هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**Introduction to Engineering Material**
Course Code:	**113MMET**
Program:	**Mechanical Maintenance Engineering Technology**
Department:	**Mechanical Engineering Technology**
College:	**College of Applied Industrial Technology**
Institution:	**Jazan University**
Version:	**V2022**
Last Revision Date:	**24/01/2023**

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	3				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered: 3rd Level/ 1st Year					
4. Course general Description This subject deals with the materials commonly used in various engineering applications and manufacturing processes, differences in commonly used metals, non-metals, polymers, ceramics, and alloys. This is an introductory course which provides the basic theoretical and practical skills on materials science. The course contents may include definition of basic terms used in materials science, types of materials and structures, materials properties, physics and chemistry principles related to materials structure to their properties, the crystalline structure, characteristics of crystal planes & directions crystal defects and their effects on properties, and the phase diagrams for solid materials.					
5. Pre-requirements for this course (if any): 091PHY Physics					
6. Co- requirements for this course (if any): None					
7. Course Main Objective(s) The **primary objective** is to present the basic fundamentals on a level appropriate for college students who have completed their freshmen physics, chemistry and mathematics. To achieve this goal it has endeavored that is familiar to the students who is encountering the discipline of Engineering material for the first time and also to explain other unfamiliar terms.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	44	100
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	22
2.	Laboratory/Studio	22
3.	Field	-
4.	Tutorial	-
5.	Others (specify)	-
	Total	44

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe the Concept of Materials Science, Materials Engineering, physical properties of the material and Elements atomic structure.	K12	Lecture, active learning, discussion	Quizzes, Assignments, & exams
1.2				
…				
2.0	Skills			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Utilize the structure-process-properties relationship to enhance properties of a material .	S12	Lecture, active learning, discussion	Quizzes, Assignments, & exams
2.2	Calculate packing factor & density of crystal structure & Relative Amounts of Ferrite, Cementite, and Pearlite Micro constituents	S21	Lecture, active learning, discussion	Quizzes, Assignments, & exams
2.3	Apply various processes of materials system in order to produce desired structure and properties of the material.	S23	Lecture, active learning, discussion	Quizzes, Assignments, & exams
2.4	Conduct various Experiments to evaluate properties of Material	S41	Lecture, active learning, discussion	Assessing Experiment data
3.0	Values, autonomy, and responsibility			
3.1	Participate in Team work, Timely completion of Lab reports	V1.3	Class room activities	Class room activities
3.2	Recognize that materials engineering is diverse and continuously evolving and that finding solutions may involve exploring new knowledge using multiple sources.	V2.1	Self Study	Report Presentation
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C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction :** Material Science & Engineering Material. Why studying Material Science and Engineering? Classifications of materials with properties that determine their applicability. Four components that are involved in the design, production, and utilization of materials, and their interrelationships.Three criteria that are important in the materials selection process.	3
2.	**Atomic Structure & Bonding :** Introduction, Fundamental Concept, Atomic Structure, Atomic Bonding	1
3	**Metallic Crystal Structure :** Introduction, Fundamental Concept, Unit Cell, Crystal Structure, Metallic Crystal Structure, Density Computation, Polycrystalline Material, Non Crystalline or Amorphous Solids	4
4	**Impurities & Diffusion :** Introduction, Impurities in Solids, Solid Solution, Diffusion , Impurities & Diffusion, Mechanism of Strengthening, Recovery, Recrystallization and Grain Growth.	2
5	**Phase Diagram :** Introduction, Unary Phase Diagram, Binary Phase Diagram, Iron- Iron Carbide Phase Diagram	4
6	**Metals Alloy & Forming Process:** Introduction, Ferrous Alloys, Non Ferrous Alloys, Forming Process	3
7	**Thermal Process :** Introduction, Types of Heat Treatment	3
8	Quiz and Test	2
Total		22

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	4th , 6th & 9th week	13%
2.	Lab Experiments	4th – 9th week	15%
3.	Self Study Report & Viva Voce	10th Week	7%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4	Formative Assessment Exam	7th Week	15%
5	Final Exam	As per schedule	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Material Science and Engineering an Introduction, Willium D. Callister, Jr. ; David G. Rethwisch- John Wiley & Sons Inc.
Supportive References	Class Notes
Electronic Materials	*Audio/ Video*
Other Learning Materials	Not utilized

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratory with hardness tester, microscopic structure observation, furnaces & other equipment related to Engineering material - Under graduate level.
Technology equipment (projector, smart board, software)	Available
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Class Teacher	Quiz, Test, Exam
Effectiveness of students assessment	Class Teacher	Servey
Quality of learning resources	Institution	Online Direct Survey
The extent to which CLOs have been achieved	Course Coordinator	Direct Survey
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	MET
REFERENCE NO.	CAITMET20232
DATE	25/01/2023