CEE619 - Advanced Structural Dynamics and Smart Structures (3 Credits)
Winter Semester 2008-2009
3-Credits

Instructor: Jerome P. Lynch
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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
• An Introduction to Random Vibrations, Spectral & Wavelet Analysis, by D. E. Newland, Longman

Course Requirements:
• Regular attendance
• Small Projects (Approximately 5 or 6 assignments)
• Final Research Project (Formal report and presentation)

Small Projects:
Approximately, 5 or 6 small projects will be provided during the course of the semester. Each
assignment will have a specified due date – on the day due, please hand the assignment in during
class. I would like each student to work individually on each assignment because each assignment is
designed like a mini-Ph.D. oriented research task.

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:
The course grading will be based on the small projects (5 to 6) and the comprehensive research
project with the weighting between the two to be roughly 60-40, respectively.

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