

UNIVERSITY OF SOUTH FLORIDA
DEPARTMENT OF MECHANICAL ENGINEERING
FALL 2003 EGN 4366 MATERIALS ENGINEERING II
DR. ALEX A. VOLINSKY, OFFICE HOURS: MW 3:15-5:15 ENG 2214

CATALOG DESCRIPTION: Applications and structure property relationships of commonly used engineering materials. Steel, non-ferrous alloys and their welding, heat treatment and processing. Introduction to ceramic and polymeric materials.

PREREQUISITES: Materials Engineering I, EGN 3365. If you do not have the prerequisite, you will be dropped from the class regardless of current grade.

TEXTBOOKS AND/OR OTHER REQUIRED MATERIAL: Materials Selection in Mechanical Design, M.F. Ashby, 2nd Edition. Butterworth-Heinemann, Oxford 1999

COURSE OBJECTIVES:

1. Students learn how the different classes of materials achieve their elastic modulus.
2. Students learn how the microstructure influences the failure of the material for metals, polymers, ceramics and composites.
3. Students learn when to expect time-temperature dependent material behavior.
4. From a Materials selection perspective, students can select an alloyed material.
5. Students learn how processing and fabrication can influence the performance of a material.
6. Students learn how the environmental surroundings can influence the performance of the material.
7. Students will learn a design philosophy for the selection of materials given:
 - a) Single constraint design applications.
 - b) Multiple constraints design applications.

TOPICS COVERED:

- 1 Origin of elastic behavior for metals, polymers, ceramics, elastomers, and glasses.
- 2 Origin of Inelastic behavior (Non-time dependent) (Yield, Fracture)
- 3 Crystallinity versus Amorphous materials
- 4 Time dependent Inelastic behavior
- 5 Alloying
- 6 Heat treating and annealing
- 7 Environmental degradation of materials
- 8 Materials selection charts
- 9 Material selection procedure
- 10 Selection of material and shape
- 11 Multiple constraints and compound objectives
- 12 Materials processing and design

CLASS/LABORATORY SCHEDULE: 2 – 1.25 Hr Classes Per Week, 15 Week Semester

Assignment of Grades:

Homework	20%
Quizzes	40%
Midterm Project	15%
Final Project	25%

Final Grade in Class

A = 90 and above
B = 80 to 89
C = 70 to 79
D = 60 to 69
F = 59 and below