

Course	ME 30300 – Material Science and Engineering
Type of Course	Required for ME program
Catalog Description	Concepts of materials science and their relevance to engineering design. Structure, properties, and uses of engineering materials. Strengthening methods and environmental effects.
Credits	2
Contact Hours	2
Prerequisite Courses	CHM 11500 and PHYS 25100
Corequisite Courses	ME 25200
Prerequisites by Topics	Unit systems and conversion, atomic structure, chemical periodicity, chemical bonds and their relation to physical properties, properties of liquid and solid states, heat, kinetic theory, elementary thermodynamics, heat transfer, electrostatics, electromagnetism, magnetic properties of matter.
Textbook	W. D. Callister, <i>Materials Science and Engineering: An Introduction</i> , Wiley, current edition.
Course Objectives	To present the basic concepts of materials science and to help the students select engineering materials according to the structure, properties and applications of the materials.
Course Outcomes	<p>Students who successfully complete this course will have demonstrated an ability to:</p> <ol style="list-style-type: none">1. Describe micro-scale structural properties of engineering materials. (1,2)2. Describe mechanical properties of metallic materials. (1,2)3. Determine and apply proper strengthening methodologies for metallic materials. (1,2,6)4. Choose proper engineering materials for specific applications. (1,2,6)5. Take account of possible failure due to cracks and fatigue in the design of engineering structures. (5,6)
Lecture Topics	<ol style="list-style-type: none">1. Introduction

2. Crystal structure
3. Imperfection in solids
4. Mechanical properties of metals
5. Dislocation and strengthening
6. Failure
7. Phase diagrams and transformations
8. Metal alloys
9. Ceramics
10. Polymers
11. Composites
12. Economic, environmental and societal issues

Computer Usage	Low
Laboratory Experience	None
Design Experience	None
Coordinator	Bongsu Kang, Ph.D.
Date	March 26, 2018