Chemical Engineering and Materials Science

UNIVERSITY OF CALIFORNIA, DAVIS

Winter, 2015

EMS 181 - Materials Processing

Course Description: This course will provide a fundamental understanding of the scientific principles underlying various processing techniques, used for producing materials for the benefit of the society. It will also emphasize processing-structure-property relationships.

Grading Basis: Homework (**40%**); Two Examinations (**30%** each)

Topics covered:

1. What is Processing/Manufacturing- Product and process design and selection
2. Classes of Materials- structures and properties- major processing techniques
3. Diffusion, Nucleation, growth, Ostwald ripening, Sintering
4. Solidification
5. Glass and polymer processing
6. Composites- design and processing
7. Superplastic forming
8. Single crystal growth
9. Transformation toughening
10. Vapor deposition, epitaxy, semiconductor processing

Course Textbook: We will not be using a specific textbook for this course.

The following books are on reserve in the library and the materials presented in class will be heavily drawn from the first two books. The third book is an excellent reference for ceramics, glasses and sintering phenomena.

1. **Manufacturing engineering and technology / Serope Kalpakjian, Steven R. Schmid**

2. **Materials processing handbook [electronic resource available*] / edited by Joanna R. Groza**

3. **Physical Ceramics : principles for ceramic science and engineering / Yet-ming Chiang, Dunbar P. Birnie III, W. David Kingery**

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