

COURSE NUMBER: ME 5223, 4 credits	COURSE TITLE: Materials in Design
TERMS OFFERED: Fall	PREREQUISITES: ME 3221
TEXTBOOKS/REQUIRED MATERIAL: "Materials: Engineering, Science, Processing and Design" , Michael Ashby, Hugh Shercliff, and David Cebon , Elsevier, 2007 (Required) "Principles of Polymer Engineering", McCrum, N. G., Buckley, C. P., and Bucknall, C.B., 2 nd Edition, Oxford Scientific Publications, 1999 (Recommended) "Materials Selection in Mechanical Design", MF Ashby, Butterworth-Heinemann, 1999. (Full Text Electronic Resource , U of M Libraries)	PREPARED BY: Professor S. Ramalingam DATE OF PREPARATION: May 23, 2007
COURSE LEADER(S): Professor S. Ramalingam	CLASS/LABORATORY SCHEDULE: Two 120 minute lectures per week CONTRIBUTION OF COURSE TO MEETING PROFESSIONAL OBJECTIVES: 100 % Engineering Topics
CATALOG DESCRIPTION: Fundamental properties of engineering materials. Fabrication, treatment. Physical and corrosive properties. Failure mechanism, cost and value analysis as related to material selection and specification.	COURSE TOPICS: 1. Review of mechanical, thermal, electrical, magnetic behavior and testing of materials 2. Principles and basis for materials selection 3. Review of material science 4. Theory of defects, crystals, microstructure, thermal treatment 5. Polymers and polymer processing 6. Visco-elasticity and pseudo-elastic design 7. Fracture and fatigue failure, creep, friction, wear 8. Modern materials: electronic, optical, precision engineered, nanostructures, integrated sensors

COURSE OBJECTIVES	<ol style="list-style-type: none"> 1. Provide the theoretical and scientific background for selection of materials used in engineered products. 2. Provide practical guidelines for material selection in the context of design
COURSE OUTCOMES	<p>(Letters shown in brackets are linked to program outcomes a-k)</p> <ol style="list-style-type: none"> 1. Students understand the scientific and theoretical principles related to materials and are able to comprehend what drives the choice of materials. [a, e] 2. Students become skilled at selecting the proper material for a given design. [a, c]
ASSESSMENT TOOLS:	<ol style="list-style-type: none"> 1. Homework assignments 2. Hour Exams 3. Final exam

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Nature of Changes:

The required and recommended texts for the course were updated, no other changes were made.