EGR 172: Material Science

A study of the physical, mechanical, and chemical properties of materials. The course places particular emphasis on the interdependency of atomic structure, microstructure, material phase relationships, and solid-state reactions to each other and to the modification of these properties. It investigates the use of metals, plastics and advanced materials in economic, sustainable, and reliable design. The laboratory includes metallographic examination using light microscopy and the study of material science principles and treatments of metals. Three lecture hours and three laboratory hours per week. Instructional Support Fee applies. Gen. Ed. Competencies Met: Scientific Reasoning and Discovery. 4 credits Fall

Course Student Learning Outcomes

1. Define and describe chemical and physical bonding, how it relates to the micro and macrostructure of materials, and how these relate to its material properties. 2. Apply these relationships to materials with known bonding and material structure to determine material properties. 3. Utilize experimental material testing techniques for determining material properties. 4. Apply basic metallographic and light microscopy techniques for microstructure analysis of materials including preparation and analysis material samples. 5. Illustrate the benefits and limitations associated with many categories of engineering materials. 6. Describe how material properties can be modified by treatments designed to change material structure. 7. Apply material science to design techniques used to create safe, economic, and reliable products.

Credits: 4
Program: Engineering