MSE 223R – Introduction to Materials Science and Engineering II

Designation: Required

2012-2013 course description: This course is the continuation of MSE 222 and covers mechanical, electrical, magnetic and optical properties (phase diagrams, phase transformations, mechanical testing, strengthening mechanisms, steels, superalloys, ceramics, and polymers. [3 units, offered in the Spring]

Prerequisites: Basic Chemistry, Physics, Materials Science and Engineering I (MSE 222).

Textbook: William D. Callister, Jr.,*Fundamentals of Materials Science and Engineering: An Integrated Approach*, 2nd edition (others are fine), Wiley, 2005. ISBN: 978-0-471-47014-4

References: D.R. Askeland and P.P. Phule, *The Science and Engineering of Materials*, 5th edition, Thomson-Brooks/Cole, 2006.

Topics Covered:
* Classical Nucleation Theory
* Phase Diagrams (metallic and ceramic systems)
* Steel
* Superalloys
* Dispersion Strengthening and Precipitation Hardening of Alloys
* Mechanical Properties and Mechanical Testing
* Strain Hardening and Annealing
* Ceramic Materials and Glasses
* Polymers

Computer Usage: Students are given assignments that require the use of computer algebra systems (such as Mathematica or Maxima), numerical software, (such as Excel or Python), and are required to complete several assignments using a word processor. Additionally, some assignments require extensive internet research.

Contribution to Criterion 5:
50 % Math & Basic Sci. 1.5 credits Math & Basic Sci.
50 % Engr. Science 1.5 credits Engr. Topics
____ % Engr. Design

Person preparing syllabus and date: Robert Erdmann, Feb. 2010