ENME462 Vibrations, Controls, and Optimization II
Spring Term 2015

Instructors: Dr. Nikhil Chopra (nchopra@umd.edu) GLM 2149
Dr. Jin-Oh Hahn (jhahn12@umd.edu) GLM 2104C
Office Hours: M 1:30m-3:30pm (Dr. Chopra), T 3:00pm-5:00pm (Dr. Hahn) and by Appt.
Best Means of Contact: Piazza

Text: Control Systems Engineering 7th Ed., Norman S. Nise, Wiley (electronic or paper version)
Course Material, including lecture notes (Posted on Canvas)

TAs:	Randy Ganye	(trandy@terpmail.umd.edu)	Office Hours: W 3:00pm-5:00pm OFFICE EGR 3109
	Zahra Ghasemi	(zghasemi@umd.edu)	Office Hours: W 11:00am-1:00pm OFFICE GLM 2107B
	Albert Lee	(alee09@umd.edu)	Office Hours: T 1:00pm-3:00pm OFFICE GLM 2107B
TFs:	Ryan Martin	(rcmartin@umd.edu)	Office Hours: W 1:00pm-3:00pm OFFICE EGR 3109
	Bryce Yapps	(byapps@umd.edu)	Office Hours: M 11:00am-1:00pm OFFICE GLM 2107B

Schedule:	Lec	MW 10:00am-10:50am	HJP 0226
	Dis	W 11:00am-12:50pm	KEB 2107
	Dis	Th 1:00pm-2:50pm	KEB 2111
	Dis	F 1:00pm-2:50pm	KEB 2111
	Dis	W 8:00am-9:50am	EGR 0312

Web Page: Canvas will be the official medium for posting class material such as class notes, homework solutions, studio assignments, etc. We will also be using Canvas to send email to the class. It is your responsibility to make sure your email address on Canvas is correct.

Course Objectives: Continuation of ENME 361. Fundamentals of vibration, controls, and optimization. Analysis and design in time, Laplace and frequency domains. Mathematical descriptions of system response, system stability, control and optimization. Optimal design of mechanical systems.

Prerequisites: ENME351 and ENME361

Mark Distribution:	Homework	20%
	Studio Assignments	20%
	Midterm Exam (1 hour)	25%
	Monday, March 30, 10:00am-10:50am	
	Final Exam (2 hours)	35%
	Wednesday, May 20, 8:00am-10:00am	

It is your responsibility to pick up graded work (lab reports, homework, exams, etc.). You have one week from the date the work is returned to dispute a grade.

Calculator Policy: Calculators will be allowed for the exams, but programming of any kind will be strictly prohibited. This will be strictly enforced.

Exams: One midterm and one final will be given; the dates for these exams are on the course schedule below. The midterm exam will allow one page of notes (each front and back) and the final exam will allow two pages of notes (each front and back). Material will be drawn from reading assignments, lectures, homework, and studio assignments.

Homework: Assignments will be posted on Canvas and will be due on Wednesdays at 5pm. Late submissions will not be graded, but the lowest two homework scores will be omitted from the grade calculation. Do not count on additional exceptions.

Studios: The studio portion of this class provides students with a chance to learn more about computer-based control tools including Matlab and Simulink, and is intended to enhance learning of the lecture material. These tools are integral to modern control engineering and lessons learned in these studios/discussion sections will be frequently applied to homework assignments. We will also include 3 independent labs to enhance student learning on modeling and control of real-world systems: intro (Lab 1), modeling (Lab 2), and control (Lab 3). In the week of these labs, teams of 4 students should complete the lab at the BAE Systems Controls Instructional Lab (located 3rd floor of Jeong H. Kim Building), as described in the studio material to be distributed. The students should submit their answers to the post-lab problems (which will also be in the studio material).

Academic Integrity: We encourage you to discuss homework assignments and studio work. However, you will be cheating if you turn in anybody else's work (homework, exam answers, schematics, figures, etc) but your own. We realize that this will not apply to the large majority of students in this class, but past experience has taught us that a few will still be academically dishonest. If we catch you cheating, we will give you a 0 on the assignment and refer you to the Office of Student Conduct. Facilitating cheating is the same thing.

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.shc.umd.edu.

Tentative Schedule

Week		Topics	Reading	Studio/Discussion
1	1/26	Introduction	1	No Studios
2	2/2	Laplace Transforms Transfer Functions	2.1-2.3	[1] Laplace Transform Review
3	2/9	System Modeling (Mechanical) System Modeling (Electrical)	2.4-2.7	[2] Modeling Exercise
4	2/16	Transient Response	4.1-4.8	[3] Transient Response
5	2/23	Block Diagrams Steady State Error	5.1-5.2 7.1-7.6	[4] Block Diagrams
6	3/2	Steady State Error (Cont'd)	6.1-6.4	[3] Lab 1*
7	3/9	Stability	8.1-8.7	[4] Lab 2*
8	3/16	**Spring Break**		No Studios
9	3/23	Root Locus Basics	10.1-10.2	Midterm Review
10	3/30	**Midterm: In Class (Monday 3/30/2015)** Root Locus Basics (Cont'd)	9.1-9.4	No Studios
11	4/6	Gain Adjustment PID Compensation		[7] Root Locus
12	4/13	PID Compensation (Cont'd)		[8] Root Locus MATLAB Exercise
13	4/20	Bode Plots	10.1-10.3	[9] Compensators Exercise
14	4/27	Phase and Gain Margin	10.6-10.7	[10] Lab 3*
15	5/4	Frequency Response Design	10.8-10.12	[11] Frequency Response Exercise
16	5/11	Review (No Class on 5/13)		No Studios
		Final (Wed 5/20/2015 8-10am)		

*In the week of these labs, teams of 4 students (to be formed in the week of Feb 2) should complete the lab at the BAE Systems Controls Instructional Lab (located 3rd floor of Jeong H. Kim Building), as described in the studio material to be distributed. The lab access hours during these lab weeks will be announced as soon as finalized.