

EGN 3365 - ENGINEERING MATERIALS I
Common Course Syllabus

Catalog Data: 3 CREDITS, Structure of material systems from the atomic, micro- and macroscopic standpoints. Equilibrium and non-equilibrium structures. Relationship between structure and electrical, thermal, mechanical and failure properties of metals, ceramics and polymeric materials. Strengthening mechanisms in materials.

Goals: This course is designed to introduce the students to basic materials science with an emphasis on properties and how they are influenced by thermal and mechanical treatments. The students will be able to relate the microstructure of a material to its properties, and understand the effects of the environment on materials and the possible failure modes of structures. The students will be provided with demonstrations of various processes in the laboratory.

Prerequisites:

1. Strength of Materials – EGN 3331 or equivalent (with a minimum grade of C)

Corequisites:

1. Strength of Materials – EGN 3331 or equivalent

Topics:

1. Atomic structure
2. Structural imperfections
3. Atomic movement
4. Mechanical testing
5. Solidification
6. Solid solutions
7. Mechanical working and heat treatment
8. Dispersion strengthening
9. Phase transformations
10. Metals and alloys
11. Corrosion
12. Ceramics
13. Polymers
14. Failure Analysis

Course Outcomes: (numbers in parentheses indicate correlation of the outcome with the appropriate ABET program outcomes 1-7)

1. Students will recognize how the internal structure of a material (both at the micro and macro levels) controls the mechanical properties. (1)
2. Students will be able to explain how dislocation motion is responsible for permanent deformation in metals and how the ability to undergo slip influences the mechanical properties of the material. (7)
3. Students will realize their ability to control the mechanical properties of materials through a variety of processes and the implications on materials selection and design. (1)
4. Students will understand the importance of engineering standards for the determination of

the mechanical properties of materials. (8)

5. Students will improve their writing skills through technical essay assignments summarizing laboratory procedures and demonstrations. (3)

Design Content: This course has no formal design projects.

Updated 1/25