Course Specification
(Bachelor)

Course Title: Materials Science
Course Code: PHYS 0485
Program: BSc in Physics
Department: Physics
College: College of Science
Institution: Majmaah University
Version: 2
Last Revision Date: 30/12/2024

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A. General information about the course:

1. Course Identification

1. Credit hours: 3 (3, 0, 0)					
2. Course type					
A.	☐ University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered:					
4. Course General Description:					
This course aims to provide fundamental knowledge of the types of materials, their uses, properties, and characteristics, which are important in engineering design. It is also intended to provide a theoretical background for the analysis of the behavior of engineering materials, emphasizing important relationships between internal structure and properties. It attempts to present ways of modifying and controlling the material microstructures and especially mechanical properties (toughness, strength, fatigue, and creep resistance) by suitable heat treatment operations.					
5. Pre-requirements for this course (if any)**:**					
Solid State Physics 1 PHYS 0381					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
Aim of this course is to provide the fundamentals of Materials Science.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

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

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.2	**Recognizing the different mechanical properties and interpreting them.**	**K2**	Lectures In-class discussions Exercises	Exams Homework Classwork Quizzes
2.0	**Skills**			
2.1	Analyzing the stress-strain diagrams and extracting all necessary information from them.	**S1**	Lectures In-class discussions Exercises	Exams Homework Classwork Quizzes
2.4	Discriminating between the different types of phase diagrams and extracting all necessary information from it.	**S4**	Lectures In-class discussions Exercises	Exams Homework Classwork Quizzes
3.0	**Values, autonomy, and responsibility**			
3.2	Work in a group and learn time management.	**V2**	Class discussions. Making students aware about time management.	Evaluation of group reports and individual contribution

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			Counsel students on how to make a good presentation. Encourage students to help each other	within the group. Self- assessment

C. Course Content

No	List of Topics	Contact Hours
1.	Classification of materials	3
2.	Structure of crystalline solids	6
3.	Imperfections in solids	6
4.	Diffusion	3
5.	Mechanical properties of metals	6
6.	Dislocations and strengthening mechanics	3
7.	Phase diagrams	6
8.	Phase transformations	6
9.	Applications and processing of metal alloys	6
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First exam	7	**15**
2.	Second exam	12	**15**
3.	Final exam	End of the semester	**40**
4.	Homework	Every week	**10**
5.	E-exam	one time/ semester	**5**
6.	Quizzes	End of topics	**5**
7.	Presentation/Discussions	7	**10**

*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	**Materials science and engineering introduction**; *W. D. Callister and D. G. Rethwisch*; Wiley; 9th edition; (2013).
Supportive References	▪ Journal of Materials Science ▪ Journal of Materials Science & Technology ▪ International Journal of Materials Science ▪ Journal of Semiconductor Technology ▪ Journal of Materials Science Letters.
Electronic Materials	▪ http://demonstrations.wolfram.com ▪ http://www.engineersedge.com/manufacturing_menu.shtml ▪ http://www.nist.gov/mml/ ▪ http://www3.fi.mdp.edu.ar/ingpolimeros/en ▪ http://faculty.mu.edu.sa/mkamran
Other Learning Materials	▪ Excel software for drawing graphs in the lab. ▪ MS Office for writing reports and presentations.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Furnished Lecture Room equipped with smart board and computer.
Technology equipment (projector, smart board, software)	Computational Lab with proper software.
Other equipment (depending on the nature of the specialty)	Library, Seminar Room, and Wi-Fi internet connections.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Subject Teacher	Statistical Analysis
Effectiveness of Students' assessment	Quality Director	Survey
Quality of learning resources	Subject Teacher	Meetings with Students
The extent to which CLOs have been achieved	Program Leaders	Survey
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department council
REFERENCE NO.	16
DATE	30/12/2024