Code and Name: ChE 341, **Materials Science and Engineering**
Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook:
- Fundamentals of Materials Science and Engineering: An Integrated Approach, William D. Callister, Jr. & David G. Rethwisch , 4th Edition, John Wiley & Sons
Other References:
- Introduction to Material Science for Engineers, 7th Edition, James F. Shackelford, Prentice Hall, 2008.
- Materials Science and Engineering, 9th Edition, William D. Callister, Jr. and David G. Rethwisch, John Wiley & Sons, Inc, 2011

Course Description:
Properties and behavior of engineering materials, atomic structures, interatomic forces. Mechanical properties and characterization of engineering materials.

Pre-requisites: CHEM 103 General Chemistry
Co-requisites: None

Course Learning Outcomes:
With relation to ABET Student Outcomes (SOs: a-k)
1. Describe the atomic structure and atomic bonding in solids. (1)
2. Describe metallic, ceramic and polymer crystal structures. (1)
3. List types of defects in solid materials. (1)
4. Recognize different diffusion mechanisms in solid materials. (1)
5. Describe the concepts of stress, strain and the mechanical properties of solid materials. (1)
6. List and define the basic concepts of different failure modes of materials. (1)
7. List the basic concepts related to phase diagram. (1)
8. Calculate these problems using standard techniques and interpret solutions (1)

Topics to be covered:
- Introduction to Materials Science Introduction to Engineering Calculations
- Atomic Structures and Bonding in Solids
- Metallic and Ceramic Structures
- Structures of Polymers
- Defects in Solids
- Diffusion in Solids
- Mechanical Properties of Solids
- Failure of Materials
- Phase Diagram

Grading Policy:
The grading for the course are 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, homework, and projects for the remaining 20% that is modified by the course instructor.