THE UNIVERSITY OF TEXAS AT EL PASO – COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING

MECH 2331 Materials And Manufacturing Processes

1. **Course number and name:** MECH 2331: Materials and Manufacturing Processes

2. **Credits and contact hours:** 3 SCH – 3 hours of lecture

3. **Instructor's or course coordinator's name:** Arturo Bronson

4. **Text book, title, author, and year:** Henkel, D. P., & Pense, A. W. (2002). *Structure and Properties of Engineering Materials* McGraw Hill.
   a. **other supplemental materials: reference books:**
   Askeland, D. R., Fulay, P.P., & Wright, W. J. (2011). *The Science and Engineering Materials.* Cengage Learning Engineering.

5. **Specific course information**

   a. **brief description of the content of the course (catalog description): Fall 2012 UTEP catalog description**: Properties of engineering materials and failure theories. Introduction to manufacturing processes, manufacturing equipment and quality assurance.
   b. **prerequisites or co-requisites:** CHEM 1305: Chemistry I
   c. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program:** Required course.

6. **Specific goals for the course**
   a. specific outcomes of instruction:
   In future years, structural materials and processes in aerospace, power, marine, engine and other mechanical and chemical propulsion applications will have to meet the challenges of reaching new heights of efficiency and service life. In this context, engineers must be prepared to better handle the industrial and technological challenges specifically to engineer novel materials and predict their failures due to deterioration. However, the ability to improve the efficiency by engineering and designing can only be derived from the knowledge of structure-property relationships and deterioration mechanisms of a wide range of engineering materials, specifically those as encountered by mechanical engineers in the industry. This course is intended and designated to prepare the mechanical engineers with a broad knowledge and skill set in the topical area of structure and properties of engineering materials. Specifically, students will explore the fundamentals of engineering materials, which include simple metals to advanced ceramics and composites, and their properties. By learning the course contents, students will be able to answer questions for selection of engineering materials in terms of property requirement, processes involved, prediction of service life, and cost and efficiency.

   Course Objectives:

   - Introduce various types of engineering materials that are most common to the mechanical engineers in the industry

- Develop familiarity with materials' structure, properties and phenomena for efficient designing
- Discuss options to further increase the efficiency, reduce costs, and establish the environmental safety

b. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course:**

Student Outcomes						
1	2	3	4	5	6	7
	X					

7. Brief list of topics to be covered

1. Introduction to Engineering Materials
2. Structure
3. Crystal Imperfections
4. Equilibrium and Kinetics
5. Phase Diagrams
6. Phase Transformations
7. Mechanical Properties
8. Thermal Properties
9. Deterioration of Properties and Failure Prevention
10. Oxidation and Corrosion
11. Ceramics
12. Composites
13. Selection and Designing of Engineering Materials
14. Manufacturing Industries
15. Operations of Manufacturing
    a. Quality Control
    b. Manufacturing Systems
    c. Product Design
    d. Manufacturing Engineering