Dept. of Materials Science & Engineering

Spring 2013

MTSE 3100: Materials Science and Engineering Lab II
Course Syllabus

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Time: (W) 2:30-5:20 pm, **Room:** DP D212, Office hours: Open door policy

Course Description: This course covers labs of essential processing methods for polymer, glass, and composite materials, as well as computational materials. The labs will be conducted at faculty research groups with expertise of processing these types of materials within the MSE department.

Course Requirements: Mandatory attendance.

Text book: None. The instructor will provide the laboratory manual and references.

Grading: Class participation is required for each of the labs. Lab reports are due at the end of each session (e.g. polymer, glass, etc …). Grading is based on class participation and the reports.

Credits and contact hours: 1 Credit. Walk ins or by appointment

Specific Course Information

a. Brief description of the content of the course (catalog description)
Polymer and processing, computational materials, nanocomposite materials, glasses.

b. Prerequisites or co-requisites: ENGR 2332, 3450

Specific goals for the course

a. *Specific outcomes of instruction*

- Students will conduct experiments, analyze and interpret data, and write reports on the experiments.
- Students will learn structure-property relationships for polymers, ceramics and composites from the lab experiments.
- Students will use the techniques, skills, lab equipment, as well as computational tools (FEA) to solve practical engineering problems in the experiment.

Brief list of topics to be covered

1. General introduction and overview; Discovery Park D212 (Dr. Xia)
Week 1: Introduction (Jan. 16, 2013)

2. Polymer processing (3 labs); Lab Room: Discovery Park E-146 (Dr. Brostow)
Week 2: Polymer forming methods **(2:30pm-3:00, Room: DP-D212)** (Jan. 23, 2013)
Week 3: Thermophysical analysis (DSC, TGA, DMA) (Jan. 30, 2013)
Week 4: Polymer-based nanocomposites (Feb. 6, 2013)

3. Computational materials (3 labs); Lab Room: Discovery Park D212 (Dr. Xia)
Week 5: Finite element (FE) methods (Feb. 13, 2013)
Week 6: FE Simulation of tensile test-modeling (Feb. 20, 2013)
Week 7: FE Simulation of tensile test-data and post-processing (Feb. 27, 2013)

4. Ceramic processing – glass melting (3 labs) Lab Room: Discovery Park E-135 (Dr. Du)
Week 8: Glass and glass formation methods (Mar. 6, 2013)
Week 9: Melting of soda lime silicate glasses (Mar. 20, 2013)
Week 10: Structure and composition characterization of glasses (Mar. 27, 2013)

5. Composite materials (3 labs); Lab room: Discovery Park D212 (Dr. Aouadi)
Week 11: TiO_2 and TiO_2/ZnO nanocomposite structures (April 3, 2013)
Week 12: Fabrication of dye-sensitized solar cells (April 10, 2013)
Week 13: Measurement of dye-sensitized solar cells (April 17, 2013)