

ESG 332 Materials Science I: Structure & Properties of Materials (Required)

Course Catalog description:

A study of the relationship between the structure and properties of engineering materials and the principles by which materials' properties are controlled. The structure and the structural imperfections in simple crystalline materials and the role that these factors play in defining electrical conductivity, chemical reactivity, strength and ductility are considered. The molecular structure of polymers is discussed and related to the behavior of plastics, rubber, and synthetic fibers. The principles of phase equilibria and phase transformations in multicomponent systems are developed. These principles are applied to the control of the properties of semiconductors, commercial plastics, and engineering alloys by thermochemical treatment. Corrosion, oxidation, and other deterioration processes are interpreted through the interaction of materials with their environment

4 credits

Pre- or Co-requisite(s): ESG 198 or CHE 131 or 141

Text(s): William D. Callister, Materials Science and Engineering: An Introduction, 1999, Wiley, ISBN# 0471320137

Course learning outcomes:

Topics Covered:

- Week 1. Atomic Structure
- Week 2. Interatomic Bonding
- Week 3. Structure of Crystalline Solids
- Week 4. Imperfections in Solids, Diffusion
- Week 5. Mechanical Properties of Metals
- Week 6. Dislocation and Strength Mechanisms
- Week 7. Phase Diagrams
- Week 8. Phase Transformations in Metals
- Week 9. Thermal Processing of Metal Alloys
- Week 10. Structure and Properties of Ceramics, Applications and Properties of Ceramics
- Week 11. Polymer Structures, Characteristics of Polymers
- Week 12. Corrosion and Degradation of Metals
- Week 13. Electrical Properties
- Week 14. Materials for Integrated Circuit Packages

Class/ Laboratory Schedule:

ESG	332	Materials Sci I: Struct & Prop	LEC	1	TUTH	9:50 AM	11:10 AM
			REC	R01	RECF	9:35 AM	10:30 AM
			REC	R02	RETH	2:20 PM	3:15 PM
			REC	R03	RECF	10:40 AM	11:35 AM
			REC	R04	RECF	2:20 PM	3:15 PM

Contribution of Course to meet requirement of Criterion 5:

Relationship of course to program outcomes:

Person(s) who prepared this description and date of preparation: