Catalog Description – Credits: 3.
Introduction to the technology and science of processing ceramic materials, including traditional clay based ceramics, modern technical ceramics, and glasses. Topics include the nature of fine particles, forming methods and consolidation by heat.

Prerequisites - EMA 4144

Course Objectives - At the end of this course students will be able to understand and apply the basic principles of ceramic processing, including characterization techniques, colloid and surface science, sol-gel techniques, particle mechanics, ceramic forming and sintering.

Contribution of course to meeting the professional component - This is a 3 credit course. It provides 3 credits towards engineering sciences.

Relationship of course to program outcomes - This course addresses the following MSE Program outcomes:
1 Ability to apply knowledge of mathematics, science, and engineering to materials systems. (High Coverage)
4 Ability to apply and integrate knowledge of structure, properties, processing, and performance to solve materials selection and design problems within realistic constraints. (Medium coverage)
7 Ability to identify, formulate, and solve engineering problems. (Medium coverage)
9 Ability to communicate effectively in both oral and written form. (Low coverage)

Instructor – Dr. Wolfgang Sigmund. Office location: 225 Rhines Hall
Telephone: 352-846-3343 (office)
E-mail address: wsigm@mse.ufl.edu
Web site: http://sigmund.mse.ufl.edu/
Office hours: Friday 2-4 pm

Teaching Assistant – N/A

Meeting Times – M, W, F 9th period

Class schedule - Three hours of class time each week.

Meeting Location – CSE E118

Material and Supply Fees - None.

Textbooks and Software Required – Ceramic Processing, by M.N. Rahaman, CRC, Taylor and Francis,
You must have access to a computer and the following software to complete course assignments:

- Word processing software, such as Word.
- Spreadsheet software, such as Excel.
- Pdf writer.
- UF e-learning.

This course will use Canvas as an electronic course management system. The course website will have reading and homework assignments, updated grades, and course announcements. You can access canvas via e-learning from https://lss.at.ufl.edu/ by clicking on canvas and logging in with your Gatorlink ID and password.

13. **Recommended Reading** –
R. Hunter, *Introduction to Modern Colloid Science*, Oxford University Press, (1993);  

Supplementary reading and links to various other websites are provided and updated throughout the semester.

14. **Course Outline** –

Class starts on August 25, 2014 and has a total of 39 semester hours, 30 interactive lectures and 5 student exercise hours, 4 hour exams.

No classes on the following days: Sept 1 – Labor Day; October 13+15+17 – MS&T Conference and Homecoming; November 7+10 – OTI/OSTEM 2014 Conference; November 26+28 – Thanksgiving

<table>
<thead>
<tr>
<th>#</th>
<th>Topics</th>
<th>Lectures/Exams</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Introduction to Ceramic Fabrication Processes (Chapter 1, p. 1-32)</strong> Overview of ceramic materials and processing; definition of ceramics and the distinctions between ceramic, metals, polymers; ceramic materials and products; classification by function; modern materials needs; steps in ceramic processing. Societal needs, impacts from global community on ceramic markets. Job market, outlook on ceramics in the future.</td>
<td>3 lectures HW 1</td>
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<tr>
<td>2</td>
<td><strong>Synthesis of Powders (Chapter 2, p. 37-91)</strong> Terminology; desirable powder characteristics; preparation techniques by mechanical and chemical methods; oxide and non-oxide powders.</td>
<td>4 lectures Exam 1 on Sept. 12</td>
</tr>
<tr>
<td>3</td>
<td><strong>Powder Characterization (Chapter 3, p. 97-138)</strong> Physical characterization; chemical and phase composition; surface characterization.</td>
<td>3 lectures HW 2</td>
</tr>
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</table>
Starting November 24 graduate students will present in class with the following outline.  
**Expect to see pop-quizzes during this period.**  
List of potential topics:  
November 24: Nanopowders  
December 1: Ceramics as energy harvesting materials  
December 3: Ceramics as energy conversion materials  
December 5: Ceramics as energy storage materials  
December 8: Future of Ceramic materials  
December 10: wrap up of course

### Attendance and Expectations
- All students are expected to attend class. Attendance also requires participation in class by solving problems in small groups and presenting the solutions in front of the class. Cell phones should be turned off. Reading of newspapers, work on assignments for this or other classes, or other activities that are not part of the class are not allowed during class time.

### Grading
- Best 2 out of 4 exams: 60%
- Class participation: 10%
- Best 5 out of 8 pop-quizzes: 10%
Grading Scale –

<table>
<thead>
<tr>
<th>Percentage</th>
<th>≥94</th>
<th>≥90</th>
<th>≥87</th>
<th>≥84</th>
<th>≥80</th>
<th>≥77</th>
<th>≥74</th>
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<th>≥67</th>
<th>≥64</th>
<th>≥61</th>
<th>&lt;61</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter Grade</td>
<td>A</td>
<td>A-</td>
<td>B+</td>
<td>B</td>
<td>B-</td>
<td>C+</td>
<td>C</td>
<td>C-</td>
<td>D+</td>
<td>D</td>
<td>D-</td>
<td>E</td>
</tr>
</tbody>
</table>

Grades are not curved. There is no final exam in this class.

“C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Homework is due online in e-learning, no late homework will be accepted. If you have trouble with on time submission on e-learning you need to get a trouble ticket from the UF help desk before the deadline and also send an email alerting the instructor about the problem. Late submissions without trouble ticket and email alert will not be considered.

Make-up Exam Policy – There are no make-up exams since 4 exams are offered and only 3 exams are needed.

19. 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.

Note that failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures. See http://www.dso.ufl.edu/sccr/procedures/honorcode.php

20. 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.

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

*UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.*

*Career Resource Center, Reitz Union, 392-1601, career and job search services.*
22. **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.

23. **Syllabus Changes** – I reserve the right to make changes in the syllabus as needed. Any changes will be clearly announced on canvas and in class.

   **Sections in italics are from the UF catalog or from college of engineering prescribed syllabus.**