

EMA 5646 CERAMIC PROCESSING
Fall 2015

Basic Information

Instructor: Dr. Zhe Cheng Phone: 305-348-1973 Email: zhcheng@fiu.edu
Office: EC3172 Office Hours: Wed, Fri 11:00-13:00
Class Hours: Mon, Wed, Fri 10:00-10:50
Classroom: EC1110
Prerequisite: N/A
Time offered: Fall of every other year

Course Description

Introduction to the science and engineering of ceramic processing, with emphasis on theoretical fundamentals and current state-of-the-art processing.

Course Objective

The main objective of EMA5646 Ceramic Processing is to introduce principles and engineering practices of conventional as well as new, unconventional processing techniques for ceramics, especially advanced technical ceramics and glass materials.

Learning Outcomes

Through this course, students will be able to understand the state-of-the-art knowledge about processing of ceramic and glass materials. In particular, students will be able to understand the principles behind all the processing techniques and the impacts of processing variables on the microstructure and the resulting properties of ceramic and glass materials.

Contents Covered

- Powder synthesis
- Post synthesis processing and characterization of ceramic powders
- Green body formation and characterization including additives
- Thermal processing of ceramics
- Post firing processing of ceramics
- Processing of glass

Textbook & Other Course Materials

- Textbook: **Ceramic Processing and Sintering**, M. N. Rahaman, CRC Press (2003), ISBN 0-8247-0988-8
- Principles of Ceramic Processing, James S. Reed, 2nd edition, Wiley (1995), ISBN 0-471-59721-X.
- Class notes

Grading

- Quiz (20%)
- Homework (30%)
- "Mini research proposal" (50%)

- Final grades: A: ≥ 90 ; A-: 87-89.9; B+: 84-86.9; B: 80-83.9; B-: 77-79.9; C+: 74-76.9; C: 70-73.9; C-: $< 67-69.9$; D+: 64-66.9; D: 60-63.9; D-: 57.0-59.9; F: < 57

Course Policy

- Attendance required
- Students can discuss homework problems, but must independently finish it
- Grade discrepancies – resolve in the same day
- Homework will be collected
- Accommodate “make-up” quiz, tests, or delayed term paper if proven medical necessity
- Accommodate disability (<http://drc.fiu.edu/>) and religious holidays
- NO cheating or plagiarizing in ANY form (Check with me if questions)
 - No excuses will be accepted
 - Will be reported and handled according to FIU policy

Topics and Tentative Schedule

- Particle synthesis, processing, and characterization (week ~1-3)
- Additives in ceramic processing (week ~4)
- Green body formation (week ~5-7)
- Heat treatment for ceramics (week ~8-11)
- Post firing processing (week ~12)
- Processing of glass (week ~13)
- Other ceramic processing (week ~14-15)

Related MME Program Outcomes

- (a) Ability to apply knowledge of mathematics, science, and engineering
- (e) Ability to identify, formulate, and solve engineering problems
- (g) Ability to communicate effectively
- (i) Recognition of the need for, and an ability to engage in life-long learning
- (k) Ability to use the techniques, skills and modern engineering science necessary for engineering

Guidance about “Mini Research Proposal”

- Description
 - Identify a particular ceramic material, or a ceramic-based composite, or ceramic-based simple device of your (research) interest, do some research, and write a mini research proposal about that material/device with particular focus on: i) why that material/device is of interest to you, ii) how it is typically processed from powder into useful form including common features and variations, iii) what are the unanswered questions and/or remaining challenges concerning its processing, and iv) what are your hypothesized solution and detailed experimental plan to prove/disprove your solution; v) preliminary results you have collected/literature search results to show your plan/solution is feasible
- Will go through peer review and rating, with each proposal subject to at least 3 peer reviews
- Grading based on criteria for publication quality
- Format: 3 page (excluding references), single space, 10-12 point font size,
- Grading and timeline

- Totally 50 points towards overall grade
 - 1st draft due Oct 7, 2015 for 5 points
 - 2nd draft due Nov 4, 2015 for 10 points
 - Final version due Dec 4, 2015 for 20 points
 - Response/rebuttal to peer review feedbacks for 5 points
 - Review feedbacks and ratings to “mini research proposal” by peer students for 10 points
- ❑ **NO plagiarism in any form**
- **NO excuses accepted**
 - **FIU plagiarism guide**
<http://education.fiu.edu/plagiarism/index.htm>
<http://libguides.fiu.edu/plagiarism>