IE251Manufacturing Materials 3(2,1,2)

Catalog Data	Understanding engineering materials properties and processing parameters; Material compositions and structures; Ferrous and Non-Ferrous alloys, Ceramics, Composites.			
Prerequisite	PHYS 104, CHEM101			
Co-requisites				
Level	3			
Textbook	1. `Materials Science and Engineering: An Introduction' by William D. Callister, Jr., John Wiley & Sons, Inc.(Fifth Edition.)			
Reference	1. Engineering Materials 1: An introduction to their properties and applications - M. Ashby & D.Jones 2. Engineering Materials 2: An introduction to microstructures, processing & design - M. R. Ashby & D. R. H. Jones			
Learning Objectives	To review and discuss the various material properties and its production methods and application.			
Topics (classes)		**Topic**	**Week**	**Contact, hr**
	1.	***Introduction to Materials***: Importance of engineering materials in today's products, Historical development of Materials	**(1.5)**	**[6]**
	2.	***Structure of materials:*** Crystalline and Non-crystalline structure; Atomic Packing Factor, Affect of structure on properties	**(2)**	**[8]**
	3.	***Mechanical properties of materials:*** Tensile test, Bend test, Torsion test, Shear test etc.	**(2)**	**[8]**
	4.	***Ceramics:*** Production, Applications, Structure and Properties	**(2)**	**[8]**
	5.	***Polymers:*** Production, Applications, Structure and Properties	**(2)**	**[8]**
	6.	***Ferrous materials:*** Iron and its alloys, Phase diagrams, Iron-Iron Carbide phase diagram	**(2)**	**[8]**
	7.	***Non-Ferrous alloys:*** Copper, Aluminum, Titanium etc., Uses, Advantages and disadvantages	**(2)**	**[8]**
	8.	***Composite Materials***: Types and Uses	**(0.5)**	**[2]**
Laboratory Topics	1.	Testing material properties	6 lab classes	
	2.	Computer lab for simulating material production	6 lab classes	
Project work				
Computer Usage	Computer use covers course topics and lab classes			
Learning outcomes	1) Understand basic material properties, ***[a,e]*** 2) Classify Materials ***[a,c]*** 3) Describe basic materials production ***[a]*** 4) Solve material testing and property problems, ***[e]*** 5) Evaluate materials based on properties ***[b]***			
Estimated Category Content	Engineering Science: 2.5 credit hours (80%) Engineering Design: 0.5 credit hour (20%)			
Prepared by	*Dr. Ashfaq Mohammad*			
Preparation Date	16-May-2012			