ME 495: Smart Structures

Winter 2013 Time: Tu Th 12.30 – 13.50

Instructor:
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Course Topic: Structures fail due to improper manufacturing, accidents (overloads), and aging (fatigue, environmental damage). Intelligent Structural Health Management (ISHM) systems seek to prevent catastrophic structural failure by integrating diagnostic sensors and multifunctional materials into the structures ("smart structures") so that they can provide near real-time information about their state which can then be used to make informed decisions about their continued reliability.

Course Content: In this course, we will discuss:
- Introduction to Smart Structures
- Structural Dynamics & Wave-propagation methods of damage detection.
- Diagnostic Sensors for Smart Structures
- Multifunctional Materials and Systems for Smart Structures

Course Material: The course will include a mix of lectures, discussions of papers and case-studies, and presentations.
Handouts and web notes (no text).

Course Structure: This is a seminar-type special topics course with a couple of homework assignments and a term project (experimental or computational). There are no exams.
Lectures by SK: 10-12 on the topics listed above.

Grading:
- Homework assignments (30%)
- Project (including term paper and presentation) (70%)

Catastrophic Structural Failures: Aloha airline disaster; Minneapolis bridge collapse; Paris Airport Terminal collapse; Wind turbine failure.

Presentations by each of you:
- One 40-45 minute introductory presentation in the third/fourth week of the term on the term project topic you have chosen;
- One 30 minute presentation in the $9^{th}/10^{th}$ week at the end of the term discussing your findings and your final project report.

Computational/Experimental Laboratory: The bulk of the course hours outside of my lectures and your presentations will be devoted to your project and to individual or small group discussions with me regarding your project.