lab.		
Online Assignments (واجبات بيتية)	10% (10)	2
Assignments Onsite (واجبات صفية)	10% (10)	7
Report	10% (10)	13
حلقات دراسية		
Midterm Exam	10% (10)	7
Final Exam		

Learning and Teaching Resources

Resource	Details
Required Texts	University-approved materials on human rights, democracy, constitutional principles, and citizenship.
Recommended Texts	Universal Declaration of Human Rights; Constitution of the Republic of Iraq; relevant United Nations human-rights educational materials.
Websites / Electronic Resources	United Nations Human Rights resources and official Iraqi legal and educational sources.

7- MTE 121- Extraction Metallurgy

Course Name	Extraction Metallurgy
Course Code	MTE 121
Year / Semester	First Year / Semester 2
Language	English
Total Study Hours / ECTS	150 Hours / 6 ECTS
Structured / Unstructured SWL	150 hours
Module Type	C
Attendance Forms	Lecture+ Theory+ Seminar
Course Administrator	M.M. Qasim Mazhar

Course Objectives

1. Understand the fundamental chemistry and physics underlying metallurgical extraction processes from ores.
2. Identify common ore characteristics and relate ore preparation steps (crushing, grinding, concentration) to extraction efficiency.
3. Explain the main extraction routes for metals (e.g., iron, copper, and other relevant metals) and the role of reduction and refinement.
4. Apply basic thermodynamic principles (e.g., Gibbs free energy, enthalpy, equilibrium) to predict the feasibility and direction of extraction reactions.
5. Describe reduction mechanisms and the key factors affecting reduction performance, such as temperature, reducing agent type, and ore composition.
6. Explain purification concepts including separation of slag/impurities and their impact on metal quality.
7. Recognize core industrial extraction processes (furnaces/reactors and process flow) and connect them to basic process principles.
8. Interpret simple phase/equilibrium diagrams and use them to understand reaction behavior across different conditions.
9. Develop awareness of safety and quality considerations in extraction metallurgy, including major chemical/thermal hazards and process control needs.
10. Solve introductory problem sets involving reaction equations, basic thermodynamic reasoning, and extraction-related calculations.

Course Learning Outcomes

1. **Explain** the basic concepts of ore formation, mineral processing basics, and why ore preparation affects extraction performance.
2. **Describe** the principle of metal extraction, including major steps: reduction, separation (slag/impurities), and purification/refining (conceptually).
3. **Classify** typical extraction methods according to the driving chemistry (e.g., oxidation/reduction routes) and the type of reducing agent.
4. **Apply** fundamental thermodynamic ideas to evaluate whether an extraction reaction is likely to occur (qualitatively and with basic calculations when required).
5. **Interpret** simple equilibrium concepts and diagrams to predict tendencies of reactions under different conditions (temperature/composition).
6. **Identify and explain** the role of key process variables (temperature, reducing agent type, ore composition) on the effectiveness of reduction.
7. **Analyze** separation behavior between metal and gangue/impurities using the concept of slag formation and its effect on metal purity.
8. **Explain** the basic mechanisms and goals of refining/purification, and how impurities influence product quality.
9. **Recognize** major industrial extraction process units (e.g., furnaces/reactors) and describe their purpose within the overall flow sheet.
10. **Demonstrate** fundamental problem-solving skills by solving introductory tasks related to reaction stoichiometry and basic thermodynamic reasoning.

Teaching and Learning Strategies

1. Lectures (Conceptual foundation)

- Instructor-led lectures to introduce key extraction principles, thermodynamics basics, reduction/separation concepts, and industrial context.

2. Problem-Based Learning (Introductory numerical practice)

- Regular tutorial/problem sessions focusing on reaction stoichiometry and basic thermodynamic reasoning to build practical competence.

3. Guided Learning Worksheets / Worked Examples

- Step-by-step worked examples in class, followed by similar practice problems to help students learn the method.

4. Seminar-Style Discussions

- Short discussion sessions on case-based topics (e.g., how impurity removal affects final metal quality, or why temperature matters in reduction).

5. Use of Simple Diagrams and Visual Learning

- Teaching with simplified equilibrium/phase diagrams and process flow schematics to help students connect theory to process behavior.

6. Laboratory/Practical Demonstrations (if available)

- Demonstration-based practical sessions (or simulations) to observe separation concepts and reinforce safety and process control awareness.

7. Student Presentations (Mini-topics)

- Assign small group presentations on specific extraction routes or industrial process steps to improve communication and deeper understanding.

8. Learning Support via Office Hours / Review Sessions

- Structured support for students who need extra help with thermodynamics concepts or problem-solving steps.

9. Formative Assessment during Teaching

- Quizzes, short in-class questions, and checkpoints to measure progress and identify learning gaps early.

10. Feedback-Driven Improvement Provide timely feedback on tutorials, quizzes, and assignments so students can refine their problem-solving approaches.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1.2.3	Introduction to metal extraction, Principals of metal extraction	Lecture+ Theory+ Seminar	Continuous Assessment	2,5	1
1.2.3	Definition of metal ores and ore preparation.	Lecture+ Theory+ Seminar	Practical / Lab Assessment	2,5	2
1.2.3	Minerals and metallurgy , Metals in nature	Lecture+	Continuous	2,5	3

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
		Theory+ Seminar	Assessment		
1.2.3	Methods of metal extraction and mineral processing: Electrolysis, Heating of the ore.	Lecture+ Theory+ Seminar	Continuous Assessment	2,5	4
1.2.3	Pyro metallurgical extraction processes: Distillation, Halide metallurgy.	Lecture+ Theory+ Seminar	Continuous Assessment	2,5	5
1.2.3	Calcination, Roasting, Smelting, Oxide reduction.	Lecture+ Theory+ Seminar	Project / Report	2,5	6
1.2.3	Mid-term Exam	Lecture+ Theory+ Seminar	Continuous Assessment	2,5	7
1.2.3	Electro winning and electro refining.	Lecture+ Theory+ Seminar	Midterm / Test	2,5	8
1.2.3	Hydrometallurgical processes: Leaching and leaching technique.	Lecture+ Theory+ Seminar	Continuous Assessment	2,5	9
1.2.3	Electrometallurgical extraction processes.	Lecture+ Theory+ Seminar	Continuous Assessment	2,5	10
1.2.3	Extraction procedure for selected metals: Extraction of Iron.	Lecture+ Theory+ Seminar	Continuous Assessment	2,5	11
1.2.3	Extraction of Aluminum.	Lecture+ Theory+ Seminar	Midterm / Test	2,5	12
4,6,7	Extraction of copper .	Lecture+ Theory+ Seminar	Continuous Assessment	2,5	13
4,6,7	Extraction of Nickel.	Lecture+ Theory+ Seminar	Continuous Assessment	2,5	14
4,6,7	Extraction of gold.	Lecture+ Theory+ Seminar	Continuous Assessment	2,5	15
4,6,7	Final Exam	Lecture+ Theory+ Seminar	Final Examination	2,5	16

Course Evaluation

Assessment Method	Weight		Week / Notes
Quizzes	5% (5)	Continuous	
Report	5% (5)	13	
Midterm Exam	20% (20)	7, 14	
Final Exam	70% (70)	16	

Learning and Teaching Resources

Resource	Details
Required Texts	Principles of Extractive Metallurgy, 2nd Ed. (Terkel Rosenqvist).

Resource	Details
Recommended Texts	Extractive Metallurgy 3: Processing Operations and Routes Alain Vignes, Wiley, 2013.
Websites / Electronic Resources	.

8. MTE 122- Physic

Course Name	Physic
Course Code	MTE 122
Year / Semester	First Year / Semester 2
Language	Arabic
Total Study Hours / ECTS	150 Hours / 6 ECTS
Structured / Unstructured SWL	150 hours
Module Type	B
Attendance Forms	Lecture+ Tutorial+ Theory
Course Administrator	Dr. Marwa Ghazi Ms. Amna Hamza

Course Objectives

1. Understand core physics principles across mechanics, waves, electricity, magnetism, and basic optics (as covered in the syllabus).
2. Apply fundamental laws and equations (e.g., Newton's laws, kinematics, energy and momentum concepts) to describe physical motion and interactions.
3. Develop strong problem-solving skills by translating physical situations into mathematical models and selecting appropriate methods.
4. Use scientific units and dimensional analysis correctly to ensure consistency and to check the validity of results.
5. Interpret experimental measurements and understand the meaning of accuracy, precision, and uncertainty.
6. Analyze graphs and data (e.g., motion graphs, V-I characteristics, wave relationships) to extract physical meaning from results.
7. Understand basic wave phenomena such as frequency, wavelength, reflection/refraction concepts, and wave behavior in physical contexts.
8. Explain basic electric and magnetic concepts, including electric fields, potential difference, current, and magnetic effects (according to the course scope).
9. Gain introductory laboratory competence (if labs are included): operating safely, recording data properly, and reporting results.
10. Build scientific reasoning and conceptual understanding, connecting theory to everyday or engineering-related physical applications.

Course Learning Outcomes

- 1 -Understand the concept of equilibrium and determine the actions of forces and moments; identify and explain tensile and compressive loading and the associated linear stress-strain relationship.
- 2- Analyse forces and moments on beams and pin-jointed structures.
- 3 -Evaluate the kinematics of simple translation and rotational systems, kinetics of rigid bodies and apply the concepts of work, power and energy.
- 4- Define and calculate friction force, mass moment of inertia and the dynamics of simple systems.
- 5 -Investigate experimentally the mass moment of inertia and mechanical properties of materials

Teaching and Learning Strategies

1. Interactive Lectures
 - Instructor-led lectures with guided questioning to build conceptual understanding and connect theory to real examples.
2. Problem-Solving Sessions (Tutorials)
 - Structured practice on typical exam-style problems, with emphasis on method selection and step-by-step reasoning.
3. Worked Examples and Board/Screen Demonstrations
 - Frequent use of fully worked problems to show how to translate physical situations into equations and graphs.
4. Concept Check Questions (In-Class)
 - Short quizzes or conceptual questions during lectures to detect misconceptions early.
5. Laboratory Practical Sessions (if included)
 - Hands-on experiments focusing on measurement skills, safe lab practice, data recording, and uncertainty handling.
6. Data Analysis and Graph Interpretation
 - Training students to analyze experimental/assigned data, plot graphs, and extract physical quantities from trends.
7. Group Work and Peer Instruction
 - Small group discussions for solving selected problems or interpreting results, followed by instructor feedback.
8. Use of Visual Aids and Simulations
 - Simple simulations/animations (when available) to visualize motion, fields, waves, and relationships between variables.
9. Homework and Assignments with Feedback
 - Regular assignments graded with constructive feedback to improve both correctness and problem-solving approach.
10. Formative Assessment and Remediation
 - Short tests, homework checks, and review sessions for students who need additional support in foundational topics.

Course Structure

Weekly Syllabus

Week	Material Covered
1	General principles; Newton's laws; Vectors and Forces
2	Newton's laws; Vectors and Forces
3	Vectors and Free-Body Diagrams (FBD), Moment of a Force
4	Moment of a Force; Moment of a Couple, Resultant Forces
5	Equilibrium of a Rigid Body and 3D FBDs
6	Structural analysis; Internal forces, Shear and Bending Moments
7	Mid-term Exam
8	Introduction of mechanics II dynamic
9	Kinematics of particles: rectilinear motion of particles.
10	Kinematics of particles - two particles dependent & relative motion.
11	Kinematics of particles: curvilinear motion of particles.
12	Kinetics of a particle: Force and Acceleration, n-t & cylindrical
13	Kinetics of particles newton's second law
14	Mid-term Exam
15	Kinetics of particles ,Work, Energy, and Potential Energy
16	Final Examination

Course Evaluation

Assessment Plan

Assessment Method	Weight	Week / Notes
Quizzes	10% (10)	5, 10
Assignments / Activities	10% (10)	2, 12
Report / Presentation	10% (10)	Continuous
Midterm Exam	20% (20)	7,14
Final Exam	50% (50)	16

Learning and Teaching Resources

Resource	Details
Required Texts	Ferdinand p. Beer & E. Russel Johnston "mechanics for engineering static and dynamic"
Recommended Texts	R.C. Hibbeler Title: Engineering Mechanics: Statics and Dynamics
Websites / Electronic Resources	United Nations Human Rights resources and official Iraqi legal and educational sources.

9. MTE 123- Programming-I

Course Name	Programming-I
Course Code	MTE 123
Year / Semester	First Year / Semester 2
Language	English
Total Study Hours / ECTS	100 Hours / 4 ECTS
Structured / Unstructured SWL	100 hours
Module Type	S
Attendance Forms	Lecture + THEORY+LAB
Course Administrator	M. Amjad Hassoun

Course Objectives

1. Understand fundamental programming concepts, including variables, data types, operators, and control structures.
2. Write and debug basic programs using a structured programming approach.
3. Apply control flow statements such as conditional statements (if/else) and loops (for/while) to solve programming problems.
4. Use functions (procedures/methods) to organize code, reduce repetition, and improve readability.
5. Handle basic input/output operations and format program output correctly.
6. Understand arrays and simple data structures to store and access multiple values efficiently.
7. Learn basic algorithm design skills, such as problem decomposition and step-by-step solution planning (pseudocode/flow logic).
8. Develop competence in basic error handling and debugging techniques to identify and correct common mistakes.
9. Use programming best practices (naming conventions, comments, code structure, readability).
10. Solve introductory computational problems by implementing correct algorithms and producing working, tested solutions.

Course Learning Outcomes

- techniques for solving problems
 - basic computational concepts and elementary data structures
 - the edit-compile-link-run cycle from a user point of view
 - testing strategies
 - the main activities of software development and their interactions, and some of the major problems of software development
- Developing the student's ability to deal with modern technology and electronic classes

Teaching and Learning Strategies

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
3,6,7	Introduction to visual basic	Lecture + THEORY+LAB	Continuous Assessment	2	1
3,6,7	Programming statements.	Lecture + THEORY+LAB	Continuous Assessment	5	2
3,6,7	Inputs and outputs	Lecture + THEORY+LAB	Continuous Assessment	5	3
3,6,7	Functions and differential equations	Lecture + THEORY+LAB	Continuous Assessment	5	4
3,6,7	Drawing and Engineering applications	Lecture + THEORY+LAB	Continuous Assessment	5	5
3,6,7	Forms: Control tools, name selection of the control tools, explorer project,	Lecture + THEORY+LAB	Midterm / Test	5	6
3,6,7	Mid-term Exam	Lecture + THEORY+LAB	Continuous Assessment	5	7
3,6,7	properties, events, project, save project, applications.	Lecture + THEORY+LAB	Continuous Assessment	5	8
3,6,7	Subroutines.	Lecture + THEORY+LAB	Continuous Assessment	5	9
3,6,7	Files	Lecture + THEORY+LAB	Continuous Assessment	5	10
3,6,7	Save files	Lecture + THEORY+LAB	Continuous Assessment	5	11
3,6,7	Menus, building and writing the code. Dialogue box, message box	Lecture + THEORY+LAB	Continuous Assessment	5	12
3,6,7	file dialogue box, line dialogue box	Lecture + THEORY+LAB	Continuous Assessment	5	13
3,6,7	color dialogue box, printer dialogue box. Black Diagrams and Loops.	Lecture + THEORY+LAB	Continuous Assessment	5	14
3,6,7	Variables and Fixed. Engineering applications	Lecture + THEORY+LAB	Continuous Assessment	5	15
3,6,7	Preparatory week before the final Exam	Lecture + THEORY+LAB	Final Examination	5	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Quizzes	10% (10)	5, 10
Assignments	10% (10)	2, 12
Projects / Lab.	10% (10)	Continuous
Report	10% (10)	13
Midterm Exam	10% (10)	7
Final Exam	50% (50)	16

Learning and Teaching Resources

Resource	Details
Required Texts	Microsoft Books Programming Microsoft Visual Basic 6.0 Book
Recommended Texts	getyourpost.com/blog/best-visual-basic-books-to-learn
Websites / Electronic Resources	

10. MTE 124-Statistics and Probability

Course Name	Statistics and Probability
Course Code	MTE 124
Year / Semester	First Year / Semester 2
Language	English
Total Study Hours / ECTS	100 Hours / 4 ECTS
Structured / Unstructured SWL	100 hours
Module Type	S
Attendance Forms	Lecture + Theory + LAB
Course Administrator	Dr. Asaad Saasaa

Course Objectives

1. Understand key concepts in statistics and probability, including randomness, events, and probability models.
2. Solve basic probability problems using rules such as addition and multiplication, and interpreting outcomes correctly.
3. Use descriptive statistics (mean, median, mode, variance, standard deviation, range) to summarize data.
4. Construct and interpret probability distributions for common discrete and continuous cases (as covered in the syllabus).
5. Apply estimation and confidence ideas (where included) to interpret variability and uncertainty in data results.
6. Understand hypothesis testing basics (where included), including the meaning of p-value, significance level, and decision logic.
7. Learn sampling concepts and the impact of sample size on results and variability.
8. Interpret correlation and regression concepts to describe relationships between variables (intro level).
9. Use graphical representations (histograms, box plots, scatter plots, probability plots) to analyze data patterns.
10. Develop data analysis skills by translating real scenarios into statistical/probability reasoning and producing justified conclusions.

Course Learning Outcomes

1. The student will be introduced to the concept of statistics and its applications
2. How to make charts and represent them with statistical graphics
3. The student will be familiar with the most important measures of central tendency and dispersion of the data
4. The student will be familiar with the types of data distribution
5. The student learns about sampling methods and what they represent in society
6. The student will know how to calculate the results of hypotheses and probabilities for the occurrence of a particular event
7. Organizing data in tabular form and representing it in the form of curves and geometric shapes
8. Describe and determine the average of the data and the amount of its dispersion
9. Coming up with a scientific engineering conclusion and linking it to reality

Teaching and Learning Strategies

The main strategy that will be adopted in delivering this module is assigning the student to find a specific problem and work on it, assigning the student some duties and activities, forming small groups in the classroom to solve a specific problem, and ask the student to explain a topic or a specific solution method to the students.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,3,7	Introduction to the basic concepts of science statistics	Lecture + Theory + LAB	Continuous Assessment	5	1
1,3,7	Data graphs	Lecture + Theory + LAB	Continuous Assessment	5	2
1,3,7	Statistical Distribution	Lecture + Theory + LAB	Continuous Assessment	5	3
1,3,7	Know and find measures of tendency Central	Lecture + Theory + LAB	Continuous Assessment	5	4
1,3,7	Central Tendency Measures	Lecture + Theory + LAB	Continuous Assessment	5	5
1,3,7	Formulas for frequency distribution	Lecture + Theory + LAB	Continuous Assessment	5	6
1,3,7	Probability theory	Lecture + Theory + LAB	Midterm / Test	5	7
1,3,7	Types of probability	Lecture + Theory + LAB	Continuous Assessment	5	8
1,3,7	Permutation of data	Lecture + Theory + LAB	Continuous Assessment	5	9
1,3,7	Combination of data	Lecture + Theory + LAB	Continuous Assessment	5	10
1,3,7	Conditional Probability	Lecture + Theory + LAB	Continuous Assessment	5	11
1,3,7	Discrete probability Distribution- Binomial Distribution	Lecture + Theory + LAB	Continuous Assessment	5	12
1,3,7	Discrete probability Distribution- Poisson Distribution	Lecture + Theory + LAB	Midterm / Test	5	13
1,3,7	Continuous Probability Distribution- normal distribution	Lecture + Theory + LAB	Continuous Assessment	5	14
1,3,7	Continuous Probability Distribution- Chi square distribution	Lecture + Theory + LAB	Continuous Assessment	5	15
1,3,7	Introduction to the basic concepts of science statistics	Lecture + Theory + LAB	Final Examination	5	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Introduction to SPSS
2	Reading data
3	Using the data editor
4	Examining Summary Statistics for Individual Variables
5	Creating and editing charts
6	Charts for Categorical Data
7	Histograms for Scale Variables
8	Working with Output
9	Displaying Variable and Value Labels
10	Sorting and Selecting Data
11	Application examples
12	Application examples

Course Evaluation

Assessment Method	Weight	Week / Notes
Quizzes	10% (10)	4, 7, 10, 13
Lab	10% (10)	Continuous
Assessment	20% (20)	Continuous
Mid exam	10% (10)	10
Final Exam	50% (50)	16

Learning and Teaching Resources

Resource	Details
Required Texts	
Recommended Texts	
Websites / Electronic Resources	

11. MTE 125- Mathematic - II

Course Name	Mathematic – II
Course Code	MTE 125
Year / Semester	First Year / Semester 2
Language	English
Total Study Hours / ECTS	150 Hours / 6 ECTS
Structured / Unstructured SWL	150 hours
Module Type	B
Attendance Forms	THEORY + Tutorial
Course Administrator	M. Ghufraan Abdul Qader

Course Objectives

1. Understand core mathematical concepts covered in Mathematics II (as specified in the course syllabus), and their mathematical meaning.
2. Solve algebraic and analytical problems using appropriate mathematical techniques and procedures.
3. Apply calculus/advanced mathematical methods (e.g., differentiation/integration fundamentals if included) to model and analyze changes in functions.
4. Develop skills in working with functions and graphs, including understanding behavior, transformations, and key properties (domain, range, continuity if applicable).
5. Use mathematical reasoning and proof techniques at an introductory level to justify results and follow logical steps.
6. Perform problem-solving with accuracy, including correct use of notation, units (where relevant), and standard solution formats.
7. Interpret mathematical results in terms of real-world or engineering/scientific contexts when applicable.
8. Use approximation and numerical ideas (if included) to estimate solutions and assess accuracy.
9. Handle basic differential equations or linear algebra topics (only if included in your syllabus) to solve standard problem types.
10. Apply mathematical tools to engineering/science problems by selecting the correct method and presenting solutions clearly.

Course Learning Outcomes

1. explain the main definitions and theorems related to the Mathematics II syllabus.
2. Solve standard problem types using correct mathematical methods and step-by-step reasoning.
3. Apply calculus/advanced techniques (according to the syllabus) to analyze functions and compute required quantities.
4. Use function analysis skills to interpret graphs and determine important properties such as behavior and continuity (where applicable).
5. Perform algebraic manipulations and transformations accurately while maintaining correct notation.
6. Use appropriate mathematical tools (e.g., series/integration methods, matrices/vectors, or other topics in your syllabus) to reach correct solutions.
7. Verify and check results for correctness through alternative methods, limiting cases, or basic sanity checks.
8. Communicate solutions clearly using correct formatting, notation, and logical structure.
9. Interpret mathematical results and describe their meaning in a mathematical/engineering or real-world context (when required).
10. Demonstrate confidence in problem-solving by tackling unseen problems following learned strategies.

Teaching and Learning Strategies

- Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while Partial Derivatives.

Double and triple integrals and its applicationsle at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2	Function of several variables	THEORY + Tutorial	Continuous Assessment	4	1
1,2	Limits and Continuity for functions of two variables.	THEORY + Tutorial	Continuous Assessment	4	2
1,2	Ordinary Differential Equation	THEORY + Tutorial	Continuous Assessment	4	3
1,2	First order differential equations :separable variables ,homogeneous equations.	THEORY + Tutorial	Continuous Assessment	4	4
1,2	Exact equaions, linear and Bernullis equations	THEORY + Tutorial	Continuous Assessment	4	5
1,2	second and higher order solutions	THEORY + Tutorial	Continuous Assessment	4	6-7
1,2	Double integrals	THEORY + Tutorial	Continuous Assessment	4	8-9
1,2	Double integral in polar coordinates	THEORY + Tutorial	Midterm / Test	4	10
1,2	Double integrals and its applications	THEORY + Tutorial	Continuous Assessment	4	11-12
1,2	triple integrals	THEORY + Tutorial	Continuous Assessment	4	13-14
1,2	triple integrals and its applications	THEORY + Tutorial	Continuous Assessment	4	15
1,2	Divergence theorem of gauss vectors	THEORY + Tutorial	Final Examination	4	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Textbook: George B. Thomas “Thomas’ Calculus”, 11th Ed., Pearson international edition, (2008).
Recommended Texts	Reference: K. A. Stroud “Engineering Mathematics”, 1stEd., Macmillan and Co LTD, (1970)
Websites / Electronic Resources	

12. QU01 - English Language

Course Name	English Language
Course Code	QU01
Year / Semester	First Year / Semester 1
Language	English
Total Study Hours / ECTS	50 Hours / 2 ECTS
Structured / Unstructured SWL	32 / 18 hours
Module Type	Basic learning activity
Attendance Forms	Lecture
Course Administrator	M.M. Shamam Kadhim

Course Objectives

Establish grammatical foundations: Teach basic grammar structures such as the present simple, subject pronouns, articles, and question form . Improve listening and speaking: Provide practice in listening to simple conversations and responding appropriately in spoken English.. Enhance reading and writing: Develop the ability to read short texts and write simple sentences and forms. Foster learner confidence: Encourage students to participate actively and build confidence in using English in real-life situations.. Introduce cultural awareness: Expose learners to English-speaking cultures to support language use in context. Knowledge objectives:

Course Learning Outcomes

Recognize basic vocabulary: Learners will identify and understand common words related to personal identity, family, food, travel, and daily routines.

Understand simple sentence structures: Students will grasp basic grammar such as subject-verb agreement, present simple tense, and question formation.

Identify key functional language: Learners will become familiar with phrases used for greetings, introductions, asking for directions, and making requests.

Distinguish between different types of texts: Students will learn to read and comprehend short dialogues, signs, forms, and simple narratives.

Recognize pronunciation patterns: Learners will be introduced to basic sounds, stress, and intonation to aid listening and speaking.

Understand cultural references: The course introduces learners to English- speaking customs and contexts to support appropriate language use. The above objectives are designed to build a solid foundation for learners to progress confidently in their English studies, especially in real-life situations like shopping, traveling, and social interactions. 2 Skills objective:

Speaking Skills • Use basic conversational phrases: Learners practice greetings, introductions, and everyday exchanges like ordering food or asking for help. • Pronounce common words clearly: Focus on correct articulation, stress, and intonation to improve intelligibility. • Engage in short dialogues: Build confidence in participating in simple conversations using learned structures.

Listening Skills • Understand familiar spoken expressions: Learners develop the ability to follow slow, clear speech in everyday contexts. • Identify key information: Practice listening for names, numbers, times, and places in short audio clips or dialogues. • Respond appropriately: Improve reaction to questions and instructions in basic social and functional situations.

Reading Skills • Read short texts and signs: Learners interpret simple written materials like menus, schedules, and forms. • Recognize sentence patterns: Understand basic grammar and vocabulary in context. • Extract specific details: Practice scanning for key facts in short passages.

Writing Skills • Write simple sentences: Learners construct basic statements and questions using correct word order. • Fill out forms and notes: Practice writing personal information, messages, and short descriptions. • Use punctuation and spelling correctly: Focus on foundational writing mechanics for clarity and accuracy. • These skill objectives are designed to help beginners use English effectively in real-life situations, laying the groundwork for further language development.

Teaching and Learning Strategies

1- Cognitive • Repetition and reinforcement: Key vocabulary and grammar are recycled across units to strengthen memory and understanding. • Chunking language: Learners are taught useful phrases and expressions as whole units rather than isolated words. • Use of visual aids: Pictures, diagrams, and icons support comprehension and retention of new language. 2- Communicative • Role-play and dialogues: Students practice real-life scenarios like shopping, greeting, and asking for directions. • Pair and group work: Collaborative tasks encourage interaction and peer learning. • Pronunciation practice: Focused activities help learners improve clarity and confidence in speaking. 3- Metacognitive 4 • Goal setting: Learners are encouraged to set personal learning goals and reflect on progress. • Self-monitoring: Activities include checklists and review sections to help learners track their understanding. • Use of learner : Tips on how to study vocabulary, listen effectively, and practice outside the classroom are integrated into lessons. 4- Task-Based Learning • Real-world tasks: Lessons are built around practical tasks like filling out forms, reading signs, or writing short messages. • Integrated skills practice: Each unit blends listening, speaking, reading, and writing to reinforce language use in context. 5- Cultural and Contextual Learning • Exposure to English-speaking cultures: Learners gain insights into customs and everyday life in English-speaking countries. • Contextualized language use: Language is taught through relatable situations to make learning meaningful and memorable. These make Headway Plus Beginner a comprehensive and supportive course for learners starting their English journey.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
4,6	you to get to know them of course! • The introduction of some basic vocabulary (including some international words), numbers 1-10, and -s/ es plural endings. The title of Unit 2 is 'Your world' and it focuses on count...	Lecture	Continuous Assessment	2	1
4,6	people are from. • The syllabus of Wh-question words is reviewed and extended, students continue with numbers 11-30, and there is an introduction of the adjectives fantastic, awful, and beautiful. • The title of Unit ...	Lecture	Practical / Lab Assessment	2	2
4,6	grammar of the verb to be is recycled and extended to include the we form, negatives, Wh- questions and short answers. • The title of this unit is 'family and friends' and it aims to extend the range of personal infor...	Lecture	Continuous Assessment	2	3
4,6	students can give. • The unit introduces the possessive's with family vocabulary, has/have, and some irregular plurals such as children. + 1st quiz • This unit introduces the Present Simple with I, you, we, and they i...	Lecture	Continuous Assessment	2	4
4,6	this point the Present Simple is used with a fairly limited range of verbs so that students can get used to the new tense. • Students get skills practice with reading and speaking, and listening and speaking tasks.	Lecture	Continuous Assessment	2	5
4,6	Seminars and projects discussions • The title of this unit is 'Every day' and it covers the language of daily routines. It presents the third person singular form of the Present Simple and so follows on from the langu...	Lecture	Project / Report	2	6
4,6	Basic frequency adverbs, telling the time, and days of the week are also introduced. • The title of this unit is 'My favorites' and it gives practice in describing lifestyles, preferences, and places. The grammar inpu...	Lecture	Continuous Assessment	2	7
4,6,7	MIDTERM REVIEW (Units 1-7) • The title of this unit is 'Where I live' and the theme is homes and cities. There is/are and any are	Lecture	Midterm / Test	2	8
4,6,7	introduced in the context of talking and asking about rooms and furniture. Prepositions of place are reviewed and extended. • The title of this unit is 'Times past' and it focuses on the birth dates and lives of famou...	Lecture	Continuous Assessment	2	9
4,6,7	past to be. The positive forms of Past Simple irregular verbs are also presented in a story context. + 2nd quiz. • The title of this unit is 'We had a great time!' and the overall theme is leisure and holidays. The	Lecture	Continuous Assessment	2	10
4,6,7	unit follows on from unit 9 with the introduction of all forms of the Past Simple with both regular and irregular verbs. Skills practice is provided with speaking, listening, and writing tasks.	Lecture	Continuous Assessment	2	11
4,6,7	Mid-term Exam • The title of this unit is 'I can do that!' and introduces can for ability. The positive, negative, and	Lecture	Midterm / Test	2	12

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	question forms are introduced and practiced, along with common verb + adverb combinations, e.g.				
4,6,7	draw well, run fast, speak (French) fluently, etc. the uses of can are also extended to cover requests and offers. • There is a Reading and Listening section with a text on the Internet, and focus on verb and noun col...	Lecture	Continuous Assessment	2	13
4,6,7	Like is also reviewed and contrasted with would like. • The lexical set of shops and amenities is reviewed and extended, and there is a Vocabulary and Speaking section on food and drink, and ordering in a restaurant. ...	Lecture	Continuous Assessment	2	14
4,6,7	lexical set of clothes and colors is reviewed and extended, and this is vehicle for further practice of the Present Continuous. • Students also get personalized practice of the tense by describing photos.	Lecture	Continuous Assessment	2	15
4,6,7	Final Exam	Lecture	Final Examination	2	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Student's Book. Oxford University Press. Ibbotson, M., 2008. Cambridge English for engineering.
Recommended Texts	Cambridge; New York: Cambridge University Press. https://www.englishteachermelanie.com/study-tip-beginner-english-online-resources
Websites / Electronic Resources	University e-learning platform, recognized academic databases, and professional educational resources.

13. QU06 - Arabic Language

Course Name	Arabic Language
Course Code	QU06
Year / Semester	First Year / Semester 2
Language	Arabic
Total Study Hours / ECTS	50 Hours / 2 ECTS
Structured / Unstructured SWL	50 hours
Module Type	S
Attendance Forms	THEORY
Course Administrator	M.M. Rasha Ali

Course Objectives

Develop the Arabic-language skills needed for professional engineering practice, with emphasis on accurate technical and administrative writing, official correspondence and laboratory reports, summarization and analysis of scientific texts, logical organization of ideas, and appropriate use or Arabization of chemical and engineering terminology.

Course Learning Outcomes

- Apply essential Arabic grammar in technical writing.
- Identify and correct common spelling and stylistic errors in scientific and administrative texts.
- Construct accurate declarative and functional sentences for engineering reports.
- Write technical or laboratory reports with clear logical sequencing.
- Prepare formal correspondence and administrative documents.
- Summarize chemical-engineering articles in concise formal Arabic.
- Demonstrate integrity in quotation, translation, and terminology use.
- Recognize the role of Arabic in professional communication and national engineering practice.

Teaching and Learning Strategies

The course combines direct instruction with practical language exercises, technical-writing tasks, classroom activities, homework, discussion, editing practice, and analysis of examples drawn from engineering and administrative communication.

Course Structure

Weekly Syllabus

Week	Material Covered
1	Introduction to levels of Arabic language and the importance of accurate technical communication for engineers.
2	Parts of speech and basic grammatical markers with engineering examples.
3	Nominal sentence: subject and predicate; basic particles affecting nominal sentences.
4	Verbal sentence: subject, passive subject, and object.
5	Rules of numbers and counted nouns.
6	Spelling I: hamza at the beginning, middle, and end of words.
7	Spelling II: taa forms, daad/zaa, and alif maqsura.
8	Midterm examination.
9	Accusative constructions: objects, circumstantial expressions, and specification.
10	Followers: adjective, conjunction, substitution, and emphasis.
11	Punctuation and linguistic linking devices.

12	Arabic editing I: official administrative correspondence.
13	Arabic editing II: technical report writing.
14	Official letters and common linguistic/stylistic errors.
15	Arabization and engineering terminology; general review.
16	Preparatory week before the final examination.

Course Evaluation

Assessment Plan

Assessment Method	Weight	Week / Notes
Quizzes	10%	During semester
Assignments / Classroom Activities	20%	During semester
Report / Writing Task	10%	During semester
Midterm Exam	10%	Week 8
Final Exam	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Department-approved Arabic language lectures covering grammar, spelling, technical writing, and professional communication.
Recommended Texts	Recognized Arabic grammar, writing, and technical-communication references suitable for university students.
Websites / Electronic Resources	University e-learning resources and recognized Arabic-language educational platforms.

14. MTE 211- Strength of Materials

Course Name	Strength of Materials
Course Code	MTE 211
Year / Semester	Second Year / Semester 3
Language	English
Total Study Hours / ECTS	180 Hours / 6 ECTS
Structured / Unstructured SWL	63/ 87 hours
Module Type	B learning activity
Attendance Forms	Lecture + Tutorial
Course Administrator	Dr. Marwa Ghazi

Course Objectives

To equip students with a fundamental understanding of the relationships between external loads applied to deformable structural elements and the internal stresses, strains, and deformations produced, enabling them to analyze and evaluate structural components under axial, torsional, bending, and combined loading conditions using analytical and graphical techniques (Mohr's Circle) and predict material yield or failure using elastic failure theories.

Course Learning Outcomes

- 1- Analyze relationships between stress, strain and displacement in deformable bodies.
- 2-Find the stress state of bodies subjected to axial, torsional, transverse, and/or bending loads
- 3-Transform plane stresses into a different coordinate system.
- 4-Calculate the stability limits of members subjected to axial compressive loads.

Teaching and Learning Strategies

Class discussions with examples. Active tutorial sessions for engaged learning and continuous feedback on progress. Experiments designing 3D printed structural members and testing them in the laboratory. Team assignments. Team projects that involve real data, summary, interpretation and reporting.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3	Course introduction, review of statics and mechanical material properties	Lecture + Tutorial	Continuous Assessment	4	1
1,2,3	Average normal stress and strain	Lecture + Tutorial	Continuous Assessment	4	2
1,2,3	Mechanical properties of materials	Lecture + Tutorial	Continuous Assessment	4	3
1,2,3	Axial load, the force method of analysis for axially loaded members	Lecture + Tutorial	Continuous Assessment	4	4
1,2,3	Torsion, power transmission.	Lecture + Tutorial	Continuous Assessment	4	5
1,2,3	Bending	Lecture + Tutorial	Continuous Assessment	4	6
1,2,3	Mid-term Exam	Lecture + Tutorial	Continuous Assessment	4	7

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Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3	Bending, stress caused by combined loadings	Lecture + Tutorial	Continuous Assessment	4	8
1,2,3	Stress transformation, plane-stress formation, principal stresses and maximum in-plane shear stress	Lecture + Tutorial	Continuous Assessment	4	9
1,2,3	Strain energy (tension or compression)	Lecture + Tutorial	Midterm / Test	2	10
1,2,3	Complex stresses (pure shear or combined direct and shear stresses)	Lecture + Tutorial	Continuous Assessment	4	11
1,2,3	Graphical solution Mohr's stresses circle	Lecture + Tutorial	Continuous Assessment	4	12
1,2,3	Theories of elastic failure.	Lecture + Tutorial	Continuous Assessment	4	13
1,2,3	Mid-term Exam	Lecture + Tutorial	Continuous Assessment	4	14
1,2,3	Review	Lecture + Tutorial	Continuous Assessment	4	15
1,2,3	Final Examination	Lecture + Tutorial	Final Examination	2	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Mechanics Of Materials, R. C. Hibbeler, Prentice Hall, ISBN 13: 978-0-13-602230-5
Recommended Texts	Mechanics of Materials, Hearn E.j., 1977, Vol.1&2., Pergamon Press, London
Websites / Electronic Resources	https://www.coursera.org

15. MTE 212- Physical Metallurgy

Course Name	Physical Metallurgy
Course Code	MTE 212
Year / Semester	Second Year / Semester 3
Language	English
Total Study Hours / ECTS	150 Hours / 6 ECTS
Structured / Unstructured SWL	72 / 78 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Laboratory
Course Administrator	Dr. Ammar Jabbar

Course Objectives

The Physical Metallurgy (MTE 212) course aims to provide students with a comprehensive understanding of the fundamental relationships between the atomic structure, microstructure, and macro-properties of metallic materials. The course is designed to equip students with the ability to analyze phase diagrams, phase transformations, and crystallographic defects, while developing their skills in assessing heat treatment processes and mechanical behavior under various operational conditions. Furthermore, it prepares students to utilize modern characterization techniques and testing methods to optimize alloy composition and processing parameters, ensuring full alignment with academic accreditation standards (such as ABET outcomes) by emphasizing failure analysis, material selection, structural integrity, and enabling students to solve complex engineering problems in manufacturing and materials design applications.

Course Learning Outcomes

1. Understand and recognize between cooling curves of pure metals & alloys.
2. Understand mechanisms of nucleation and growth from melts.
3. Understand alloy theory.
4. Understand & construct phase diagrams.
5. Understand crystallinity & ordering of alloys.
6. Understand partially non-crystalline alloys.
7. Understand mechanisms of diffusion in solids.
8. Understand crystal defects.
9. Understand types of dislocations & mechanisms of movement and multiplication.
10. Understand mechanisms of metals strengthening and hardening.

Teaching and Learning Strategies

Different teaching methods are normally applied within this module in order to support student learning. These include in-class theoretical teaching, refining and expanding their critical thinking skills. In-lap experimental learning activities are also provided. With the progress of students in stages of learning, quizzes and lap reports are performed based on schedule

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,3,7	Solidification of metals and alloys: Cooling curves, Nucleation, Growth.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	1
1,3,7	Solidification of metals and alloys: Cooling curves, Nucleation, Growth.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	2
1,3,7	Principles of alloy theory: Primary substitutional solid solutions, Interstitial solid solutions, Types of intermediate phases, Order-disorder phenomena.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	3
1,3,7	Principles of alloy theory: Primary substitutional solid solutions, Interstitial solid solutions, Types of intermediate phases, Order-disorder phenomena.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	4
1,3,7	Calculation of phase diagrams. Binary phase diagrams: Solid solution diagrams, Limit solubility phase diagram.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	5
1,3,7	Calculation of phase diagrams. Binary phase diagrams: Solid solution diagrams, Limit solubility phase diagram.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	6
1,3,7	Calculation of phase diagrams. Binary phase diagrams: Solid solution diagrams, Limit solubility phase diagram.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	7
1,3,7	Deviations from Classic Crystallinity: Nanocrystalline Metals, Amorphous Metals, Quasicrystalline Metals, Radiation Damage in Metals.	Lecture + Tutorial + Laboratory	Midterm / Test	2	8
1,3,7	Diffusion: Diffusion laws, Mechanisms of diffusion, Factors affecting diffusion.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	9
1,3,7	Crystal defects: Point defects, Line defects, Planar defects, Volume defects.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	10
1,3,7	Crystal defects: Point defects, Line defects, Planar defects, Volume defects.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	11
1,3,7	Crystal defects: Point defects, Line defects, Planar defects, Volume defects.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	12
1,3,7	Crystal defects: Point defects, Line defects, Planar defects, Volume defects.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	13
1,3,7	Crystal defects: Point defects, Line defects, Planar defects, Volume defects.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	14
1,3,7	Preparatory week before the final Exam		Continuous Assessment	5	15
1,3,7	Final Exam		Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: Cooling Curve.
2	Lab 2: Specimen Preparation for Macroscopic Examination.
3	Lab 3: Specimen Preparation for Metallographic Examination.
4	Lab 4: Microstructure of a Pure Metal.
5	Lab 5: Microstructure of an Alloy.
6	Lab 6: Determination of Grains Size.
7	Lab 7: Examination of Grain Growth.

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	1-Physical Metallurgy and Advanced Materials, by R. E. Smallman, and A. H.W. Ngan.
Recommended Texts	1-Structure-Property Relations in Nonferrous Metals, by Alan M. Russell and Kok Loong Lee. 2-Fundamentals of Materials Science and Engineering: An Integrated Approach, by William D. Callister.
Websites / Electronic Resources	https://archive.nptel.ac.in/courses/112/104/112104220/

16. MTE 213 - Chemical Metallurgy

Course Name	Chemical Metallurgy
Course Code	MTE 213
Year / Semester	Second Year / Semester 3
Language	English
Total Study Hours / ECTS	150 Hours / 6 ECTS
Structured / Unstructured SWL	72 / 78 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Laboratory
Course Administrator	Dr.Qahtan A. Yousif

Course Objectives

The Extraction of Metals / Metallurgical Thermodynamics (MTE 212) course aims to provide students with a comprehensive understanding of the fundamental chemical and thermodynamic principles governing metal extraction and processing operations. The course is designed to equip students with the skills required to analyze thermochemical reaction balances, apply the First and Second Laws of Thermodynamics to high-temperature systems, evaluate chemical equilibrium states, and calculate standard free energy changes. Furthermore, it prepares students to model reaction kinetics, determine reaction orders and rate constants, and apply electrochemical and aqueous solution principles—including electrolysis and galvanic cell thermodynamics—to practical extractive processes, ensuring full alignment with academic accreditation standards (such as ABET outcomes) by enabling students to solve complex chemical metallurgy problems and optimize material production operations.

Course Learning Outcomes

1. Know the nature of chemical metallurgy.
2. Evaluation of the reactions from one side and comparison between them in thermodynamics, kinetics, and electrochemistry
3. Evaluation of chemical reactions by the different standard methods.

Teaching and Learning Strategies

This module aims to improve student's critical thinking abilities through active exercise participation. To do this, we will hold seminars, provide interactive tutorials, and think about other short experiments involving various sample tasks that students find intriguing.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2	Introduction to chemical metallurgy	Lecture + Tutorial + Laboratory	Continuous Assessment	5	1
1,2	Thermochemistry and Exothermic and endothermic reactions	Lecture + Tutorial + Laboratory	Continuous Assessment	5	2
1,2	. Enthalpy: Standard enthalpy change for a reaction and Calculating enthalpies and enthalpy	Lecture + Tutorial + Laboratory	Continuous Assessment	5	3
1,2	Chemical equilibrium: Law of mass action and factors affecting the position of equilibrium	Lecture + Tutorial + Laboratory	Continuous Assessment	5	4
1,2	What is the effect of temperature on equilibrium?	Lecture + Tutorial + Laboratory	Continuous Assessment	5	5
1,2	Basic Principles of metallurgical thermodynamic science: Energy; the driving force for chemical changes/ The first law of thermodynamics: Work and Heat..	Lecture + Tutorial + Laboratory	Continuous Assessment	5	6
1,2	Entropy is the second factor governing energy changes and free energy, free energy at high temperatures.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	7
1,2	Introduction of the reaction kinetics	Lecture + Tutorial + Laboratory	Continuous Assessment	5	8

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2	Effect of condition on the rate of reaction and Surface area and catalysts	Lecture + Tutorial + Laboratory	Examination	2	9
1,2	Experimental rate laws/Zero order, First order/Order of reaction.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	10
1,2	Rate of constant and Molecularity.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	11
1,2	Introduction of electrochemistry and aqueous metal solutions	Lecture + Tutorial + Laboratory	Continuous Assessment	5	12
1,2	What are electrolysis and its applications?	Lecture + Tutorial + Laboratory	Continuous Assessment	5	13
1,2	Ions in solution and study the electrolytic condition in solution	Lecture + Tutorial + Laboratory	Continuous Assessment	5	14
1,2	What is the galvanic cell, how can it work, and how do we calculate the thermodynamic values of electrochemical cells?	Lecture + Tutorial + Laboratory	Continuous Assessment	5	15
1,2	Preparatory week before the final Exam	Lecture + Tutorial + Laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: How do prepare liquid materials in the laboratory and prepare chemicals, and what the most important laws are for that
2	Lab 2: Study the heat of reaction for some known reactions.
3	Lab 3: First-order reaction kinetics study
4	Lab 4: study the effect of temperature on the rate of a chemical reaction.
5	Lab 5: Calculating Avogadro's number and Faraday's constant
6	Lab 6: Calculate the standard voltage value of the galvanic cells.
7	Lab 7: Determination the dissociation constant of weak electrolyte

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Chemical Metallurgy by John J Moore, Butterworth-Heinemann; 2nd edition, 1990
Recommended Texts	Chemical Metallurgy: Principles and Practice, by Chiranjib Kumar Gupta
Websites / Electronic Resources	https://www.youtube.com/watch?v=T6KvlgHJfc&t=99s

17. MTE 214 - Computer Aid Drawing

Course Name	Computer Aid Drawing
Course Code	MTE 214
Year / Semester	Second Year / Semester 3
Language	English
Total Study Hours / ECTS	75 Hours / 3 ECTS
Structured / Unstructured SWL	58 / 17 hours
Module Type	S. learning activity
Attendance Forms	Lecture + Laboratory
Course Administrator	Dr. Ahmed Ali Shakir

Course Objectives

The purpose of CAD is to optimize and streamline the designer's workflow, increase productivity, improve the quality and level of detail in the design, improve documentation communications and often contribute toward a manufacturing design database.

Course Learning Outcomes

1. Use CAD software to create model of parts.
2. Use CAD tools for manipulating and modifying drawing elements.
3. Create assemblies and drafts using CAD.
4. Read and interpret diagrams, their symbols, dimensions, tolerances and projections.
5. Identify title block information, explain documentation systems.
6. Identify the different kinds of diagrams and classify them.

Teaching and Learning Strategies

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
2,4,7	Introduction to SolidWorks	Lecture + laboratory	Continuous Assessment	4	1
2,4,7	Basics of tools	Lecture + laboratory	Continuous Assessment	4	2
2,4,7	How to create 2D sketches	Lecture + laboratory	Continuous Assessment	4	3
2,4,7	Adding dimensions and relations	Lecture + laboratory	Continuous Assessment	4	4
2,4,7	Converting 2D sketches to 3D geometries	Lecture + laboratory	Continuous Assessment	4	5
2,4,7	Making a verity of geometries	Lecture + laboratory	Continuous Assessment	4	6
2,4,7	Selecting materials for geometries	Lecture + laboratory	Midterm / Test	2	7
2,4,7	Changing properties of some materials	Lecture + laboratory	Continuous Assessment	4	8
2,4,7	Changing appearance and render	Lecture + laboratory	Continuous Assessment	4	9
2,4,7	Doing some assembly for a verity of applications	Lecture + laboratory	Continuous Assessment	4	10
2,4,7	Using mate in assembly	Lecture + laboratory	Continuous Assessment	4	11
2,4,7	Creating drawing sheet	Lecture + laboratory	Continuous Assessment	4	12
2,4,7	Adding all views and ISO to drawing sheet	Lecture + laboratory	Continuous Assessment	4	13
2,4,7	Adding all materials and their properties to sheet table	Lecture + laboratory	Continuous Assessment	4	14
2,4,7	Adding simples and notes to sheet	Lecture + laboratory	Continuous Assessment	4	15
2,4,7	Preparatory week before	Lecture + laboratory	Final Examination	2	16

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	the final Exam				

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: Introduction to SolidWorks
2	Lab 2: Basics of tools
3	Lab 3: How to create 2D sketches
4	Lab 4: Adding dimensions and relations
5	Lab 5: Converting 2D sketches to 3D geometries
6	Lab 6: Selecting materials for geometries
7	Lab 7: Changing appearance and render

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Onwubolu, G., 2013. A Comprehensive Introduction to SolidWorks 2012. SDC publications.
Recommended Texts	Matsson, J.E., 2013. An Introduction to SolidWorks Flow Simulation 2013. SDC publications.
Websites / Electronic Resources	https://www.solidworks.com/

18. ENG 211- Mathematics-III

Course Name	Mathematics-III
Course Code	ENG 211
Year / Semester	Second Year / Semester 3
Language	English
Total Study Hours / ECTS	75 Hours / 3 ECTS
Structured / Unstructured SWL	58 / 17 hours
Module Type	Basic learning activity
Attendance Forms	Lecture + tutorial
Course Administrator	Ahmed Hakem

Course Objectives

This Module gives the student the ability to solve the partial differential equations of second order (D operator method) applications about partial differential equations (heat ,wave ,Laplace equations), sequences and series , Lagrange multipliers , algebraic equations interval halving method ,false position method Newton method .Also, numerical integration By completing this module, students should be able to solve the calculus problems.

Course Learning Outcomes

The student to knowledge Enable and understand the theoretical concepts of preliminaries.

Teaching and Learning Strategies

- Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, with Partial differential equations.
- Sequences and series and its applications.
- introduction to numerical analysis.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2	Types of partial differential equations	Lecture + tutorial	Continuous Assessment	3	1
1,2	Solutions of partial differential equations	Lecture + tutorial	Project / Report	3	2
1,2	D operator method	Lecture + tutorial	Project / Report	3	3
1,2	Examples about homogeneous partial differential equations.	Lecture + tutorial	Continuous Assessment	3	4
1,2	Applications : heat equations	Lecture + tutorial	Continuous Assessment	3	5
1,2	Wave equations	Lecture + tutorial	Continuous Assessment	3	6
1,2	Laplace equations	Lecture + tutorial	Mid exam	2	7
1,2	Solutions of exercises	Lecture + tutorial	Continuous Assessment	3	8
1,2	Applications about Nonhomogeneous wave , heat ,laplace equations	Lecture + tutorial	Continuous Assessment	3	9
1,2	Sequence and infinite series.	Lecture + tutorial	Continuous Assessment	3	10
1,2	Test series and Power	Lecture + tutorial	Continuous Assessment	3	11
1,2	Taylor and Maclorrian series series	Lecture + tutorial	Continuous Assessment	3	12
1,2	Algebraic equations interval- halving method;	Lecture + tutorial	Continuous Assessment	3	13
1,2	Newton's method.	Lecture + tutorial	Continuous Assessment	3	14
1,2	Numerical integration: Trapezoidal rule and Simpson's rule.	Lecture + tutorial	Continuous Assessment	3	15
1,2	Preparatory week before the final Exam	Lecture + tutorial	Final Examination	2	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Textbook: George B. Thomas “Thomas’ Calculus”, 11th Ed., Pearson international edition, (2008).
Recommended Texts	Reference: K. A. Stroud “Engineering Mathematics”, 1stEd., Macmillan and Co LTD, (1970)
Websites / Electronic Resources	

19. MTE 216 - Magnetic and electronic material

Course Name	Magnetic and electronic material
Course Code	MTE 216
Year / Semester	Second Year / Semester 3
Language	English
Total Study Hours / ECTS	100 Hours / 4 ECTS
Structured / Unstructured SWL	30 / 72 hours
Module Type	Basic learning activity
Attendance Forms	Lecture
Course Administrator	Dr. Haydar Swiry

Course Objectives

1. Provide students with a foundational and practical understanding of the physical, electrical, optical, and magnetic properties of solid-state materials.
2. The course aims to equip students with the theoretical knowledge and application insights required to analyze crystal structures, semiconductor behavior, and dielectric/magnetic phenomena, while exploring modern semiconductor fabrication techniques and the practical industrial applications of electronic and magnetic materials.

Course Learning Outcomes

1. **Analyze Crystal & Electronic Transport:** Understand crystal structures, atomic bonding, and the mechanisms driving electrical and thermal conductivity.
2. **Evaluate Semiconductor & Optical Physics:** Master the physics of intrinsic/extrinsic semiconductors, p-n junctions, dielectric response, and optoelectronic properties.
3. **Understand Microfabrication:** Learn the core processing steps involved in semiconductor device manufacturing.
4. **Examine Magnetic Phenomena:** Classify and quantify different forms of magnetism, including diamagnetism, paramagnetism, ferromagnetism, magnetic anisotropy, and domain behavior.
5. **Connect Theory to Device Applications:** Identify real-world engineering applications for specialized electronic and magnetic materials.

Teaching and Learning Strategies

Theoretical lecture will be given in class, using different technique. This will be supported by interactive tutorials and by laboratory experiments. Scientific visit will be considered to industrial plants.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,3	*General Information on Magnetism and electronic materials	Lecture	Continuous Assessment	2	1
1,2	Crystal structures and bonding	Lecture	Continuous Assessment	2	2
1,3	Electrical and thermal conductivity	Lecture	Continuous Assessment	2	3
1,3	Intrinsic and extrinsic semiconductors, p-n junction	Lecture	Continuous Assessment	2	4
1,3	Dielectric and piezoelectric properties	Lecture	Continuous Assessment	2	5
1,3	Optical properties	Lecture	Continuous Assessment	2	6
1,3	Semiconductor fabrication	Lecture	Continuous Assessment	2	7
1,3	Mid Term Exam	Lecture	Continuous Assessment	2	8
1,3	*Diamagnetism	Lecture	Continuous Assessment	2	9
1,3	*Paramagnetism	Lecture	Continuous Assessment	2	10
1,3	Ferromagnetism	Lecture	Continuous Assessment	2	11
1,3	Magnetic Anisotropies	Lecture	Continuous Assessment	2	12
1,3	Magnetic Domains	Lecture	Continuous Assessment	2	13

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,3	Magnetic materials and its applications	Lecture	Continuous Assessment	2	14
1,3	Electronic materials and its applications	Lecture	Continuous Assessment	2	15
1,3	Final Exam	Lecture	Final Examination	2	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Corrosion engineering by Mars G. Fontana
Recommended Texts	
Websites / Electronic Resources	

20. QU26 - Arabic Language 2

Course Name	Arabic Language 2
Course Code	QU26
Year / Semester	Second Year / Semester 3
Language	Arabic
Total Study Hours / ECTS	50 Hours / 2 ECTS
Structured / Unstructured SWL	30 / 20 hours
Module Type	Basic learning activity
Attendance Forms	Lecture
Course Administrator	Rasha Ali Abd

Course Objectives

Develop advanced Arabic communication skills for engineering and academic contexts. The course focuses on technical and scientific writing, research summaries, professional correspondence, terminology, editing, presentation, and accurate organization of engineering information in formal Arabic.

Course Learning Outcomes

1. Apply advanced grammar and punctuation in technical and academic writing.
2. Edit scientific and administrative texts for clarity, accuracy, and style.
3. Write concise technical reports, summaries, abstracts, and formal correspondence.
4. Use and explain Arabic equivalents of common engineering and chemical terminology.
5. Organize arguments and technical information in a logical sequence.
6. Prepare and deliver a short technical presentation in formal Arabic.
7. Apply appropriate citation, quotation, and language-integrity practices.

Teaching and Learning Strategies

Teaching is based on short lectures, guided writing, text editing, terminology exercises, summarization, peer review, presentations, and practical assignments drawn from scientific and engineering contexts.

Course Structure

Weekly Syllabus

Week	Material Covered
1	Review of functional grammar and technical-language accuracy.
2	Advanced sentence structure and cohesion in scientific writing.
3	Punctuation, paragraph structure, and logical flow.
4	Editing common grammatical, spelling, and stylistic errors.
5	Scientific and engineering terminology and principles of Arabization.
6	Summarizing scientific and engineering texts.
7	Writing abstracts and concise technical descriptions.
8	Midterm examination.
9	Technical report structure: introduction, methods, results, and conclusions.
10	Formal correspondence, memoranda, and meeting minutes.
11	Preparing CVs, requests, and professional documents in Arabic.
12	Citation, quotation, paraphrasing, and language integrity.
13	Editing tables, figures, captions, and terminology in Arabic reports.
14	Oral presentation and professional speaking in formal Arabic.
15	Integrated technical-writing assignment and comprehensive review.
16	Preparatory week before the final examination.

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Department-approved Arabic language lectures covering advanced writing, editing, scientific terminology, and professional communication.
Recommended Texts	Recognized references in Arabic grammar, academic writing, scientific editing, and terminology.
Websites / Electronic Resources	University e-learning resources and recognized Arabic-language academic resources.

21. MTE 221 - Sustainability of materials

Course Name	Sustainability of materials
Course Code	MTE 221
Year / Semester	Second Year / Semester 4
Language	English
Total Study Hours / ECTS	150 Hours / 6ECTS
Structured / Unstructured SWL	44 / 106 hours
Module Type	Basic learning activity
Attendance Forms	Lecture + Tutorial
Course Administrator	Dr. Haydar Swiry

Course Objectives

To equip students with the knowledge and methodology to evaluate the environmental impact of materials across their full life cycle, implement eco-informed material selection strategies, maximize material efficiency, and analyze recycling and recovery processes for key industrial metals, polymers, and composites in sustainable engineering practices.

Course Learning Outcomes

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

- **CLO 1: Analyze Material Life Cycles** Evaluate environmental impacts from raw material extraction through processing, use, and end-of-life disposal using life-cycle assessment (LCA) concepts.
- **CLO 2: Execute Eco-Informed Material Selection** Apply systematic material selection strategies that balance functional performance requirements with sustainability constraints and carbon footprint targets.
- **CLO 3: Evaluate Low-Carbon & Efficient Energy Technologies** Assess the structural and functional requirements of materials used in low-carbon power generation systems to optimize material efficiency and lower environmental impact.
- **CLO 4: Assess Recycling & Recovery Systems** Differentiate between the specific recycling pathways, thermodynamic limits, and processing challenges for major engineering materials (ferrous alloys, non-ferrous metals, polymers, and composites).

Teaching and Learning Strategies

- Interactive Lectures: Direct instruction to introduce life-cycle assessment (LCA) principles, thermodynamic constraints of recycling, and eco-selection methodologies.
- Case Studies & Real-World Scenarios: Analysis of real-world material selection trade-offs (e.g., lightweighting vehicles vs. recycling complexity) to foster critical problem-solving.
- Hands-on Design Exercises: Guided workshops using material selection frameworks (such as Ashby charts or software tools) to evaluate materials for eco-informed engineering projects.
- Group Discussions & Seminar Presentations: Collaborative research on recycling pathways for specific material classes (polymers, composites, metals) to build communication and critical evaluation skills.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
2,5,6	Materials and the environment	Lecture	Continuous Assessment	2	1
2,5,6	The material life cycle	Lecture	Continuous Assessment	2	2
2,5,6	Material selection strategies	Lecture	Continuous Assessment	2	3
2,5,6	Eco-informed materials selection	Lecture	Continuous Assessment	2	4
2,5,6	Sustainability: living within	Lecture	Continuous Assessment	2	5
2,5,6	our means	Lecture	Continuous Assessment	2	6-7
2,5,6	Materials for low-carbon power	Lecture	Continuous Assessment	2	8

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
2,5,6	Material efficiency	Lecture	Continuous Assessment	2	9-10
2,5,6	Mid Term Exam	Lecture	Continuous Assessment	2	11
2,5,6	Material profiles	Lecture	Midterm / Test	2	12
2,5,6	Material profiles	Lecture	Continuous Assessment	2	13
2,5,6	Recycling of steel	Lecture	Continuous Assessment	2	14
2,5,6	Recycling of copper	Lecture	Continuous Assessment	2	15
2,5,6	Preparatory week before the final Exam 4	Lecture	Final Examination	2	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Corrosion engineering by Mars G. Fontana
Recommended Texts	
Websites / Electronic Resources	

22. MTE 222 - Metals and Alloys

Course Name	Metals and Alloys
Course Code	MTE 222
Year / Semester	Second Year / Semester 4
Language	English
Total Study Hours / ECTS	175 Hours / 7ECTS
Structured / Unstructured SWL	72 / 103 hours
Module Type	Core learning activity
Attendance Forms	Lecture + laboratory
Course Administrator	Dr. Amara Jabbar

Course Objectives

This module aims to comprehensively understand the designations of different types of ferrous & nonferrous alloys.

Learning the various types of phase equilibrium diagrams. Understand & distinguish between the basic Properties of each alloy. Learning the Applications of each type of alloys. Understand the strengthening mechanism(s) used in each type of alloys.

Course Learning Outcomes

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

1. CLO 1: Categorize Ferrous Alloys : Distinguish the composition, microstructural characteristics, and mechanical behavior of carbon steels, alloy steels, stainless steels, and cast irons.
2. CLO 2: Evaluate Non-Ferrous & Structural Alloys : Analyze the properties, strengthening mechanisms, and applications of aluminum, copper, light alloys (e.g., titanium, magnesium), and heavy alloys.
3. CLO 3: Assess High-Performance & Refractory Metals : Select appropriate refractory metals, precious metals, and super alloys for extreme operating environments requiring high-temperature strength, oxidation resistance, or chemical stability.
4. CLO 4: Analyze Smart & Advanced Metallic Materials : Explain the phase transformation behavior, functional properties, and engineering applications of advanced materials such as shape memory alloys.

Teaching and Learning Strategies

Different teaching methods are normally applied within this module in order to support student learning. These include in-class theoretical teaching, refining and expanding their critical thinking skills. In-lap experimental learning activities are also provided. With the progress of students in stages of learning, quizzes and lap reports are performed based on schedule.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3	Carbon steels & Cast irons.	Lecture+ laboratory	Continuous Assessment	5	1
1,2,3	Carbon steels & Cast irons.	Lecture+ laboratory	Continuous Assessment	5	2
1,2,3	Alloy steel, Stainless steel, High-speed steel,	Lecture+ laboratory	Continuous Assessment	5	3
1,2,3	Alloy steel, Stainless steel, High-speed steel,	Lecture+ laboratory	Continuous Assessment	5	4
1,2,3	Aluminum & Aluminum alloys	Lecture+ laboratory	Continuous Assessment	5	5
1,2,3	Aluminum & Aluminum alloys	Lecture+ laboratory	Continuous Assessment	5	6
1,2,3	Copper & Copper Alloys	Lecture+ laboratory	Continuous Assessment	5	7
1,2,3	Copper & Copper Alloys	Lecture+ laboratory	Continuous Assessment	5	8
1,2,3	Magnesium, Titanium and their alloys.	Lecture+ laboratory	Continuous Assessment	5	9
1,2,3	Nickel, Zinc and their alloys.	Lecture+ laboratory	Midterm / Test	2	10
1,2,3	Precious metals and their alloys.	Lecture+ laboratory	Continuous Assessment	5	11
1,2,3	Refractory Metals and their alloys.	Lecture+ laboratory	Continuous Assessment	5	12
1,2,3	Shape memory alloys	Lecture+ laboratory	Continuous Assessment	5	13
1,2,3	Super alloys	Lecture+ laboratory	Continuous Assessment	5	14
1,2,3	Preparatory week before the final Exam	Lecture+ laboratory	Continuous Assessment	5	15
1,2,3	Final Exam	Lecture+ laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: Metallographic Examination of Carbon Steel.
2	Lab 2: Metallographic Examination of Stainless Steel.
3	Lab 3: Metallographic Examination of Aluminum alloy.
4	Lab 4: Metallographic Examination of Copper Alloy.
5	Lab 5: Metallographic Examination of light Alloy.
6	Lab 6: Metallographic Examination of Heavy Alloy.
7	Lab 7: Metallographic Examination of Precious Alloy.

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Alloying: Understand the Basics, by J.R. Davis & Associates. Alloys: Preparation, Properties, Applications, by Fathi Habashi.
Recommended Texts	Metals Handbook, Desk Edition. Structure-Property Relations in Nonferrous Metals, by Alan M. Russell and Kok Loong Lee.
Websites / Electronic Resources	https://archive.nptel.ac.in/courses/112/104/112104220/

23. MTE 223 - Polymer

Course Name	Polymer
Course Code	MTE 223
Year / Semester	Second Year / Semester 4
Language	English
Total Study Hours / ECTS	175 Hours / 7ECTS
Structured / Unstructured SWL	72 / 103 hours
Module Type	Core learning activity
Attendance Forms	Lecture + laboratory
Course Administrator	Dr. Isra Faisal

Course Objectives

This module will introduce the chemistry and physics of polymers by give the previous knowledge of polymer science and a good background in organic materials. The purpose of the module is to provide students with the structures and principles required to both synthesise and understand the properties of polymers. The module will prepare students for either advanced studies in the area or will give them the essential concepts required to work in this important industrial area

Course Learning Outcomes

Students will be able to classify, describe and discuss the effects of molecular structure (e.g. secondary interactions, chain stiffness, molar mass and molar mass between crosslinks or entanglements) and morphology (e.g. in blends or semi-crystalline materials) of polymers on their glass transition temperature, melting temperature, mechanical properties and process ability. They will be able to select an appropriate processing method for a wide variety of polymeric end-products. They will be able to have a basic understanding of fundamental polymer physics concepts.

Teaching and Learning Strategies

Lectures will deliver core content; providing you with the opportunity to acquire the information to enhance your knowledge and understanding of the concepts of polymer science. We will study the major classes of both synthetic polymers and learn how to specifically describe their structure. We will then turn our attention to the synthesis of synthetic polymers and we will illustrate both chemically and mathematically how the various techniques lead to different types of polymer. Our studies will extend into examining the structural factors that dictate if monomers can be polymerised and the concepts of copolymerization.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2	Introduction to the molecular structure and structure of polymers, classification of polymers, side groups, chain interactions, network formation, and molecular configuration.	Lecture+ laboratory	Continuous Assessment	5	1
1,2	Structure of the main chain, degree of polymerisation and chain length.	Lecture+ laboratory	Continuous Assessment	5	2
1,2	Calculation of number average molar mass, weight average molar mass.	Lecture+ laboratory	Continuous Assessment	5	3
1,2	The mechanical properties, modulus of elasticity of polymeric materials.	Lecture+ laboratory	Continuous Assessment	5	4
1,2	Influence of temperature on modulus for semi-crystalline and amorphous polymers.	Lecture+ laboratory	Continuous Assessment	5	5
1,2	Deformation behaviour of	Lecture+ laboratory	Continuous Assessment	5	6

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	polymers: amorphous and semi-crystalline polymers, viscoelasticity, modulus, yielding, necking, draw and strain hardening.				
1,2	Fracture of Polymers, crazing of glassy polymers, toughening mechanisms.	Lecture+ laboratory	Continuous Assessment	5	7
1,2	Mechanisms of Deformation and for Strengthening of Polymers.	Lecture+ laboratory	Continuous Assessment	5	8
1,2	Crystallinity of polymers and influence of polymer structure on crystallization, influence of crystallinity on stiffness and high temperature properties of polymers.	Lecture+ laboratory	Continuous Assessment	5	9
1,2	Definition of Elastomer & Rubber and Elastomer Property.	Lecture+ laboratory	Midterm / Test	2	10
1,2	Transitions in polymers: glass transition temperature, melt temperature, secondary transitions, crystallisation. Influence of chain stiffness, side groups and chain	Lecture+ laboratory	Continuous Assessment	5	11
1,2	interactions on Tg.	Lecture+ laboratory	Continuous Assessment	5	12
1,2	Polymer types, plastics, elastomers, fibers, coatings, adhesives, foams, and films.	Lecture+ laboratory	Continuous Assessment	5	13
1,2	Polymer Additives plasticizers, filler, colorant, stabilizers and flame retardants.	Lecture+ laboratory	Continuous Assessment	5	14
1,2	Polymerization techniques, Step-growth polymerization, Chain growth polymerization, Free radical.	Lecture+ laboratory	Continuous Assessment	5	15
1,2	Basics of polymer processing: injection moulding, extrusion, and blow moulding.	Lecture+ laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: The percentage of water absorption in polymers.
2	Lab 2: Relaxation time and relaxation stress in polymers.
3	Lab 3: Study the effect of solvent on the polymers.
4	Lab 4: Measured and calculation the tensile strength of polymeric materials.
5	Lab 5: Impact test and calculate the fracture of K _{IC} for the polymer materials.
6	Lab 6: Study of the hardness of polymeric materials.
7	Lab 7: Calculation of compressive strength of polymeric materials.

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	R J Young and P A Lovell ((1991)). Introduction to Polymers. 2nd Edition. Chapman and Hall, London. / ISBN:0412306409
Recommended Texts	Polymer chemistry: an introduction Date: 1999, Edition: 3rd ed, ISBN: 0195124448

Resource	Details
Websites / Electronic Resources	https://www.wappalyzer.com/technologies/javascript-frameworks/polymer/

24. QU24 - Computer 2

Course Name	Computer 2
Course Code	QU24
Year / Semester	Second Year / Semester 4
Language	English
Total Study Hours / ECTS	75 Hours / 3 ECTS
Structured / Unstructured SWL	44/ 31 hours
Module Type	S learning activity
Attendance Forms	Lecture + laboratory
Course Administrator	Dr. Aqeel Latif

Course Objectives

1. Network Design & Analysis: The ability to design and analyze basic network architectures to meet specific communication requirements.
2. E-Commerce Systems Implementation: The ability to evaluate and utilize electronic banking platforms while understanding security protocols and transaction mechanisms.
3. Systematic Troubleshooting: The ability to apply structured diagnostic methodologies and appropriate tools to resolve hardware and software faults.
4. AI Principles & Methodologies: The ability to explain fundamental AI concepts, historical evolution, and core techniques.
5. AI Application & Ethical Assessment: The ability to analyze real-world AI applications while critically evaluating ethical, social, and privacy implications.

Course Learning Outcomes

By the end of the course, the student will be able to:

1. **Network Design & Analysis:** Design and analyze basic network architectures, identifying appropriate network types and components to meet specific communication requirements.
2. **E-Commerce Systems Implementation:** Evaluate and utilize electronic banking platforms (online, mobile, SMS, and phone banking) while understanding the underlying security protocols and transaction mechanisms.
3. **Systematic Troubleshooting:** Apply structured diagnostic methodologies and appropriate tools to identify, isolate, and resolve common hardware and software faults effectively.
4. **AI Principles & Methodologies:** Explain the fundamental concepts, historical evolution, and core techniques (machine learning, neural networks) of artificial intelligence, distinguishing between different AI approaches.
5. **AI Application & Ethical Assessment:** Analyze real-world AI applications across diverse sectors (healthcare, transportation, finance, education), while critically evaluating the ethical, social, and privacy implications of AI adoption in society.

Teaching and Learning Strategies

The course will use the following teaching and learning methods □ Board (Normal or Smart) □ Computers □ Presentation software such as PowerPoint 3

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,3,6,7	network components.	Lecture + Laboratory	Continuous Assessment	4	1

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Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	Network Security Basics. Understanding network threats. Network Troubleshooting □ E-Commerce: Concepts of Electronic banking services this include				
1,3,6,7	online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking Computer Troubleshooting: Identifying and solving common hardware and	Lecture + Laboratory	Continuous Assessment	4	2
1,3,6,7	software problems that computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues. Computer Troubleshooting: Identifying and solving common hardware and software	Lecture + Laboratory	Continuous Assessment	4	3
1,3,6,7	problems that computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues.	Lecture + Laboratory	Continuous Assessment	4	4
1,3,6,7	Introduction to AI: Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations. □ Introduction to AI: Definition of AI, History of AI, AI Techniques and	Lecture + Laboratory	Continuous Assessment	4	5
1,3,6,7	Approaches, Challenges and Ethical Considerations.	Lecture + Laboratory	Continuous Assessment	4	6
1,3,6,7	AI in Our Daily Lives: AI in smartphones and virtual assistants like Siri or Google Assistant.)	Lecture + Laboratory	Continuous Assessment	4	7
1,3,6,7	AI in Our Daily Lives: AI in smartphones and virtual assistants like Siri or Google Assistant.) □ Applications of AI: Education, Healthcare, Finance, Transportation, Marketing	Lecture + Laboratory	Continuous Assessment	4	8
1,3,6,7	and Advertising. □ Applications of AI: Education, Healthcare, Finance, Transportation, Marketing	Lecture + Laboratory	Continuous Assessment	4	9
1,3,6,7	and Advertising. □ Applications of AI: Education, Healthcare, Finance, Transportation, Marketing	Lecture + Laboratory	Continuous Assessment	4	10
1,3,6,7	and Advertising. □ AI and Society: (How AI affects social, AI and international relations, AI and the	Lecture + Laboratory	Continuous Assessment	4	11
1,3,6,7	future of humanity.) □ Ethical Challenges in AI: (AI ethics, privacy and surveillance, the impact of AI	Lecture + Laboratory	Continuous Assessment	4	12
1,3,6,7	on the job market.)	Lecture + Laboratory	Continuous Assessment	4	13
1,3,6,7	The Future of AI (Future trends in AI, recent research and emerging technologies.)	Lecture + Laboratory	Continuous Assessment	4	14
1,3,6,7	Preparatory week before	Lecture + Laboratory	Final Examination	2	15

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	the final Exam 5				

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Security and Networking: What is a network? Types of networks. Basic network components. Network Security Basics. Understanding network threats. Network Troubleshooting
2	E-Commerce: Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking Computer Troubleshooting: Identifying and solv...
3	computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues. Computer Troubleshooting: Identifying and solving common hardware and software problems that
4	computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues.
5	Introduction to AI: Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
6	Introduction to AI: Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations. AI in Our Daily Lives: AI in smartphones and virtual assistants like Siri or Google Assistant.)
8	AI in Our Daily Lives: AI in smartphones and virtual assistants like Siri or Google Assistant.)
9	Applications of AI: Education, Healthcare, Finance, Transportation, Marketing and Advertising.
10	Applications of AI: Education, Healthcare, Finance, Transportation, Marketing and Advertising.
11	Applications of AI: Education, Healthcare, Finance, Transportation, Marketing and Advertising. Week12 AI and Society: (How AI affects social, AI and international relations, AI and the future of humanity.)
13	Ethical Challenges in AI: (AI ethics, privacy and surveillance, the impact of AI on the job market.)
14	The Future of AI (Future trends in AI, recent research and emerging technologies.)
15	Preparatory week before the final Exam 6

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Communication Technology", 3rd Edition)0202(1. Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology In Action Complete,"16th Edition.)0202(2. Ahmed Banafa, "Introduction to Artificial
Recommended Texts	Intelligence (AI)", 1st Edition.)0202(3. " " 2112 " " 2112
Websites / Electronic Resources	University e-learning platform, recognized academic databases, and professional educational resources.

25. ENG221 - Mathematics 4

Course Name	Mathematics 4
Course Code	ENG221
Year / Semester	Second Year / Semester 4
Language	English
Total Study Hours / ECTS	75 Hours / 3 ECTS
Structured / Unstructured SWL	58 / 17 hours
Module Type	Basic learning activity
Attendance Forms	Lecture + Tutorial
Course Administrator	Ahmed Hakem

Course Objectives

1. Identify functions.
2. studying multiple integrals.
3. Know how to integral in polar system.
4. Know how to find triple integrals in the polar system.
5. Identify the solution of first order differential equations.

Course Learning Outcomes

- Understand and know the solution of mathematical problems
- Recognize symbols and write down mathematics.
- Develop the student's skills in using matrices, finding the determinant and solving mathematical equations.
- Develop abstract, logical and critical thinking and the ability to think decisively about their work and the work of others

Teaching and Learning Strategies

1. Diction method
2. Dialogic method
3. The active method (depends on the student's activity)

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2	Function of several variables	Lecture + Tutorial	Continuous Assessment	4	1
1,2	Partial derivatives	Lecture + Tutorial	Continuous Assessment	4	2
1,2	The chain rule	Lecture + Tutorial	Continuous Assessment	4	3
1,2	Application of partial derivatives	Lecture + Tutorial	Continuous Assessment	4	4
1,2	Multiple integrals	Lecture + Tutorial	Continuous Assessment	4	5
1,2	Double and iterated integrals over rectangular region	Lecture + Tutorial	Continuous Assessment	4	6
1,2	Double and iterated integrals over general region	Lecture + Tutorial	Continuous Assessment	4	7
1,2	Double integral in polar coordinates 3	Lecture + Tutorial	Mid exam	2	8
1,2	Application of double integrals	Lecture + Tutorial	Continuous Assessment	4	9
1,2	Triple integrals	Lecture + Tutorial	Continuous Assessment	4	10
1,2	Triple integrals	Lecture + Tutorial	Continuous Assessment	4	11
1,2	Application of triple integrals	Lecture + Tutorial	Continuous Assessment	4	12
1,2	Introduction to differential equation	Lecture + Tutorial	Continuous Assessment	4	13
1,2	First order ordinary differential equation	Lecture + Tutorial	Continuous Assessment	4	14
1,2	Solution of ordinary equation	Lecture + Tutorial	Continuous Assessment	4	15
1,2	Final exam	Lecture + Tutorial	Continuous Assessment	2	16

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
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Assessment Method	Weight	Week Due (if stated)
Quizzes	27%	5, 9,13
Assignments	10%	0
Projects	0%	1
Report	3%	12
Midterm Exam	10%	8
Final Exam	50%	16

Learning and Teaching Resources

Resource	Details
Required Texts	• THOMAS' CALCULUS TWELFTH EDITION
Recommended Texts	• none
Websites / Electronic Resources	University e-learning platform, recognized academic databases, and professional educational resources.

26. QU21 - English Language 2

Course Name	English Language 2
Course Code	QU21
Year / Semester	Second Year / Semester 4
Language	English
Total Study Hours / ECTS	50 Hours / 2 ECTS
Structured / Unstructured SWL	32 / 18 hours
Module Type	S . learning activity
Attendance Forms	Lecture
Course Administrator	Dr. Ahmed Ali Shakir

Course Objectives

To enhance students' general English proficiency by integrating core language skills—listening, speaking, reading, and writing—with a focus on real-world communication, complex grammatical structures, and everyday functional vocabulary.

Course Learning Outcomes

By the end of this course, students will be able to:

- **CLO 1 (Grammar & Structure):** Apply key grammatical frameworks correctly in context, including present tenses, future forms, first and second conditionals, passive voice, and phrasal verbs.
- **CLO 2 (Listening & Speaking):** Demonstrate functional fluency in daily interactions, including telephone conversations, social exchanges, role-playing, and discussing statistical or textual data.
- **CLO 3 (Reading Comprehension):** Analyze and interpret authentic reading passages (e.g., biographical profiles, story narratives, news articles) to extract main ideas and key details.
- **CLO 4 (Writing & Interactive Communication):** Produce structured news reports and narrative texts while actively participating in group seminars, project discussions, and story-building activities.

Teaching and Learning Strategies

To achieve the course objectives and learning outcomes, the instructional design relies on an Interactive & Task-Based Approach, emphasizing practical application through the following methods:

- **Communicative & Interactive Learning:** Active engagement through role-playing (e.g., telephone conversations, celebrity interviews, social greetings), group seminars, and interactive project discussions to build real-time speaking fluency.
- **Contextual Grammar & Vocabulary Integration:** Theoretical language structures (e.g., conditionals, passive voice, phrasal verbs, present tenses) are introduced and practiced within authentic thematic contexts—such as lifestyle profiles, travel planning, and short stories—rather than isolated drills.
- **Integrated-Skills Development:** Combining receptive skills (listening to authentic audio, analyzing reading articles) with productive skills (writing news reports, oral story-building) to reinforce retention and practical use.
- **Continuous Assessment & Feedback:** Regular formative evaluations (quizzes, on-site writing assignments, mid-term exam) paired with review sessions to identify learning gaps and reinforce key concepts prior to the final examination.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
4,6	how people communicate, and the Listening and Speaking section involves listening to two neighbors describe their relationship • There are opportunities for students to role-play polite conversation and practice socia...	Lecture	Continuous Assessment	2	1
4,6	listening texts containing facts and figures about different English-speaking countries. The Practice section provides the opportunity to practice Present tenses and have/have got in the context of 6 lifestyles. • The...	Lecture	Continuous Assessment	2	2

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
4,6	activities, writing news report, and telling stories round the class. • The theme of this unit is shopping. In the opening section, 'The Weekend Shop', expressions of quantity are introduced in the context of two frie...	Lecture	Continuous Assessment	2	3
4,6	about Hollywood kids, growing up in Los Angeles, and the Listening activity exploits the song 'You've got a friend' by Carole King. The Vocabulary section looks at the Hot verbs have, go, and come. + 1st quiz • The Read...	Lecture	Continuous Assessment	2	4
4,6	Speaking section has an interview with an imaginary rock band. • There are opportunities to role play interviews with celebrities.	Lecture	Continuous Assessment	2	5
4,6	Seminars and projects discussions • The title of this unit is 'Going places'. The future form will and its use in time and	Lecture	Project / Report	2	6
4,6	conditional clauses introduced and practiced in the context of two friends talking about their plans for the gap year. • The title of this unit is, 'Scared to death', and the texts all reflect this theme. The opening ...	Lecture	Continuous Assessment	2	7
4,6	The Reading text is about a young man lost in Alaska. • And the listening is about how a group of friends scare a boy by kidnapping him as a practical joke on his birthday. + on sit assignment • The title of this unit...	Lecture	Continuous Assessment	2	8
4,6	'Sweet dreams', the dream of a young girl, set against the reality of her day-to-day life, provides the 7 context to introduce and highlight the unreality an improbability in the use of the second conditional. • The t...	Lecture	Continuous Assessment	2	9
4,6	for contrasting The Present Perfect Simple and the Present Perfect Continuous to talk about the past. + 2nd quiz Identifying the passive tense, If conditionals (four cases). Reading the first and second articles in the	Lecture	Continuous Assessment	2	10
4,6	ninth and tenth chapters.	Lecture	Continuous Assessment	2	11
4,6	Mid-term Exam How to have a conversation over the phone, farewell phrases , Everyday English of units (1-10)	Lecture	Midterm / Test	2	12
4,6	2nd assignment.	Lecture	Continuous Assessment	2	13
4,6	Examples on Phrasal verbs and if-conditions.	Lecture	Examination	2	14
4,6	Review - with questions and answers	Lecture	Continuous Assessment	2	15
4,6	Final Exam	Lecture	Final Examination	2	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Intermediate Student's Book. Oxford University Press. 8 Ibbotson, M., 2008. Cambridge English for engineering.
Recommended Texts	Cambridge; New York: Cambridge University Press. https://learnenglish.britishcouncil.org/english-levels/understand-your-english
Websites / Electronic Resources	level/a2-pre-intermediate

27. QU08 - The Crimes of Baath Regime in Iraq

Course Name	The Crimes of Baath Regime in Iraq
Course Code	QU08
Year / Semester	Second Year / Semester 4
Language	Arabic
Total Study Hours / ECTS	50 Hours / 2 ECTS
Structured / Unstructured SWL	32 / 18 hours
Module Type	S . learning activity
Attendance Forms	Lecture
Course Administrator	Hesam Aziz

Course Objectives

Provide students with an academic understanding of documented violations and crimes associated with the Baath regime in Iraq within their historical, legal, social, economic, and human-rights contexts. The course develops the ability to examine evidence and official documentation, distinguish legal categories of violations, and discuss their effects on Iraqi society using a factual and responsible approach.

Course Learning Outcomes

1. Describe the historical and political context of Baath rule in Iraq.
2. Identify major categories of documented human-rights violations and explain their legal significance.
3. Discuss the social, economic, cultural, and environmental consequences of authoritarian policies.
4. Distinguish between historical claims, documented evidence, legal findings, and opinion.
5. Explain the role of documentation, archives, courts, and transitional-justice mechanisms.
6. Analyze selected cases using respectful, non-inflammatory, evidence-based academic discussion.
7. Prepare concise reports and presentations using appropriate sources and citation practices.

Teaching and Learning Strategies

The course uses lectures, document-based learning, guided discussion, case analysis, short reports, presentations, and structured classroom activities. Emphasis is placed on evidence, legal and historical context, respectful discussion, and critical evaluation of sources.

Course Structure

Week	Material Covered
1	Course introduction, terminology, historical sources, and methods of documentation.
2	Political and historical context of Baath rule in Iraq.
3	Human rights, constitutional principles, and relevant legal classifications.
4	Political repression and restrictions on civil and political rights.
5	Forced displacement, demographic policies, and their societal effects.
6	Documented cases of mass violence and the role of official records.
7	Effects on education, culture, public institutions, and professional life.
8	Midterm review and examination.
9	Economic consequences of authoritarian governance and conflict.
10	Environmental consequences of policies and armed conflicts.
11	Impact on families, communities, and social cohesion.
12	Documentation, archives, testimony, and standards for evaluating evidence.
13	Iraqi legal processes and the role of courts and accountability mechanisms.
14	Transitional justice, memory, reparative approaches, and institutional learning.
15	Student presentations, course review, and evidence-based discussion.
16	Preparatory week before the final examination.

Course Evaluation

Assessment Method	Weight	Week / Notes
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Quizzes	10%	During semester
Assignments / Document Analysis	20%	During semester
Report / Presentation	10%	During semester
Midterm Exam	10%	Week 8
Final Exam	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	University-approved course materials and documented historical and legal sources related to the subject.
Recommended Texts	Relevant Iraqi legislation, official documents, scholarly historical studies, and human-rights references used for academic study of the period.
Websites / Electronic Resources	Official Iraqi institutional sources, university digital resources, and recognized academic databases.

27. CHE311 - Casting and Welding

Course Name	Casting and Welding
Course Code	MTE 311
Year / Semester	third Year / Semester 1
Language	English
Total Study Hours / ECTS	175 Hours / 7 ECTS
Structured / Unstructured SWL	62 / 113 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial
Course Administrator	Ahmed Mossy

Course Objectives

1-The course will highlight a number of commercially significant applications where phase transformations due to heat treatment are important.

2-To introduce fundamental concepts relevant to phase diagrams, phase transformations and heat treatment of metals and alloys.

3- To study the phase changes that occurs during both thermal and thermomechanical treatments

.Course Learning Outcomes

1-Understand the effect of heat treatment on the microstructure of the materials.

2- Understand the role of phase transformations with respect to heat treatment on the development of microstructure.

3- Understand the properties of metallic materials.

Teaching and Learning Strategies

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1	Overview of Casting Technology	Lecture + Tutorial	Continuous Assessment	3	1
1	Molding and Casting Processes	Lecture + Tutorial	Continuous Assessment	3	2
1	Conventional molding processes	Lecture + Tutorial	Continuous Assessment	3	3

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	(green sand, shell, flask less molding).				
1	Permanent-Mold Casting Processes	Lecture + Tutorial	Continuous Assessment	3	4
1	Sand Casting.	Lecture + Tutorial	Continuous Assessment	3	5
1	Introduction to welding engineering.	Lecture + Tutorial	Continuous Assessment	3	6
1	Fusion welding processes	Lecture + Tutorial	Continuous Assessment	2	7
1	Fusion welding processes	Lecture + Tutorial	Continuous Assessment	3	8
1	Solid-state welding processes	Lecture + Tutorial	Continuous Assessment	3	9
1	Solid-state welding processes	Lecture + Tutorial	Midterm / Test	3	10
1	Heat Flow in Welding	Lecture + Tutorial	Continuous Assessment	3	11
1	Chemical Reactions in Welding	Lecture + Tutorial	Continuous Assessment	3	12
1	Fluid Flow and Metal Evaporation in Welding	Lecture + Tutorial	Continuous Assessment	3	13
1	Stresses in welding	Lecture + Tutorial	Continuous Assessment	3	14
1	Microstructure of welding zones	Lecture + Tutorial	Continuous Assessment	3	15
1	Welding inspection and Welding defects	Lecture + Tutorial	Final Examination	2	16

Course Evaluation

Assessment Method		Weight		Week / Notes	
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Learning and Teaching Resources

Resource	Details
Required Texts	Manufacturing & Technology: Foundry Forming and Welding, P.N.Rao, 3rd Ed., Tata McGraw Hill, 2003.
Recommended Texts	Principles of metal casting, Richard W. Heine, Carl R. Loper Jr., Philip C. Rosenthal, Tata McGraw Hill Education Private Limited Ed. 1976.
Websites	https://www.coursera.org

43. MTE 312 - Fracture Mechanics

Course Name	Fracture Mechanics
Course Code	MTE 312
Year / Semester	Third Year / Semester 3
Language	English
Total Study Hours / ECTS	150 Hours / 5 ECTS
Structured / Unstructured SWL	77 / 48 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Saleh jawad

Course Objectives

- This module aims to comprehensively observe the concept of theory of elasticity, the true and engineering stress/strain and theory of plasticity.
 - To understand the concept of the stresses states: uniaxial, biaxial and triaxial stress state.
- Focusing on fracture mechanics according to stress-concentration factor, Griffith crack theory and Irwin plastic, Elasto-plastic theory, and plastic deformation theory.

Course Learning Outcomes

- Understanding how the crack initiation in metallic/non-metallic materials occurred and crack propagation behaved under loading.
 - Understanding the concepts of linear elastic fracture mechanics and crack tip plasticity.
- Learning the difference in fracture mechanics applied for plain-strain and plain stress plates.

Teaching and Learning Strategies

Different teaching methods are normally applied within this module in order to support student learning. These include in class theoretical teaching, tutorial and discussion, brain storming about some fracture mechanics examples. Whenever needed, practical and experimental lecturing are sometimes provided.

With the progress in stages of the learning journey of the students, quizzes, and seminars are performed from time to time based on the time allowance.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,6	Systems of generating electrical energy	Lecture + Tutorial	Continuous Assessment	3	1
Types of fracture in materials/Metals.	Efficiency of Rankine cycle	Lecture + Tutorial	Continuous Assessment	3	2
How can fracture in materials be avoided.	Freezing system and heat pump	Lecture + Tutorial	Continuous Assessment	3	3
Theory of elasticity	Efficiency of vapor compression cycle	Lecture + Tutorial	Continuous Assessment	3	4

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
Types of stresses.	Heats effects of mixing processes 3	Lecture + Tutorial	Continuous Assessment	3	5
Fracture mechanics	Vapor - liquid equilibrium	Lecture + Tutorial	Continuous Assessment	3	6
Griffith theory of brittle fracture.	Mid-term Exam	Lecture + Tutorial	Midterm / Test	2	7
Crack propagation theory.	Bubble pressure calculation	Lecture + Tutorial	Continuous Assessment	3	8
Metallographic aspects of brittle fracture.	Dew pressure calculation	Lecture + Tutorial	Continuous Assessment	3	9
Crack Tip Theory.	Bubble temperature calculation	Lecture + Tutorial	Continuous Assessment	3	10
Ductile and Brittle Fracture/Notch effects.	Dew temperature calculation	Lecture + Tutorial	Continuous Assessment	3	11
Fracture under combined stresses.	Flash vaporization	Lecture + Tutorial	Continuous Assessment	3	12
Fracture mechanics and toughening mechanisms of polymers.	Chemical reaction equilibrium	Lecture + Tutorial	Continuous Assessment	3	13
Fracture mechanics and toughening mechanisms of ceramics.	Equilibrium constant and conversion	Lecture + Tutorial	Continuous Assessment	3	14
Damages under dynamic loads.	Effect of temperature on chemical equilibrium conversion	Lecture + Tutorial	Continuous Assessment	3	15
Modelling of fracture toughness	Preparatory week before the final Exam	Lecture + Tutorial	Final Examination	2	16
Exam					

Course Evaluation

Weight	Week Due (if stated)		
Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Quizzes	1 hour/2	10 % (10)	5, 10
Assignments	2	10 % (10)	5, 12

	Weight	Week Due (if stated)		
	Projects / Lab.	-	-	-
	Report	1	10 % (10)	13
nt	Mid-term Exam	2 hour	20 % (20)	7
	Final Exam	2 hour	50 % (50)	16
	100% (100 Marks)			

Learning and Teaching Resources

Resource	Details
Required Texts	THERMODYNAMICS, NINTH EDITION, McGraw Hill, USA, 2022
Recommended Texts	Recent textbooks, handbooks, and peer-reviewed references relevant to the course.
Websites / Electronic Resources	4

28. MTE313 - Ceramic Engineering

Course Name	Ceramic Engineering
Course Code	MTE313
Year / Semester	Third Year / Semester 5
Language	English
Total Study Hours / ECTS	175 Hours / 7 ECTS
Structured / Unstructured SWL	87 / 88 hours
Module Type	C
Attendance Forms	Lecture + Tutorial
Course Administrator	Dr .saleh

Course Objectives

Examination of technical properties of ceramic materials and teaching of their use..

Course Learning Outcomes

7. Knows the properties of ceramic materials
8. Knowledgeable about the use of ceramic materials
9. Knows the production techniques of ceramic materials.
10. Knows sintering.

Knows particle development techniques

Teaching and Learning Strategies

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Mathematical modeling workflow and model assumptions	Lecture + Tutorial	Continuous Assessment	3	1
1,2,3,6	Systems of ordinary differential equations	Lecture + Tutorial	Continuous Assessment	3	2
1,2,3,6	Linear ODE systems and matrix-exponential concepts	Lecture + Tutorial	Continuous Assessment	3	3

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Nonlinear ODE models and phase-plane interpretation	Lecture + Tutorial	Continuous Assessment	3	4
Introduction to ceramics.	Dimensionless analysis and Buckingham Pi theorem	Lecture + Tutorial	Continuous Assessment	3	5
Structure and Properties of Ceramics.	Scaling and order-of-magnitude analysis	Lecture + Tutorial	Continuous Assessment	3	6
Traditional Ceramics.	Midterm examination and problem review	Lecture + Tutorial	Midterm / Test	2	7
New Ceramics.	Partial differential equations in transport phenomena	Lecture + Tutorial	Continuous Assessment	3	8
Processing of Traditional Ceramics.	Separation of variables for diffusion and conduction	Lecture + Tutorial	Continuous Assessment	3	9
Processing of New Ceramics.	Integral transforms in applied engineering models	Lecture + Tutorial	Continuous Assessment	3	10
Processing of Cermets	Special functions and series solutions: introductory applications	Lecture + Tutorial	Continuous Assessment	3	11
Product Design Considerations.	Calculus of variations / optimization concepts	Lecture + Tutorial	Continuous Assessment	3	12
Machining of ceramics.	Unconstrained optimization for engineering design	Lecture + Tutorial	Continuous Assessment	3	13
Design and Fabrication of ceramics components.	Constrained optimization and Lagrange multipliers	Lecture + Tutorial	Continuous Assessment	3	14
Fracture mechanics in Ceramics.	Integrated chemical-engineering modeling and optimization case study	Lecture + Tutorial	Continuous Assessment	3	15
Conductive ceramics.	Comprehensive review / final examination preparation	Lecture + Tutorial	Final Examination / Review	2	16

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
Production of conductive ceramics.					
Glass, Glass working, Raw Materials Preparation and Melting					
Shaping Processes in Glass working, Fabrication techniques for glasses					
Preparatory week before the final Exam					

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments	10%	3, 12
Case Study / Project	10%	6, 13
Report / Presentation	10%	14
Midterm Exam	10%	7
Final Exam	50%	16
Laboratory	0%	N/A
Other	0%	N/A

Learning and Teaching Resources

Resource	Details	
Required Texts	A. Koller, "Structure and Properties of Ceramics" Elsevier, 1994.	Yes
Recommended Texts	Ceramic Materials: Processes, Properties, and Applications Philippe Boch, Jean-Claude Nègre, 2010	No
Websites		

45. MTE313 - Phase Transformations

Course Name	Phase Transformations
Course Code	MTE 314
Year / Semester	Third Year / Semester 6
Language	English
Total Study Hours / ECTS	100 Hours / 4 ECTS
Structured / Unstructured SWL	100 / 30 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Department Teaching Assignment

Course Objectives

2. This module aims to comprehensively define & understand the concept of phase transformation.
3. Understand the diffusional transformations in solids.
4. Understand the diffusionless transformations in solids.
5. Understand instability of phases & structures, & amorphous materials.

Understand grain boundary reactions

. Course Learning Outcomes

1. Understand Basic concepts of phase transformation.
2. Understand Homogeneous & Heterogeneous Nucleation in Solids.
3. Crystal Interfaces and Microstructure.
4. Understand diffusional growth in Solids.
5. Understand transformation of eutectoids.
6. Understand ordering transformations.
7. Understand transformation Kinetics in TTT Diagrams.
8. Understand martensite crystallography.
9. Understand diffusionless martensite nucleation & theories.

Understand diffusionless martensite growth.

Teaching and Learning Strategies

Different teaching methods are normally applied within this module in order to support student learning. These include in-class theoretical teaching, refining and expanding their critical thinking skills. Seminar reports are also provided as learning activities. With the progress of students in stages of learning, quizzes and seminar reports are performed based on schedule.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,3,6	Definitions and basic concepts: Single component solution. Binary solutions. The Kinetics of Phase Transformations.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	1
1,3,6		Lecture + Tutorial + Laboratory	Continuous Assessment	3	2
1,3,6	Crystal Interfaces and Microstructure: Interfacial Free Energy, Solid/Vapour Interfaces, Boundaries in Single-Phase Solids, and Interphase Interfaces in Solids, and Interface Migration.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	3
1,3,6		Lecture + Tutorial + Laboratory	Continuous Assessment	3	4
1,3,6	Diffusional Transformations in Solids: Homogeneous Nucleation in Solids. Heterogeneous Nucleation in Solids.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	5
1,3,6		Lecture + Tutorial + Laboratory	Continuous Assessment	3	6

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,3,6	Precipitate Growth. Particle Coarsening. Cellular Precipitation.	Lecture + Tutorial + Laboratory	Continuous Assessment	2	7
1,3,6		Lecture + Tutorial + Laboratory	Continuous Assessment	3	8
1,3,6	Eutectoid Transformations. Rule of Scheil. Ordering Transformations	Lecture + Tutorial + Laboratory	Continuous Assessment	3	9
1,3,6		Lecture + Tutorial + Laboratory	Continuous Assessment	3	10
1,3,6	Overall Transformation Kinetics—TTT Diagrams.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	11
1,3,6	Diffusionless Transformations in Solids: Martensite Crystallography.	Lecture + Tutorial + Laboratory	Midterm / Test	3	12
1,3,6	Theories of Martensite Nucleation.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	13
1,3,6	Martensite Growth.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	14
1,3,6		Lecture + Tutorial + Laboratory	Continuous Assessment	3	15
1,3,6		Lecture + Tutorial + Laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Introduction to Programming Tools: Basics of MATLAB/Python or Excel/VBA for numerical solutions.
2	Root Finding I: Implementing Bisection and False-Position algorithms.
3	Root Finding II: Implementing Newton-Raphson and Secant methods for non-linear equations.
4	Linear Systems: Solving simultaneous equations using Gauss Elimination and LU Decomposition.
5	Iterative Solvers: Programming Jacobi and Gauss-Seidel methods for large systems.
6	Regression Analysis: Applying Least-Squares to fit chemical engineering experimental data.
7	Interpolation: Coding Newton's divided-difference and Lagrange polynomials.

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical	40%	Throughout the semester

work, projects or seminars as applicable)		
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Phase Transformations in Metals and Alloys, by DAVID A. PORTER, KENNETH E. EASTERLING, and MOHAMED Y. SHERIF.
Recommended Texts	The Physics of Phase Transitions: Concepts and Applications, by P. Papon, J. Leblond, and P.H.E. Meijer.
Required Texts	Phase Transformations in Metals and Alloys, by DAVID A. PORTER, KENNETH E. EASTERLING, and MOHAMED Y. SHERIF.

29. MTE315 - Mathematical Analysis

Course Name	Mathematical Analysis
Course Code	CHE327
Year / Semester	Third Year / Semester 6
Language	English
Total Study Hours / ECTS	100 Hours /4 ECTS
Structured / Unstructured SWL	44 /56 hours
Module Type	Core learning activity
Attendance Forms	Lecture
Course Administrator	Ahmad Ali

Course Objectives

1. Treatment of ordinary and partial differential equations and their applications.

Teaching students' ways to solve ordinary and partial differential equations and how to use them to solve engineering problems, in addition to numerical methods for processing a system of linear equations and how to use them in engineering applications.

Course Learning Outcomes

1. The ability to devise and choose methods of solution and analyze the results of engineering problems mathematically.
2. Comparing, criticizing and checking the used solution methods with other engineering solutions.

The ability to propose alternative solutions to solve engineering problems in a scientific manner and to determine the appropriate method to address these problems.

Teaching and Learning Strategies

Understand the Basic Concepts about ordinary differential equations (D.E) of the first order and solve some examples of separable and exact D.E

Understand the Solving of some examples of homogeneous ordinary differential equations of the first order

Understand the Solving of some examples of linear ordinary differential equations of the first order

Understand the Solving of some examples of special ordinary differential Bernoulli's equations of the first order

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,6	Water conditioning and treatment processes, softening and demineralization of water	Lecture	Continuous Assessment	2	1
1,2,6	Water conditioning and	Lecture	Continuous Assessment	2	2

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	treatment processes, softening and demineralization of water Amorphous and crystalline forms of carbon, manufacture and applications of carbon black				
1,2,6	Complex Functions, Gamma Function, Beta Function, Error Function	Lecture	Continuous Assessment	2	3
1,2,6	Complex Functions, Gamma Function, Beta Function, Error Function	Lecture	Continuous Assessment	2	4
1,2,6	Complex Functions, Gamma Function, Beta Function, Error Function	Lecture	Continuous Assessment	2	5
1,2,6	Complex Functions, Gamma Function, Beta Function, Error Function	Lecture	Continuous Assessment	2	6
1,2,6	Fourier Series: Euler Relation, Odd And Even Function, Half Range Expansion, Complex Fourier, Fourier Integration	Lecture	Continuous Assessment	2	7
1,2,6	Fourier Series: Euler Relation, Odd And Even Function, Half Range Expansion, Complex Fourier, Fourier Integration	Lecture	Continuous Assessment	2	8
1,2,6	Fourier Series: Euler Relation, Odd And Even Function, Half	Lecture	Continuous Assessment	2	9

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	Range Expansion, Complex Fourier, Fourier Integration				
1,2,6	Fourier Series: Euler Relation, Odd And Even Function, Half Range Expansion, Complex Fourier, Fourier Integration	Lecture	Continuous Assessment	2	10
1,2,6	Laplace Transformation: Inverse Laplace Trans, Ode And Applications, Initial Value Problem	Lecture	Continuous Assessment	2	11
1,2,6	Laplace Transformation: Inverse Laplace Trans, Ode And Applications, Initial Value Problem	Lecture	Continuous Assessment	2	12
1,2,6	Laplace Transformation: Inverse Laplace Trans, Ode And Applications, Initial Value Problem	Lecture	Continuous Assessment	2	13
1,2,6	Partial Differential Equations: Equations Forming, Solution Of Wave Equations, Solution Of Heat Equations, Solution By Laplace Transformation	Lecture	Continuous Assessment	2	14
1,2,6	Partial Differential Equations: Equations Forming, Solution Of Wave	Lecture	Continuous Assessment	2	15

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	Equations, Solution Of Heat Equations, Solution By Laplace Transformation				
1,2,6	Partial Differential Equations: Equations Forming, Solution Of Wave Equations, Solution Of Heat Equations, Solution By Laplace Transformation	Lecture	Final Examination	2	16

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	5, 10
Assignments	10%	2, 12
Report	10%	13
Midterm Exam	20%	7
Final Exam	50%	16

Learning and Teaching Resources

Resource	Details
Required Texts	ADVANCED ENGINEERING MATHEMATICS. Michael D. Greenberg
Recommended Texts	
Required Texts	ADVANCED ENGINEERING MATHEMATICS. Michael D. Greenberg

30. MTE316 - Corrosion Engineering

Course Name	Corrosion Engineering
Course Code	MTE314
Year / Semester	Third Year / Semester 7
Language	English
Total Study Hours / ECTS	75 Hours / 3 ECTS
Structured / Unstructured SWL	62 / 13 hours
Module Type	Core learning activity
Attendance Forms	Tutorial + Laboratory + Seminar
Course Administrator	Dr.. Hussain

Course Objectives**Course Learning Outcomes**

1. Define a clear process-design problem and establish an appropriate design basis.
2. Prepare process descriptions, material balances, energy balances, and process flow diagrams.
3. Select and preliminarily size major process equipment using engineering principles.
4. Incorporate safety, environmental, operability, and sustainability considerations into process decisions.
5. Apply introductory economic analysis to the proposed process.
6. Work effectively within a project team and manage tasks and deadlines.
7. Prepare and present a structured technical project report using accepted engineering conventions.

Teaching and Learning Strategies

Project-based learning is the principal approach. Students work individually and in teams under academic supervision to define the design basis, perform process calculations, prepare drawings and design documents, evaluate alternatives, and present progress. Regular project meetings, technical discussions, seminars, and written feedback support integration of knowledge from previous chemical-engineering courses.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	General introduction, which is include definition of corrosion, classification of corrosion, and passivation and immunity,	Lecture + Tutorial + Laboratory	Continuous Assessment	3	1
1,2,3,6	General introduction, which is include definition of corrosion, dry and wet corrosion, and passivation	Lecture + Tutorial + Laboratory	Continuous Assessment	3	2

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	and immunity,				
1,2,3,6	General introduction, which is include definition of corrosion, classification of corrosion, and passivation and immunity,	Lecture + Tutorial + Laboratory	Continuous Assessment	3	3
1,2,3,6	Basic of corrosion cell, and classification of metals according galvanic and electrochemical series.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	4
1,2,3,6	Classification and types of corrosions.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	5
1,2,3,6	Mechanism of corrosion for various types of corrosion processes.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	6
1,2,3,6	Basic information on corrosion cell.	Lecture + Tutorial + Laboratory	Midterm / Test	2	7
1,2,3,6	Mid Term Exam	Lecture + Tutorial + Laboratory	Continuous Assessment	3	8
1,2,3,6	Thermodynamic principle of corrosion processes.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	9
1,2,3,6	Kinetic principle of corrosion processes	Lecture + Tutorial + Laboratory	Continuous Assessment	3	10
1,2,3,6	Selection materials from galvanic series for corrosion protection.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	11
1,2,3,6	Cathodic protection	Lecture + Tutorial + Laboratory	Continuous Assessment	3	12
1,2,3,6	Anodic protection	Lecture + Tutorial + Laboratory	Continuous Assessment	3	13
1,2,3,6	Coating	Lecture +	Continuous	3	14

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
		Tutorial + Laboratory	Assessment		
1,2,3,6	Modification of the environment to prevent corrosion	Lecture + Tutorial + Laboratory	Continuous Assessment	3	15
1,2,3,6	Final Exam	Lecture + Tutorial + Laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Laboratory / Practical Weekly Plan

Stage	Practical / Project Activity
1	Literature review, design basis, process definition, and data collection
2	Material and energy balance calculations and process-flow development
3	Equipment sizing, simulation, and preparation of engineering calculations
4	Safety, environmental, and economic evaluation as required by the project
5	Preparation of drawings, results, final report, and project presentation

Course Evaluation

Assessment Plan

Assessment Method	Weight	Week / Notes
Project Progress / Assignments	20%	Continuous
Technical Report / Design Work	20%	Continuous
Seminar / Presentation	10%	During semester
Midterm Review	10%	Mid-semester
Final Project Assessment	40%	End of semester

Learning and Teaching Resources

Resource	Details
Required Texts	Gavin Towler and Ray Sinnott, Chemical Engineering Design.
Recommended Texts	Turton et al., Analysis, Synthesis, and Design of Chemical Processes; Peters, Timmerhaus and West, Plant Design and Economics for Chemical Engineers.
Websites / Electronic Resources	AspenTech educational documentation, AIChE resources, and relevant engineering standards and manufacturer data.

31. MTE317 - Engineering workshop

Course Name	Engineering workshop 1
Course Code	MTE317
Year / Semester	Fourth Year / Semester 7
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	77 / 48 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Marram

Course Objectives

engineering-based appreciation of unit operations and separation processes in the context of modern chemical processing. The course includes classical heat- and mass-transfer-based processes commonly used in the chemical and processing industries, as well as a selected range of processes for particulates' handling. On completion of this module, students should be able to:

Course Learning Outcomes

Demonstrate an understanding of the analysis of a range of separation processes in terms of equilibrium stages as applied to chemical, oil & gas processing systems.

Design and analyze batch and continuous binary systems to achieve a specified degree of separation.

Apply the preliminary design of multi-component systems.

Specify appropriate system configurations for mixing processes.

Design packed bed columns, based on the height and number of transfer units, and on the generalised pressure drop correlation.

Develop and apply the fundamental equations required for the design of fluidization systems.

Specify the configuration and operating conditions of a selected range of solid-liquid and solid-gas separation systems.

Teaching and Learning Strategies

Theoretical lecture will be given in class, using different technique. This will be supported by interactive tutorials and by laboratory experiments.

Scientific visit will be considered to industrial plants.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	General instructions and safety	Lecture + Tutorial + Laboratory	Continuous Assessment	3	1
1,2,3,6	Principle of Turning	Lecture + Tutorial + Laboratory	Continuous Assessment	3	2
1,2,3,6	Turning	Lecture + Tutorial + Laboratory	Continuous Assessment	3	3
1,2,3,6	Turning	Lecture + Tutorial + Laboratory	Continuous Assessment	3	4
1,2,3,6	Milling	Lecture + Tutorial + Laboratory	Continuous Assessment	3	5

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Milling	Lecture + Tutorial + Laboratory	Continuous Assessment	3	6
1,2,3,6	Drilling	Lecture + Tutorial + Laboratory	Midterm / Test	2	7
1,2,3,6	Mid Term Exam	Lecture + Tutorial + Laboratory	Continuous Assessment	3	8
1,2,3,6	Welding	Lecture + Tutorial + Laboratory	Continuous Assessment	3	9
1,2,3,6	Welding	Lecture + Tutorial + Laboratory	Continuous Assessment	3	10
1,2,3,6	Casting	Lecture + Tutorial + Laboratory	Continuous Assessment	3	11
1,2,3,6	Casting	Lecture + Tutorial + Laboratory	Continuous Assessment	3	12
1,2,3,6	CNC machine	Lecture + Tutorial + Laboratory	Continuous Assessment	3	13
1,2,3,6	CNC machine	Lecture + Tutorial + Laboratory	Continuous Assessment	3	14
1,2,3,6	CNC machine	Lecture + Tutorial + Laboratory	Continuous Assessment	3	15
1,2,3,6	Final Exam	Lecture + Tutorial + Laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
Required Texts	Corrosion engineering by Mars G. Fontana
Recommended Texts	
Websites	
Required Texts	Corrosion engineering by Mars G. Fontana
Recommended Texts	
Websites	
Required Texts	Corrosion engineering by Mars G. Fontana

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Lab 1: corrosive solution.	Lab 1: corrosive solution.
Lab 2: pitting corrosion.	Lab 2: pitting corrosion.
Lab 3: weight loss measurement of corrosion.	Lab 3: weight loss measurement of corrosion.

32. MTE321 - Testing of Engineering Materials

Course Name	Testing of Engineering Materials
Course Code	MTE321
Year / Semester	Third Year / Semester 7
Language	English
Total Study Hours / ECTS	150 Hours / 6 ECTS
Structured / Unstructured SWL	87 /63 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Mohammed Majeed

Course Objectives

1. This module aims to comprehensively understand the properties of engineering materials.
2. Learning the methods of destructive and nondestructive tests.
3. Understand the mechanisms of test instruments.
4. Learning the preparation of test specimens, and choosing test conditions.

Evaluation the test results.

Course Learning Outcomes

Understand and recognize between the main properties of engineering materials, and distinguish between destructive and nondestructive tests.

Understand mechanisms of hardness test, prepare the samples, execute process, and evaluate results.

Understand mechanisms of tensile test, prepare the samples, execute process, and evaluate results.

Understand mechanisms of compression test, prepare the samples, execute process, and evaluate results.

Understand mechanisms of shear test, prepare the samples, execute process, and evaluate results.

Understand mechanisms of impact test, prepare the samples, execute process, and evaluate results.

Understand mechanisms of creep test, prepare the samples, execute process, and evaluate results.

Understand mechanisms of fatigue test, prepare the samples, execute process, and evaluate results.

Understand mechanisms of sheet metal tests, prepare the samples, execute process, and evaluate results.

Understand mechanisms of visual inspection & liquid penetration inspection, prepare the samples, execute process, and evaluate results.

Understand mechanisms of magnetic particle inspection, prepare the samples, execute process, and evaluate results.

Understand mechanisms of eddy current test, prepare the samples, execute process, and evaluate results.

Understand mechanisms of Ultrasonic testing test, prepare the samples, execute process, and evaluate results.

Teaching and Learning Strategies

Visual inspection & Liquid penetrant inspection – direct & indirect V.I., essential steps in penetrant inspection, advantages & limitations, applications. [6 hrs.]

Magnetic particle inspection – magnetisation & magnetisation methods, sensitives, demagnetization, particles, applications, advantages & limitations. [6 hrs.]

Eddy current testing – conductivity of a material, magnetic properties, lift-off and edge effects, skin effect, inspection frequency, coil arrangements & probes, reference pieces. [6 hrs.]

Ultrasonic testing – wave length and frequency, generation of ultrasound, characteristics of an ultrasonic beam, wave reflection, transmission and refraction, attenuation, probe construction. [6 hrs.]

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Introduction to Destructive-nondestructive tests. Mechanical Properties, and	Lecture + Tutorial + Laboratory	Continuous Assessment	3	1

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	applications to Eng. Materials.				
1,2,3,6	Hardness test of engineering materials.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	2
1,2,3,6	Hardness test of engineering materials-continue.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	3
1,2,3,6	Tensile test of engineering materials.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	4
1,2,3,6	Tensile test of engineering materials-continue.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	5
1,2,3,6	Compression and shear tests of engineering materials.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	6
1,2,3,6	Impact test of engineering materials.	Lecture + Tutorial + Laboratory	Continuous Assessment	2	7
1,2,3,6	Creep test of engineering materials.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	8
1,2,3,6	Fatigue test of engineering materials.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	9
1,2,3,6	Sheet Metal Tests.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	10
1,2,3,6	Visual inspection & Liquid penetrant inspection.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	11
1,2,3,6	Magnetic particle inspection	Lecture + Tutorial + Laboratory	Continuous Assessment	3	12
1,2,3,6	Eddy current testing	Lecture + Tutorial + Laboratory	Continuous Assessment	3	13
1,2,3,6	Ultrasonic testing	Lecture + Tutorial + Laboratory	Continuous Assessment	3	14
1,2,3,6	Preparatory week before	Lecture + Tutorial + Laboratory	Continuous Assessment	3	15

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	the final Exam				
1,2,3,6	Final Exam	Lecture + Tutorial + Laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: measuring the density of petroleum and gas
2	Lab 2: : measuring the viscosity of petroleum
3	Lab 3: Combustion characteristics of petroleum and gas
4	Lab 4: Smoke point
5	Lab 5: Flash and fire point
6	Lab 6: Aniline point
7	Lab 7: petroleum distillation 4

Course Evaluation

Assessment Method		Weight		Week / Notes		
Formative assessment	Quizzes	Formative assessment	Quizzes	Formative assessment	Quizzes	3, 6, 9, 14
	Assignments		Assignments		Assignments	3, 5, 7
	Projects / Lab.		Projects / Lab.		Projects / Lab.	Continuous
	Report		Report		Report	- -
Summative assessment	Midterm Exam	Summative assessment	Midterm Exam	Summative assessment	Midterm Exam	1h8
	Final Exam		Final Exam		Final Exam	3hr6
Total assessment		Total assessment		Total assessment		
Formative assessment	Quizzes	Formative assessment	Quizzes	Formative assessment	Quizzes	3, 6, 9, 14
	Assignments		Assignments		Assignments	3, 5, 7
	Projects / Lab.		Projects / Lab.		Projects / Lab.	Continuous
	Report		Report		Report	- -
Summative assessment	Midterm Exam	Summative assessment	Midterm Exam	Summative assessment	Midterm Exam	1h8
	Final Exam		Final Exam		Final Exam	3hr6
Total assessment		Total assessment		Total assessment		

Formative assessment	Quizzes	Formative assessment	Quizzes	Formative assessment	Quizzes	30	6, 9, 14
	Assignments		Assignments		Assignments		33 5, 7
	Projects / Lab.		Projects / Lab.		Projects / Lab.	Continuo	
	Report		Report		Report		- -
Summative assessment	Midterm Exam	Summative assessment	Midterm Exam	Summative assessment	Midterm Exam		1h8
	Final Exam		Final Exam		Final Exam		3h6
Total assessment		Total assessment		Total assessment			

Learning and Teaching Resources

Resource	Details
Required Texts	Different teaching methods are normally applied within this module in order to support student learning. These include in-class theoretical teaching, refining and expanding their critical thinking skills. In-lap experimental learning activities are also provided. With the progress of students in stages of learning, quizzes and lap reports are performed based on schedule.
Recommended Texts	Different teaching methods are normally applied within this module in order to support student learning. These include in-class theoretical teaching, refining and expanding their critical thinking skills. In-lap experimental learning activities are also provided. With the progress of students in stages of learning, quizzes and lap reports are performed based on schedule.
Websites / Electronic Resources	Different teaching methods are normally applied within this module in order to support student learning. These include in-class theoretical teaching, refining and expanding their critical thinking skills. In-lap experimental learning activities are also provided. With the progress of students in stages of learning, quizzes and lap reports are performed based on schedule.

33. MTE322 - Corrosion Protection

Course Name	Corrosion Protection
Course Code	MTE322
Year / Semester	Third Year / Semester 7
Language	English
Total Study Hours / ECTS	87 Hours / 7 ECTS
Structured / Unstructured SWL	87/88 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial
Course Administrator	Dr. Hasina

Course Objectives

1. To understand the principle for corrosion.
2. To have knowledge on types of corrosion.
3. To understand the mechanism for corrosion.
4. To be familiar with Practical corrosion problem.
5. To understand methods and types of protection from corrosion.

Course Learning Outcomes

Students will have knowledge on effect of chemical on engineering parts in different industrial applications. Students will be able to express on problem of corrosion and suggestion solution by oral presentation or written reports.

Students will take responsibility to contribute to industrial society by acquired information during study.

Teaching and Learning Strategies

Assignments, reports, seminars, and examination work are expected to be the sole effort of the student submitting the work. Students are expected to follow The University of Al-Qadisiyah Regulations and should expect that every instance of a suspected violation will be reported. All students are obliged to follow the code of academic responsibility. Cheating in any form will be prosecuted to the full extent possible. Discussing homework is allowed and encouraged, but blind copying is NOT acceptable.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	General introduction, which is include definition of corrosion, classification of corrosion, and passivation and immunity,	Lecture + Tutorial	Continuous Assessment	3	1
1,2,3,6	General introduction, which is include definition of corrosion, dry and wet corrosion, and passivation and immunity,	Lecture + Tutorial	Continuous Assessment	3	2
1,2,3,6	General	Lecture + Tutorial	Continuous Assessment	3	3

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	introduction, which is include definition of corrosion, classification of corrosion, and passivation and immunity,				
1,2,3,6	Basic of corrosion cell, and classification of metals according galvanic and electrochemical series.	Lecture + Tutorial	Continuous Assessment	3	4
1,2,3,6	Classification and types of corrosions.	Lecture + Tutorial	Continuous Assessment	3	5
1,2,3,6	Mechanism of corrosion for various types of corrosion processes.	Lecture + Tutorial	Continuous Assessment	3	6
1,2,3,6	Basic information on corrosion cell.	Lecture + Tutorial	Midterm / Test	2	7
1,2,3,6	Mid Term Exam	Lecture + Tutorial	Continuous Assessment	3	8
1,2,3,6	Thermodynamic principle of corrosion processes.	Lecture + Tutorial	Continuous Assessment	3	9
1,2,3,6	Kinetic principle of corrosion processes	Lecture + Tutorial	Continuous Assessment	3	10
1,2,3,6	Selection materials from galvanic series for corrosion protection.	Lecture + Tutorial	Continuous Assessment	3	11
1,2,3,6	Cathodic protection	Lecture + Tutorial	Continuous Assessment	3	12
1,2,3,6	Anodic protection	Lecture + Tutorial	Continuous Assessment	3	13
1,2,3,6	Coating	Lecture + Tutorial	Continuous Assessment	3	14

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Modification of the environment to prevent corrosion	Lecture + Tutorial	Continuous Assessment	3	15
1,2,3,6	Final Exam	Lecture + Tutorial	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: First order control system
2	Lab 2: Second order non- interacted system
3	Lab 3: Second order interacted system
4	Lab 4: Continuous stirred tank heater
5	Lab 5: Temperature control
6	Lab 6: Level control
7	Lab 7: concentration control

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Practice, 4th Edition. Authors: George Stephanopoulos Process Dynamics and Control, 4th Edition, Dale E. Seborg,
Recommended Texts	Thomas F. Edgar, Duncan A. Mellichamp, Francis J. Doyle III https://www.coursera.org/browse/physical-science-and-engineering/chemical
Websites / Electronic Resources	Engineering

34. MTE323 - Machining Processes of Eng. Materials

Course Name	Machining Processes of Eng. Materials
Course Code	MTE323
Year / Semester	Fourth Year / Semester 7
Language	English
Total Study Hours / ECTS	150 Hours / 6 ECTS
Structured / Unstructured SWL	87 / 63 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Ahmad

Course Objectives

1. To develop an understanding of machining theories.
2. To develop problem solving skills and machining process design.
3. To upgrade student knowledge of different machining processes.
4. To learn how to deal with machines in practical part of semester.
5. To understand cutting tools (materials, geometry and applications).
6. To specify cutting condition for each machining process.

Course Learning Outcomes

1. Realizing the cutting mechanism by orthogonal cutting theory.
2. Knowing machine tool (definition, functions requirements).
3. Students will be able to recognize the following Traditional machining processes [turning, milling, drilling, shaping, grinding, broaching and sawing].
4. Students will be able to recognize the following Traditional machining processes [USM, WJM, AWJ, AJM, IBM, EBM, LBM, PAM, EDM and ECM]
5. Selecting the right process and tool and design machining tool-path for a specific product.

Teaching and Learning Strategies

Indicative content includes the following. Part A – Traditional machining processes

Introduction and machining aspects, manufacturing processes classification, part geometry, generating machining and form machining, orthogonal cutting model, cutting forces, cutting power, cutting temperature. [12 hrs] Turning and related operations, drilling operation. [8 hrs] Milling operation. [4 hrs] Shaping and planning, grinding, sawing and broaching. [12 hrs] Cutting tool technology [8 hrs] Revision problem classes [4 hrs] Part B – Non-traditional machining operations Mechanical NTM [USM, WJM, AJM, MAF]. [12 hrs] Examinations, Quizzes and assignments [7 hrs]

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Introduction – manufacturing processes classification- machining definition- part geometry	Lecture + Tutorial + Laboratory	Continuous Assessment	3	1
1,2,3,6	Orthogonal cutting model-	Lecture + Tutorial + Laboratory	Continuous Assessment	3	2
1,2,3,6	Cutting forces - Cutting power and temperature	Lecture + Tutorial + Laboratory	Continuous Assessment	3	3
1,2,3,6	Traditional Machining operations, 1- turning	Lecture + Tutorial + Laboratory	Continuous Assessment	3	4
1,2,3,6	Traditional Machining operations, 2- drilling	Lecture + Tutorial + Laboratory	Continuous Assessment	3	5
1,2,3,6	Traditional Machining operations, 3- milling	Lecture + Tutorial + Laboratory	Continuous Assessment	3	6
1,2,3,6	Traditional Machining operations, 4- shaping and planning.	Lecture + Tutorial + Laboratory	Continuous Assessment	2	7
1,2,3,6	Traditional Machining operations, 5- grinding, sawing and broaching.	Lecture + Tutorial + Laboratory	Continuous Assessment	3	8
1,2,3,6	Mid Term	Lecture + Tutorial + Laboratory	Continuous Assessment	3	9

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	Exam				
1,2,3,6	Cutting tool technology [Tool geometry, tool materials, tool life]	Lecture + Tutorial + Laboratory	Continuous Assessment	3	10
1,2,3,6	Mechanical Non-Traditional Machining operations, 1-USM, 2-WJM, 3-AJM	Lecture + Tutorial + Laboratory	Continuous Assessment	3	11
1,2,3,6	Thermal Non-Traditional Machining operations, 4-EDM, 5-LBM, 6-PAM, 7-EBM	Lecture + Tutorial + Laboratory	Continuous Assessment	3	12
1,2,3,6	Chemical Non-Traditional Machining operations, , 8-CHM, 9-ECM	Lecture + Tutorial + Laboratory	Continuous Assessment	3	13
1,2,3,6	Seminar discussion	Lecture + Tutorial + Laboratory	Project / Report	3	14
1,2,3,6	Syllabus Review	Lecture + Tutorial + Laboratory	Continuous Assessment	3	15
1,2,3,6	Final Examination	Lecture + Tutorial + Laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: Introduction-PFD design using Aspen Hysys
2	Lab 2: Example of PFD design using Aspen Plus
3	Lab 3: Material Balance design using Aspen Hysys
4	Lab 4: Energy Balance design using Aspen Hysys
5	Lab 5: Cost estimation using Aspen Hysys
6	Lab 6: Example 1 for plant design using Aspen Hysys
7	Lab 7: Example 2 for plant design using Aspen Plus

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester

Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Fundamentals of modern manufacturing by M. K. Groover
Recommended Texts	None
Websites	None

35. MTE324 - Heat Treatments

Course Name	Heat Treatments
Course Code	MTE324
Year / Semester	Third Year / Semester 2
Language	English
Total Study Hours / ECTS	100 Hours / 4 ECTS
Structured / Unstructured SWL	58 / 48 hours
Module Type	Core learning activity
Attendance Forms	Lecture
Course Administrator	Dr. Saleh

Course Objectives

1-The course will highlight a number of commercially significant applications where phase transformations due to heat treatment are important.

2-To introduce fundamental concepts relevant to phase diagrams, phase transformations and heat treatment of metals and alloys.

3- To study the phase changes that occurs during both thermal and thermomechanical treatments.

Course Learning Outcomes

10. 1-Understand the effect of heat treatment on the microstructure of the materials.
11. 2- Understand the role of phase transformations with respect to heat treatment on the development of microstructure.
12. 3- Understand the properties of metallic materials...
13. Introduction to heat treatment, Deformation and recrystallization. Heat treatment of carbon steel: All types of annealing, Isothermal annealing, Spheroidising, Homogenization, Normalizing. Hardening, Phase diagrams of carbon steel. TTT diagrams, Effects of alloying elements on TTT diagrams. Cooling curves of TTT diagrams. Tempering, Austempering and Martempering. Heat treatment of Cast Iron (CI). Heat treatment of white and ductile CI. Heat treatment of gray CI. Heat treatment of alloy steel. Heat treatment of Al and its alloys. Heat treatment of Ti alloys. Heat treatment of materials using electron beam method. Induction hardening and Laser hardening.

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,4,5,7	Introduction to heat treatment.	Lecture	Continuous Assessment	3	1
1,4,5,7	Deformation and recrystallization.	Lecture	Continuous Assessment	3	2

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,4,5,7	Heat treatment of carbon steel	Lecture	Continuous Assessment	3	3
1,4,5,7	Isothermal annealing, Spheroidising, Homogenization,	Lecture	Continuous Assessment	3	4
1,4,5,7	Normalizing , Hardening.	Lecture	Continuous Assessment	3	5
1,4,5,7	Tempering, Austempering and Martempering.	Lecture	Continuous Assessment	3	6
1,4,5,7	TTT diagrams, Effects of alloying elements on TTT diagrams.	Lecture	Continuous Assessment	2	7
1,4,5,7	Cooling curves of TTT diagrams.	Lecture	Continuous Assessment	3	8
1,4,5,7	Heat treatment of Cast Iron (CI).	Lecture	Continuous Assessment	3	9
1,4,5,7	Heat treatment of alloy steel.	Lecture	Continuous Assessment	3	10
1,4,5,7	Heat treatment of Al and its alloys.	Lecture	Continuous Assessment	3	11
1,4,5,7	Heat treatment of Cu and its alloys.	Lecture	Continuous Assessment	3	12
1,4,5,7	Heat treatment of Ti alloys.	Lecture	Continuous Assessment	3	13
1,4,5,7	Induction hardening.	Lecture	Continuous Assessment	3	14
1,4,5,7	Laser hardening.	Lecture	Continuous Assessment	3	15
1,4,5,7	Heat treatment of materials using electron beam method.	Lecture	Final Examination	2	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes,	40%	Throughout the semester

assignments, reports, laboratory/practical work, projects or seminars as applicable)		
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Caroline Whitbeck, Ethics in Engineering Practice and Research.
Recommended Texts	Mike W. Martin and Roland Schinzinger, Ethics in Engineering.
Websites / Electronic Resources	Professional engineering codes of ethics, university e-learning materials, and recognized engineering-ethics resources.

36. MTE325 - Analytical Analysis

Course Name	Analytical Analysis
Course Code	MTE325
Year / Semester	Thrid Year / Semester5
Language	English
Total Study Hours / ECTS	100 Hours / 4 ECTS
Structured / Unstructured SWL	58 / 42 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial
Course Administrator	Amad

Course Objectives

1. Treatment of ordinary and partial differential equations and their applications.

Teaching students' ways to solve ordinary and partial differential equations and how to use them to solve engineering problems, in addition to numerical methods for processing a system of linear equations and how to use them in engineering applications.

Course Learning Outcomes

Explain the functions of planning, organizing, leading, and controlling in industrial organizations.

Apply basic production planning, capacity, inventory, and scheduling concepts.

Use project-management tools including work breakdown, Gantt charts, CPM/PERT, and risk registers.

Interpret basic quality-management, maintenance, and reliability indicators.

Evaluate engineering-management decisions considering cost, safety, people, environment, and productivity.

Work in teams to analyze an industrial-management case and communicate recommendations professionally.

Teaching and Learning Strategies

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Role of industrial management in	Lecture + Tutorial / Case Study	Continuous Assessment	3	1

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	chemical/process industries				
1,2,3,6	Introductions, Finite Method	Lecture + Tutorial / Case Study	Continuous Assessment	3	2
1,2,3,6	Introductions, Finite Method	Lecture + Tutorial / Case Study	Continuous Assessment	3	3
1,2,3,6	Introductions, Finite Method	Lecture + Tutorial / Case Study	Continuous Assessment	3	4
1,2,3,6	Solution Method	Lecture + Tutorial / Case Study	Continuous Assessment	3	5
1,2,3,6	Solution Method	Lecture + Tutorial / Case Study	Continuous Assessment	3	6
1-4	Solution Method	Lecture + Tutorial / Case Study	Midterm / Test	2	7
1,2,3,6	Equations Of Difference	Lecture + Tutorial / Case Study	Continuous Assessment	3	8
1,2,3,6	Equations Of Difference	Lecture + Tutorial / Case Study	Continuous Assessment	3	9
1,2,3,6	Numerical Solution Of P.D.F	Lecture + Tutorial / Case Study	Continuous Assessment	3	10
1,2,3,6	Numerical Solution Of P.D.F	Lecture + Tutorial / Case Study	Continuous Assessment	3	11
1,2,3,6	Numerical Solution Of P.D.F	Lecture + Tutorial / Case Study	Continuous Assessment	3	12
1,2,3,6	Numerical Solution Of P.D.F	Lecture + Tutorial / Case Study	Continuous Assessment	3	13
1,2,3,6	Double Integration Method	Lecture + Tutorial / Case Study	Continuous Assessment	3	14
1,2,3,6	Double Integration	Lecture + Tutorial / Case Study	Continuous Assessment	3	15

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	Method	Study			
All	Double Integration Method	Lecture + Tutorial / Case Study	Final Examination / Review	2	16

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments	10%	3, 12
Case Study / Project	10%	6, 13
Report / Presentation	10%	14
Midterm Exam	10%	7
Final Exam	50%	16
Laboratory	0%	N/A
Other	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	Numerical Analysis, Richard L. Burden and J. Douglas Faires.
Recommended Texts	
Websites	https://www.coursera.org

54. MTE326 - Material and resources of renewable energy

Course Name	Material and resources of renewable energy
Course Code	MTE326
Year / Semester	Third Year / Semester 7
Language	English
Total Study Hours / ECTS	100Hours / 2 ECTS
Structured / Unstructured SWL	32 / 18 hours
Module Type	Core learning activity
Attendance Forms	Lecture
Course Administrator	Dhay

Course Objectives

1. To understand the principle for corrosion.
2. To have knowledge on types of corrosion.
3. To understand the mechanism for corrosion.
4. To be familiar with Practical corrosion problem.

5. To understand methods and types of protection from corrosion.

Course Learning Outcomes

- 1- Students will have knowledge on effect of chemical on engineering parts in different industrial applications.
- 2- Students will be able to express on problem of corrosion and suggestion solution by oral presentation or written reports.

Students will take responsibility to contribute to industrial society by acquired information during study.

Teaching and Learning Strategies

Theoretical lecture will be given in class, using different technique. This will be supported by interactive tutorials and by laboratory experiments. Scientific visit will be considered to industrial plants.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Introduction to sustainability and sustainable development goals	Interactive Lecture + Case Study	Continuous Assessment	2	1
1,2,3,6	Systems thinking, boundaries and sustainability indicators	Interactive Lecture + Case Study	Continuous Assessment	2	2
1,2,3,6	Material efficiency, atom economy and waste prevention	Interactive Lecture + Case Study	Continuous Assessment	2	3
1,2,3,6	Energy efficiency and process integration concepts	Interactive Lecture + Case Study	Continuous Assessment	2	4
1,2,3,6	Green engineering and inherently safer design	Interactive Lecture + Case Study	Continuous Assessment	2	5
1,2,3,6	Life-cycle thinking and life-cycle assessment	Interactive Lecture + Case Study	Continuous Assessment	2	6

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	framework				
1-4	Midterm examination / case review	Interactive Lecture + Case Study	Midterm / Test	2	7
1,2,3,6	Life-cycle inventory and impact categories: introductory calculations	Interactive Lecture + Case Study	Continuous Assessment	2	8
1,2,3,6	Solar Energy Materials & Solar Cells	Interactive Lecture + Case Study	Continuous Assessment	2	9
1,2,3,6	Introduction to Photothermal Nanomaterials	Interactive Lecture + Case Study	Continuous Assessment	2	10
1,2,3,6	Classification of Photothermal Materials 1.3.1 Plasmonic Metal Nanostructures	Interactive Lecture + Case Study	Continuous Assessment	2	11
1,2,3,6	Semiconductors, Carbon-based Materials	Interactive Lecture + Case Study	Continuous Assessment	2	12
1,2,3,6	Polymer-based Materials	Interactive Lecture + Case Study	Continuous Assessment	2	13
1,2,3,6	Applications of Photothermal Materials	Interactive Lecture + Case Study	Continuous Assessment	2	14
1,2,3,6	Monocrystalline solar cell	Interactive Lecture + Case Study	Continuous Assessment	2	15
All	Polycrystalline solar cell	Interactive Lecture + Case Study	Final Examination / Review	2	16

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments	10%	3, 12
Case Study / Project	10%	6, 13
Report / Presentation	10%	14

Assessment Method	Weight	Week Due (if stated)
Midterm Exam	10%	7
Final Exam	50%	16
Laboratory	0%	N/A
Other	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	Allen, D. T. and Shonnard, D. R. Sustainable Engineering: Concepts, Design and Case Studies.
Recommended Texts	Allen, D. T. and Shonnard, D. R. Green Engineering: Environmentally Conscious Design of Chemical Processes.
Websites / Electronic Resources	UN Sustainable Development Goals resources; EPA life-cycle and green-engineering resources

37. MTE327 - Programming–II

Course Name	Programming–II
Course Code	MTE327
Year / Semester	Third Year / Semester8
Language	English
Total Study Hours / ECTS	125 Hours / 3 ECTS
Structured / Unstructured SWL	73 / 52hours
Module Type	Core learning activity
Attendance Forms	Tutorial + Laboratory + Seminar
Course Administrator	Lithe

Course Objectives

The purpose of CAD is to optimize and streamline the designer's workflow, increase productivity, improve the quality and level of detail in the design, improve documentation communications and often contribute toward a manufacturing design database..

Course Learning Outcomes

1. Use CAD software to create model of parts.
2. Use CAD tools for manipulating and modifying drawing elements.
3. Create assemblies and drafts using CAD.
4. Read and interpret diagrams, their symbols, dimensions, tolerances and projections.
5. Identify title block information, explain documentation systems.

Identify the different kinds of diagrams and classify them.

Teaching and Learning Strategies

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Introduction to SolidWorks	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	1
1,2,3,6	Basics of tools	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	2
1,2,3,6	How to create 2D sketches	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	3
1,2,3,6	Adding dimensions and relations	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	4
1,2,3,6	Converting 2D sketches to 3D geometries	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	5
1,2,3,6	Making a variety of geometries	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	6
1-4	Selecting materials	Tutorial +	Midterm / Test	2	7

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	for geometries	Laboratory + Seminar / Project Supervision			
1,2,3,6	Changing properties of some materials	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	8
1,2,3,6	Changing appearance and render	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	9
1,2,3,6	Doing some assembly for a variety of applications	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	10
1,2,3,6	Using mate in assembly	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	11
1,2,3,6	Creating drawing sheet	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	12
1,2,3,6	Adding all views and ISO to drawing sheet	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	13
1,2,3,6	Adding all materials and their properties to sheet table	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	14
1,2,3,6	Adding simples and notes to sheet	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	3	15

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
All	Preparatory week before the final Exam	Tutorial + Laboratory + Seminar / Project Supervision	Final Examination / Review	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Project simulation and stream-table verification
2	Equipment-sizing calculations and design spreadsheets
3	Process-flow-diagram / P&ID development
4	Safety and relief-system calculations / HAZOP-style review
5	Economic evaluation spreadsheet / cost estimation
6	Integrated process simulation and optimization
7	Final drawings, model files and technical-report compilation

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Formative assessment	Quizzes	2
Design Calculations and Technical Quality	Assignments	2
Simulation / Drawings / Project Artifacts	Projects / Lab.	1
Safety, Environmental and Economic Evaluation	Report	1
Summative assessment	Midterm Exam	2 hr
Oral Presentation and Viva	Final Exam	2hr
Total assessment	100% (100 Marks)	
Formative assessment	Quizzes	2

Learning and Teaching Resources

Resource	Details
Required Texts	Onwubolu, G., 2013. <i>A Comprehensive Introduction to SolidWorks 2012</i> . SDC publications.
Recommended Texts	Matsson, J.E., 2013. <i>An Introduction to SolidWorks Flow Simulation 2013</i> . SDC publications.
Websites	https://www.solidworks.com/