

CEE619 – Advanced Structural Dynamics and Smart Structures (3 Credits)
Winter Semester 2006-2007
3-Credits

Instructor: [Jerome P. Lynch](mailto:jerlynch@umich.edu)
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Lectures: Monday and Wednesday, 5:00 - 6:30 pm
2305 G. G. Brown

Office Hrs: By appointment

Website: www.engin.umich.edu/class/cee619

Catalog Description:

The course explores in greater depth the fundamental mathematics invoked to richly describe dynamic system behavior. A unifying theory of domain transformation (Fourier, Laplace and Z-transforms) is presented to serve as a launching point into the principles of system identification, structural control and structural monitoring. Students will learn how to design structural monitoring systems to accurately measure system responses to seismic, wind and blast excitations. The design of structural control systems that employ active, semi-active and passive actuation devices will be presented in detail.

Course References (No formal textbook required):

- *Engineering Applications of Correlation and Spectral Analysis*, by Bendant & Piersol, Wiley
- *Optimal Control and Estimation*, by Stengel, Dover
- *Applied System Identification*, by Juang, Prentice Hall PR

Course Requirements:

- Regular attendance
- Homework assignments (Approximately 5 or 6 assignments)
- Midterm exam (Details will be provided later)
- Final project (Formal report and presentation)

Homework:

Approximately, 5 or 6 homework assignments will be provided during the course of the semester. Each homework assignment will have a specified due date – on the day due, please hand the assignment in during class. **Late homework will not be accepted.** You are allowed to work on the homework in small groups, but you must write up your own homework to hand in.

Final Project:

Each student will be assigned a final project for which they will complete a formal literature search. A final report summarizing the research topic will be submitted during the final week of class. Each student will be provided a time slot during which the topic will also be presented to the class.

Grading:

Homework 30%, midterm 40%, final project 30%. The right to change these proportions is reserved.

Prerequisites:

- CEE511 Structural Dynamics (*or equivalent*) – Strictly enforced

Exposure to linear algebra and matrices. You should have seen the following topics: matrices and vectors, (introductory) linear algebra and differential equations.