

MECH 4395
Special Topic: Smart Materials and Structures
Course Syllabus
Fall, 2018

Instructors: Dr. Yirong Lin
Locations: CCSB G.0208
Time: TRs 4:30 – 5:50
Offices: Engineering A 111
Office Hours: TRs 3:30 pm to 4:30 pm
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Textbook: N/A. Notes and Power Point slides available in class and on blackboard.

Course Objective:

This course focuses on several functional materials that can be used in advanced materials systems for energy storage, energy harvesting, and sensing. It provides diverse and rich content to the students about how research in the area of nano-material, manufacturing, and energy conversion in advancing the science and engineering domains.

Course Contents:

- Course Introduction and Overview
- Overview of Functional Materials
- Piezoelectric materials modeling and testing
- Pyroelectric and thermoelectric materials
- Energy harvesting Materials and Devices
- Self-Healing polymer and its application

Objective:

This class is to expose undergraduate students with state-of-the-art advancement of functional materials and devices such as solar cells, advanced lithium-ion-batteries, super capacitors, energy harvesters, thermoelectrics, and self-healing polymers. In the classroom lecture, fundamentals on energy harvesting and storage devices fabrication, current state-of-the-art, and future development trend will be introduced; while in the term paper session, students will be divided into groups to perform investigation of green energy harvesting and storage devices fabrication such as dye-synthesized solar cell, super capacitors, lithium-ion batteries.

Project:

Projects related to functional materials such as piezoelectric and/or pyroelectric will be covered.

Grading:

- **Quiz:** 2 quizzes (20%), (09/27/18), (11/01/18)
- **Exam:** 2 Exams (50%), (10/02/18), (11/06/18)
- Project reports: 1 reports (20%)
- Presentation: 15-minutes presentation/Group (10%)