



The University of Jordan
School of Engineering
Industrial Engineering Department
Fall 2019/ 2020

Course name:	<i>Materials Science</i>		
Course code:	IE 0906275		
Credits hours	2		
Contact hours/room:	Section 1: 12:00 – 13:00 (Sun, Tue) @ Mech 103 Section 2: 08:00 – 09:00 (Mon, Wed) @ Al-Mazar OH: 09:00 -09:30 Mon, and Wed. 13:00 – 14:00 Sun, and Tue.		
Course instructor's name, E-mail, and phone:	Dr. Yazan Al-Zain y.alzain@ju.edu.jo 22732		
Course Coordinator:	NA		
Text book:	William D Callister, Materials Science and Engineering , 9 th Edition, Wiley publishers. (Text Book)		
Other reference(s):	Principles of Modern Manufacturing 5th edition, by Mikel Groover, Wiley Publishers		
Course Description:	Bonding forces and energies. Classification of engineering materials. Crystallography. X-ray diffraction. Imperfection in solids and strengthening mechanisms. Diffusion. Metallography. Mechanical properties of materials. Material testing evaluation and failure. Thermal equilibrium diagram. Corrosion of metals and their protection. Case studies in material selection. Relative cost of materials.		
Providing Department:	Industrial Engineering		
Prerequisite Course:	General Chemistry I: 0303101		
Course type	Required course		
Assessment Methods:	Method	Weight %	Date
	Project Report	10	12/12/2019
	Project Presentation	10	12/12/2019
	Mid Exam	30	TBA
	Final Exam	50	TBA
Course Learning Outcomes:	#	After successful completion of this course, the student will be able to	SO
	CLO1	Be able to discuss/explain the importance of materials structure at different levels of structure.	1
	CLO2	Understand the concepts of crystalline structure and its relations to physical and mechanical properties	1
	CLO3	Have a detailed idea about mechanical behavior of metallic materials.	1
	CLO4	To be able to understand and appreciate the difference between the different types of Binary Phase Diagrams and appreciate the	1

		diffusion phenomena and its application to solid materials		
	CLO5	Understand the differences and applications of the various heat treatment processes applied to steels. General considerations on materials selection and the selection criteria.	2	
	CLO6	The ability to work within a group, and deliver an effective presentation	3	

Brief list of topics	Week #	Topic
	1	<i>Introduction.</i>
	2	<i>Atomic Structure and Interatomic Bonding</i>
	3- 4	<i>The Structure of Crystalline Solids</i>
	5-6	<i>Imperfections in Solids</i>
	7	<i>Diffusion</i>
	8-9	<i>Mechanical Properties of Metals</i>
	10	<i>Dislocations and Strengthening Mechanisms</i>
	11	<i>Failure</i>
	12-14	<i>Phase Diagrams</i>
	15	<i>Revision</i>
Important Notes:	<ul style="list-style-type: none"> • Do not hesitate to ask questions • You are required to bring a notebook and take notes in classes. • Students are expected to attend every class session and they are responsible for all material, announcements, schedule changes, etc., discussed in class. • Discuss the assignments among yourselves • Don't Cheat; direct copying of others work will NOT be allowed or tolerated and will result in a reduction of grade. If you are found to be cheating in any way, on an exam or assignment, even signing the roll sheet for another student, you will be given an "F" for the course. There will be no exceptions. • All cases of academic dishonesty will be handled in accordance with university policies and regulations. JU policy requires the faculty member to assign ZERO grade (F) if a student misses 15% of the classes that are not excused, and 20% of the classes that are excused • Students are expected to be ready to take a quiz any time they have a class. There will be no make-up quizzes or home works. • Any students with disabilities who need accommodations in this course are encouraged to speak with the instructor as soon as possible to make appropriate arrangements for these accommodations. 	

	<i>The B.Sc. in industrial Engineering program enables students to achieve, by the time of graduation the following program learning outcome (SOs)</i>
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	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
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies