College of San Mateo
Course Outline

☐ New Course
☐ Update/No change
☒ Course Revision (Minor)
☐ Course Revision (Major)

Date: January 26, 2007

Department: ENGR **Number:** 270
Course Title: Materials Science **Units:** 3
Hours/Week: **Lecture:** 2 **Lab:** 3 **By Arrangement:** 1

Length of Course
- ☒ Semester-long
- ☐ Short course (Number of weeks___)
- ☐ Open entry/Open exit

Grading
- ☒ Letter
- ☐ Credit/No Credit
- ☐ Grade Option (letter or Credit/No Credit)

1. **Prerequisite** (Attach Enrollment Limitation Validation Form.)

MATH 251, CHEM 210

2. **Corequisite** (Attach Enrollment Limitation Validation Form.)

3. **Recommended Preparation** (Attach Enrollment Validation Form.)

PHYS 250

4. **Catalog Description** (Include prerequisites/corequisites/recommended preparation.)

Two lecture and three lab hours per week plus one hour by arrangement per week. Prerequisites: MATH 251, CHEM 210. Recommended Preparation: PHYS 250. Application of basic principles of physics and chemistry to the engineering properties of materials. Atomic and crystal structures, phase transformation, heat treatment of metals. The relationship between microstructure and the mechanical and electrical properties of metals, concrete, polymers, ceramics, and semiconducting materials.

5. **Class Schedule Description** (Include prerequisites/corequisites/recommended preparation.)

Application of basic principles of physics and chemistry to the engineering properties of materials. The relationship between microstructure and the mechanical and electrical properties of metals, concrete, polymers, ceramics, and semiconducting materials. Plus one hour by arrangement per week. Prerequisites: MATH 251, CHEM 210. Recommended Preparation: PHYS 250. (CSU/UC) (CAN ENGR 4)

6. **Student Learning Outcomes** (Identify 1-6 expected learner outcomes using active verbs.)

Upon successful completion of the course, the student will be able to:

Charlene and John: this is a draft (pending discussion with the instructor).
Describe the characteristics and behavior of the basic classes of materials (metals, ceramics, polymers, semiconductors, composites);
Explain the relationship between a material's microsturcture and processing and its properties and performance;
Begin to select appropriate materials for a specific engineering application;
Conduct experiments using standard laboratory equipment;
Analyze and interpret experimental data;
Present experimental results in laboratory report using text, calculations, and graphs as appropriate; and
Work effectively in small groups.

7. Course Objectives (Identify specific teaching objectives detailing course content and activities. *For some courses, the course objectives will be the same as the student learning outcomes. If this is the case, please simply indicate this in this section).*

Same at SLOs

8. Course Content (Brief but complete topical outline of the course that includes major subject areas [1-2 pages]. Should reflect all course objectives listed above. In addition, you may attach a sample course syllabus with a timeline.)

Classification of Materials
Atomic Structure and Interatomic Bonding
Structure of Crystalline Solids
Imperfections in Solids
Diffusion
Mechanical Properties of metals
Dislocations and Strenghtening Mechanisms
Failure
Phase Diagrams
Phase Transformations in Metals
Metal Alloys
Structure and Properties of Ceramics
Polymer Structures, Characteristics, and Applications
Composites
Semiconductors
Environmental Degradation of Materials
Materials Selection and Design Considerations
Additional Topics

9. Representative Instructional Methods (Describe instructor-initiated teaching strategies that will assist students in meeting course objectives. Include examples of out-of-class assignments, required reading and writing assignments, and methods for teaching critical thinking skills.)

Lectures to introduce new material and topics.
Textbook reading assignments to expand knowledge.
Individual take-home problems to develop skills.
Laboratory experiments and exercises to reinforce and extend concepts covered in lecture.

10. Representative Methods of Evaluation (Describe measurement of student progress toward course objectives. Courses with required writing component and/or problem-solving emphasis must reflect critical thinking component. If skills class, then applied skills.)

Individual problem-solving assignments.
Group problem-solving assignments (optional).
Individual problem-solving exams.
Individual or group laboratory reports.
Individual or group oral presentations (optional).

11. Representative Text Materials (With few exceptions, texts need to be current. Include publication dates.)

Materials Science and Engienering: An Introduction, 7th Edition, W.D.Callister, Jr., Wiley, 2007.
Introduction to Materials Science for Engineers, 6th Edition, J. F. Shackelford, Prentice-Hall, 2005.

Prepared by: _____
(Signature)

Email address:

Submission Date: _____