EMA 3050: Intro to Inorganic Materials

Fall, 2013

Section 2826

1. Catalog description:

Uses, structure, processing and properties of inorganic materials, including metals, alloys and ceramics. Scientific principles are introduced through discussion of developed inorganic materials for high technology applications.

2. Prerequisites:

EMA 3010

3. Course Objectives:

To gain an understanding of the relationships between crystal structure, processing, and properties of inorganic materials. To develop the ability to select appropriate materials to meet design specifications for engineering applications.

4. Contribution of course to meeting the professional component:

This course provides 3 credits towards Engineering Sciences.

5. Instructors:

Dr. Simon R. Phillpot Office: 100B Rhines Hall

Telephone: 846-3782 E-mail address: sphil@mse.ufl.edu (preferred)

6. Office hours:

Monday: 1.00:2.00 pm, Thursday: 2.00-3.00 pm.

7. Time and Place:

Mo,We,Fr: 2nd period (8.30-9.20 am), NEB 101

8. Text:

Course pack for EMA 3050, from Target Copy, Handouts

9. E-Learning website:

http://lss.at.ufl.edu/

https://elearning2.courses.ufl.edu/portal/site/UFL-EMA3050-29634-82013

10. Other useful books:

"Ceramic Materials: Science and Engineering", Carter and Norton, Springer 2007.

"Structure and properties of the engineering materials", Henkel and Pense, McGraw-Hill.

"Modern Ceramic Engineering: Prop, Proc and Design", Richerson, Taylor and Francis.

"Structure and Bonding in Crystalline Materials", Rohrer, Cambridge.

10. Attendance:

Material covered in class will follow the course pack closely, but with some extra material. Attendance in class is important; there will thus be assignments to be completed in class that will count towards your grade (Group Problems/Pop Quizzes). Those students not in class for any reason are responsible for the material covered and the homework assigned. UF policy may be found at https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

11. Grading:

The course grade is based on numerical scores that include homework, group problems, pop quizzes, in-class exams, and a course paper according to the following weighting system:

- Term paper: 15%
- Homework 15%
- Exam #1 (09/16/13) 16%
- Exam #2 (10/09/13) 16%
- Exam #3 (11/06/13) 16%

- Exam #4 (12/04/13) 16%
- Group Problems/Pop Quizes 16%

12. Grading Scale:

94-100: **A**, 90-93: **A-**, 87-89: **B+**, 84-86: **B**, 80-83: **B-,** 77-79: **C+**, 74-76: **C**, 70-73: **C-,** 67-69: **D+**, 64-66: **D**, 60-63: **D-,** less than 60: E.

13. Make-up Exam Policy:

No makeup exams will be given without an excused absence supported by written documentation.

14. Assignments:

- Homework will be due at the beginning of class on the dates given; no late homework will be accepted. Group problem solving and teamwork is encouraged, but all turned in problem solutions should be your own work. All homework problems and solutions should be downloaded from the e-Learning website listed above, and submitted at the same website.
- Group Problems/Pop quizzes will be assigned in class. Typically a group of 3-4 students will work on the problem and turn in a single page with the solution and the names of the people in the group. Pop quizzes are individual assignments.
- Exams will closely follow the material **covered in class, in your assigned reading and in homework problems.** Only **pens** can be used on the exams. These will be closed book and will be given in class. Requests for re-grading must be made within **one week** after an assignment has been returned.
- Term paper on "Contemporary Issues in Inorganic Materials"
  - 09/27/13: **Two** single paragraph proposals due: Have to generate a couple of ideas. Possible sources: media, MRS Bulletin,…
  - 10/23/13: Extended, 1 page white paper is due: More detailed account of the problem and proposed solutions…

- 11/25/13: Final version of the paper is due

- All papers are to be submitted via e-Learning website and will be subject to "turnitin.com" plagiarism verification.

16. Honesty Policy:

All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

17. Accommodation for Students with Disabilities:

Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

18. UF Counseling Services:

Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

19. Course overview:

Class	Date		HW		Coursepack Reading
1	We Aug 21	Overview			
2	Fr Aug 23	Bonding			Richerson (Ch. 4.1,4.2,4.3,4.4)
3	Mo Aug 26	Structure 1 (Intro, symmetry, metals)			Carter (Ch. 5), Rohrer (Ch. 4, A,B,C)
4	We Aug 28	Structure 2 (Binaries)			Carter (Ch. 6)

5	Fr Aug 30	Structure 3 (Complex and amorphous)	HW 1		Carter (Ch. 7)
Labor Day	Mo Sep 2	No class			
6	We Sep 4	Defects (Point defects)			Carter (Ch. 11)
7	Fr Sep 6	Defects (Dislocations, line defects)			Carter (Ch. 12)
8	Mo Sep 9	Defects (Planar defects: Polyscrystallinity, Grain boundaries)	HW 2		Carter (Ch. 14)
9	We Sep 11	Physical and Thermal Properties 1			Richerson (Ch. 7)
10	Fr Sep 13	Physical and Thermal Properties 2			Richerson (Ch .7)
11	Mo Sep 16	**Exam 1 (Classes 1-8)**			
12	We Sep 18	Phase Equilibria 1			Richerson (Ch. 6)
13	Fr Sep 20	Phase Equilibria 2			Richerson (Ch. 6)
14	Mo Sep 23	Phase Equilibria 3 (Instructor survey)	HW 3		Richerson (Ch. 6)
15	We Sep 25	Phase Equilibria 4			Richerson (Ch. 6)
16	Fr Sep 27	Electrical Properties 1	Paper 1		Richerson (Ch. 10)
17	Mo Sep 30	Electrical Properties 2			Richerson (Ch. 10)
18	We Oct 2	Dielectric Properties	HW 4		Richerson (Ch. 11)
19	Fr Oct 4	Magnetic Properties			Richerson (Ch. 11)
20	Mo Oct 7	Optical properties			Richerson (Ch. 11)
21	We Oct 9	**Exam 2 (Classes 9-17)**			
22	Fr Oct 11	Mechanical Properties 1			Richerson (Ch. 8)
23	Mo Oct 14	Mechanical Properties 2			Richerson (Ch. 8)
24	We Oct 16	Mechanical Properties 3	HW 5		Richerson (Ch. 8)
25	Fr Oct 18	Mechanical Properties 4			Richerson (Ch. 8)
26	Mo Oct 21	Mechanical Properties (Metals Strengthening)			Henkel (Ch. 3)
27	We Oct 23	Mechanical Properties (Metals Strengthening)	Paper 2		Henkel (Ch. 4,6)
28	Fr Oct 25	Glasses			Carter (Ch. 21)
29	Mo Oct 28	Metallic Glasses			Handouts
30	We Oct 30	Non-ferrous metals (fcc metals Al, Cu)	HW 6		Henkel (Ch. 13)
31	Fr Nov 1	Non-ferrous metals (hcp metals, Mg, Ti)			Henkel (Ch. 16)
32	Mo Nov 4	Non-ferrous metals (high T metals)			Henkel (Ch. 17)
33	We Nov 6	**Exam #3 (Classes 18-29)**			
Homecoming	Fr Nov 8	No Class			
Veterans Day	Mo Nov 11	No Class			
34	We Nov 13	Ferrous metals 1	HW 7		Henkel (Ch. 7)
35	Fr Nov 15	Ferrous metals 2			Henkel (Ch. 7)
36	Mo Nov 18	Processing 1			Handouts
37	We Nov 20	Processing 2	HW 8		Handouts
38	Fr Nov 22	Nanomaterials (0d,1d)			Handouts
39	Mo Nov 25	Nanomaterials (2d)	Paper 3		Handouts
Thanksgiving	We Nov 27	No Class			
Thanksgiving	Fr Nov 29	No Class			
40	Mo Dec 2	Infrastructure Materials (Cements/composites)			Handouts
41	We Dec 4	**Exam #4 (Classes 30-40)**			

20. Software Use:

All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

21. Cell phones policy:

No cell phones use of any kind (text or voice) is permitted during the class. Please, turn the sound off at the beginning of the class.

22. Evaluations:

Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.