

## **ENGG 245 Materials Science and Engineering**

4 Units (3 Lecture + 1 Lab), typically 96 – 102 contact hours (16-17 weeks x 2 days x 3 hrs)

Prerequisite: General Chemistry 1, Physics A

**Course description:** This course presents the internal structures and resulting behaviors of materials used in engineering applications, including metals, ceramics, polymers, composites, and semiconductors. The emphasis is upon developing the ability both to select appropriate materials to meet engineering design criteria and to understand the effects of heat, stress, imperfections, and chemical environments upon material properties and performance. Laboratories provide opportunities to directly observe the structures and behaviors discussed in the course, to operate testing equipment, to analyze experimental data, and to prepare reports.

**Learning Outcomes:** By the end of this course, students should be able to

1. Explain the relationship between the internal structure of materials and their macroscopic properties.
2. Explain methods (intentional or unintentional) of altering the structure of materials by mechanical, chemical, or thermal means in order to change material properties.
3. Illustrate the various systems for classifying materials, and compare differences in properties among material classes that derive from differences in structure.
4. Gather data from reference sources regarding the properties, processing, and performance characteristics of materials, and use it as a basis to recommend appropriate material(s) to meet engineering design criteria.
5. Measure material properties and/or evaluate processing treatments using standard materials testing equipment and techniques.
6. Write laboratory reports that communicate the collection, analysis, and interpretation of experimental data according to professional engineering standards.

### **Resource Links:**

A sample course syllabus, suggested topic sequence (with embedded links to all student resources), and editable (Microsoft Word) versions of documents can be accessed from the links below.

**[Sample Course Syllabus](#):** lecture & lab content, textbook info, course requirements, etc.

**[Topic Sequence](#):** with links to all student resources (video lessons, slides, problem sets, labs)

**[Course Documents](#):** Directory containing all documents (.doc and .pdf files)

**[Lab Overviews](#):** list of lab descriptions and learning objectives

**[An older version of the course resources from Spring 2016 are available here.](#)**