

**EMA 3050 – Introduction to Inorganic Materials – Fall 2014**  
**Section 2826**

1. **Course 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 (3 credit hours).

2. **Course Objectives:** To gain an understanding of the relationships between crystal structure, processing, and properties of inorganic materials including ceramic and metallic materials. To develop the ability to select appropriate materials to meet design specifications for engineering applications.

3. **Prerequisites:** EMA 3010

4. **Contribution of course to meeting the professional component:** This is a 3 credit course. It provides 2 credits towards engineering sciences and 1 credit towards design.

5. **Relationship of course to program outcomes (ABET):**

1. Ability to apply knowledge of mathematics, science, and engineering to materials systems (high)

As an introductory course, this course provides students with fundamentals in the structure, properties, and processing of ceramics and metals. Students demonstrate this knowledge on homework problems and exams.

11. Ability to engage in lifelong learning (low)

Each student communicates with a material scientist or engineer as a component of the contemporary issue topic. They select the person to which they communicate and, through this process, learn how to become aware of new technological, industrial, and scientific developments related to materials science and engineering.

Students are also asked to identify information from other engineering resources including primary articles, standards, patents, and technical reports.

8a. Ability to communicate effectively in written form (medium)

Each student communicates with a material scientist or engineer as a component of the contemporary issue topic, transferring that information and understanding into a written document. The document is written for the general public and must communicate scientific information to this audience.

6. Instructor: **Dr. Jennifer Andrew**

- a. Office location: **162 Rhines Hall**
- b. Telephone: **352.846.3345**
- c. E-mail address: **[jandrew@mse.ufl.edu](mailto:jandrew@mse.ufl.edu)**
- d. Office hours: **W 1:00-3:00 pm**
- e. Website: **<https://lss.at.ufl.edu/>**

7. Teaching Assistant: **Michael Ashton**

- a. Office hours location: **Rhines 100C**
- b. E-mail address: **[mashton@ufl.edu](mailto:mashton@ufl.edu)**
- c. Office hours: **T 2:00-4:00 pm**

8. Meeting Times and Location: **MWF Period 2, 8:30 am – 9:20 am Weimer Hall 1084**

9. Textbooks Required

- a. Course packet available from TargetCopy containing select chapters from the following texts:

- i. Title: Structure and Bonding in Crystalline Materials
  - 1. Author: Gregory S. Rohrer
  - 2. Publication: Cambridge University Press
  - 3. ISBN: 0521663288
- ii. Title: Ceramic Materials: Science and Engineering
  - 1. Author: C. Barry Carter and M. Grant Norton
  - 2. Publication: Springer
  - 3. ISBN: 0387462708
- iii. Title: Modern Ceramic Engineering: Properties, Processing, and Use in Design
  - 1. Author: David W. Richerson
  - 2. Publication: CRC Taylor & Francis
  - 3. ISBN: 1574446932

b. Course packet available from UF Bookstores containing select chapters from:

- i. Title: Structure and Properties of Engineering Materials
  - 1. Author: Henkel and Pense
  - 2. Publication: McGraw-Hill
  - 3. ISBN: 0072350725

10. On the Web: This course will use Sakai extensively as a communication and archival tool. The students can access all relevant course information (course notes, homework and exam solutions, announcements, grades, etc.) via the Sakai entry link: <https://lss.at.ufl.edu/>. Pertinent course information may also be announced via UFL e-mail address in addition to over Sakai.

11. Conduct, Attendance and Expectations: Proper behavior in class is always important and leads to a relaxed and productive educational environment. Thus, eating, drinking, texting, reading of newspapers, working on homework for this or other courses, or other activities that are not part of the class are not allowed. Students who do not comply with these requirements or who behave disorderly or disrespectfully may be asked to leave the classroom. Leaving your cell phone on, leaving early or arriving late can be VERY distracting. All electronic devices (PDAs, cell-phones, etc.) should be turned off or in silent mode. If your cell phone rings during class it will be confiscated for the remainder of the class period. While not directly enforced, attendance is strongly recommended for this course. While attendance does not make up a specific component of the course grade, it will be reflected in homework and exam grades.

12. **Grading and Grading Scale:** Your final grade will be allocated based on the following distribution:

Homework: 20%  
 Four In-Class exams: 20% each

Percentage	≥ 92	≥ 88	≥ 84	≥ 80	≥ 76	≥ 72	≥ 68	≥ 65	≥ 62	≥ 59	≥ 56	<56
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E

The instructor reserves the right to adjust the grade distributions, however grades **will not** be adjusted for individuals.

Exams. You will be given 4 exams throughout the semester, the exam content may change but the dates will not. **There will be no final exam.** Each exam is weighted equally and will be worth 20% of your final grade. Requests for re-grading must be made in writing and within one week after an assignment has been returned. **Make-up exams** will be provided only with the *prior approval of the instructor or excused absence*. In general, acceptable reasons for excused absence include illness, serious family emergencies, special curricular requirements, military obligation, court-imposed legal obligations, religious holidays and participation in official university activities such as music performances, athletic competition or debate.

Homework. Homework problems will be assigned, together with due dates, through e-Learning. These homework questions are *essential* to your study and some exam questions will be adapted from them. Homework will be posted through the Sakai web site. Assignments are due at the **beginning of class** (8:30 am) on the due date, unless otherwise stated. **Late homework assignments will not be accepted and will receive a grade of zero.** The lowest homework score will be dropped.

13. **Course Outline:** Below is the tentative schedule of topics, activities, reading assignments, and exams.

<b>Class</b>	<b>Date</b>	<b>Topic</b>	<b>Reading Assignments</b>
1	8/25/14	Overview, Syllabus, Remembering the Periodic Table	
2	8/27/14	Bonding	Rohrer (Ch. 1)
3	8/29/14	Basic Elements of Symmetry	Rohrer (pgs. 88-91)
4	9/1/14	<b>No Class- Labor Day</b>	
5	9/3/14	Crystal Structures- Metals	Henkel (pgs. 2-16), Rohrer (pgs. 29-49)
6	9/5/14	Crystal Structures- Ceramics & Intermetallics	Richerson (Ch. 5), Rohrer (pgs. 59-66, 135-176)
7	9/8/14	Amorphous Materials	Rohrer (pgs. 191-197), Henkel (pgs. 416-420)
8	9/10/14	Phase Equilibria	Richerson (Ch. 6)
9	9/12/14	Phase Equilibria	
10	9/15/14	Phase Equilibria	
11	9/17/14	Phase Equilibria	
12	9/19/14	Defects & Microstructures	Rohrer (pgs. 69-70, 75-81)
13	9/22/14	Defects & Microstructures	Carter & Norton (pgs. 181-193), Henkel (pgs. 12-15)
14	9/24/14	<b>Exam # 1 Wednesday Sept. 24</b>	
15	9/26/14	Defects & Microstructures	
16	9/29/14	Properties- Intro, Anisotropy, composite mixing rules, etc.	Henkel (Ch. 20)
17	10/1/14	Properties- Physical & Thermal	Richerson (Ch. 7), Henkel (pgs. 26-28)
18	10/3/14	Properties- Thermal	
19	10/6/14	Properties- Mechanical (Introduction)	Richerson (Ch. 8), Henkel (pgs. 16-23)
20	10/8/14	Properties- Mech.- Elasticity, dislocation motion, etc.	
21	10/10/14	Strengthening Mechanisms	Henkel (Ch. 3-6)
22	10/13/14	Strengthening Mechanisms	
23	10/15/14	<b>Exam #2 Wednesday, Oct. 15</b>	
24	10/17/14	<b>No Class- Homecoming</b>	
25	10/20/14	Strengthening Mechanisms	
26	10/22/14	Strengthening Mechanisms	
27	10/24/14	Aluminum, Copper, Magnesium, and Titanium	Henkel (Ch. 13-16)
28	10/27/14	Aluminum, Copper, Magnesium, and Titanium	

29	10/29/14	Aluminum, Copper, Magnesium, and Titanium	
30	10/31/14	Metals for High Temperatures	Henkel (Ch. 17)
31	11/3/14	Properties- Electrical	Richerson (Ch. 10)
32	11/5/14	Properties- Electrical	
33	11/7/14	Properties- Dielectric	Richerson (Ch. 10)
34	11/10/14	Properties- Dielectric	
35	11/12/14	<b>Exam # 3 Wednesday, Nov. 12</b>	
36	11/14/14	Advanced Dielectric Materials	
37	11/17/14	Advanced Dielectric Materials	
38	11/19/14	Martensitic Transformations	Henkel (Ch. 7)
39	11/21/14	Processing- melting and powder processing of metals	
40	11/24/14	Processing- powder processing of ceramics	Handouts
41	11/26/14	<b>No Class- Thanksgiving</b>	
42	11/28/14	<b>No Class- Thanksgiving</b>	
43	12/1/14	Nanomaterials (0d)	Handouts
44	12/3/14	Nanomaterials (0d, 1d)	
45	12/5/14	Nanomaterials (2d)	
46	12/8/14	Review	
47	12/10/14	<b>Exam # 4 Wednesday, Dec. 10</b>	

14. **Honesty Policy** – All students admitted to the University of Florida have signed a statement of academic honesty committing them 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.

15. **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.

16. **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.

17. **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.