

ECH 6939/4905 - Material Self-Assembly Over All Length Scales (Spring 2022)

Class Hours: MWF, Period 7 (1:55 PM ~ 2:45 PM) in MAT 251

Instructor: Peng Jiang, Professor of Chemical Engineering
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Office Hours: T 1:00 PM ~ 3:00 PM in ChE 319

Content: This course introduces students to interdisciplinary nanoscience and nanotechnology. It shows how nanometer and micrometer scale building blocks with a variety of shapes, compositions and surface functionalities can be assembled spontaneously into unprecedented and functional nanostructures.

Textbook: Ozin and Arsenault, *Nanochemistry: A Chemical Approach to Nanomaterials*, 2nd edition. RSC Publishing (2009) (Recommended)

Rogers and Lee, *Unconventional Nanopatterning Techniques and Applications*. John Wiley & Sons (2009) (Recommended)

Topics:

1. Photolithography and soft lithography
2. Layer-by-layer self-assembly
3. Nanocontact printing and writing
4. Nanorod, nanotube, nanowire self-assembly
5. Nanocluster self-assembly
6. Microsphere self-assembly and colloidal photonic crystal
7. Microporous and mesoporous materials
8. Block copolymer self-assembly
9. Biomaterials and bioinspiration

Grading: Class attendance and classroom performance: 10%, Mid-term exam: 30%, Proposal: 60% (presentation: 30%, proposal: 30%)

Exam: One in-class mid-term exam (2 hours, open books and open notes) will be in written short answer format.

Homework: Problems will be assigned throughout the semester to help understand lectures. They will not be graded and answers to the assigned problems will be discussed in class.

Proposal: The topic of the research proposal is any area of nanoscience and nanotechnology. It aims to assist students in developing original research ideas in new areas, and in presenting these in such a way as to persuade a critical reviewer of both the merit of the research and the soundness of the method. The length of the proposal is about 2000 words.

Academic Honesty:

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 student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.