

ENME 462 – Vibrations, Controls, & Optimization II: Summer 2017 Syllabus

Department of Mechanical Engineering

Lecture Details	Monday through Thursday, 8:00 am to 10:00 am Glenn L. Martin Hall, Room 3106										
Instructor	Name: Steven E. Mitchell, Ph.D. Office: EGR 2128 Hours: Mon - Thurs 10:00 am to 11:00 am and by request Email: mitchels@umd.edu and via Canvas Preferred Means of Contact: Piazza Google Hangouts: mitchels.umd@gmail.com										
Course Objectives	Full details regarding course objectives can be found on the departmental website: http://www.enme.umd.edu/undergrad/courses/enes462 . These include: <ol style="list-style-type: none">1. Use Laplace transform methods to manipulate and solve models of linear dynamic systems.2. Analyze the stability, transient, and steady-state behavior of linear dynamic systems.3. Design linear feedback controllers using time and frequency domain design procedures to satisfy specific performance specifications.4. Use computer-aided analysis and design tools (MATLAB).										
Textbook	<u>Control Systems Engineering</u> (7 th Edition) by Nise, Wiley, 2015 ISBN: 978-1-118-17051-9										
Grading Policy	Course grades will be based on the following approximate grade weights and breakdowns: <table><tr><td>Attendance/Participation</td><td>5%</td></tr><tr><td>Assignments and Exercises</td><td>15%</td></tr><tr><td>Midterm 1</td><td>25%</td></tr><tr><td>Midterm 2</td><td>25%</td></tr><tr><td>Final Exam</td><td>30%</td></tr></table>	Attendance/Participation	5%	Assignments and Exercises	15%	Midterm 1	25%	Midterm 2	25%	Final Exam	30%
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Attendance/participation will be self-evaluated with final grade decisions made by the professor. Assignments and exercises will be performed both in and outside class hours. Preparation, alertness, and performance in the classroom will be subjective factors used to arrive at a final grade.

It is your responsibility to confirm the proper grades are recorded online for all graded work. **You have one week from the date graded work is returned to dispute a grade.**

- Exams** Two 1-hour exams and one 2-hour final exam will be administered in this course. Successful completion of exams and assignments requires the use of calculators and, possibly, additional supplemental handouts. Calculators and additional required material may not be shared during examinations. No collaboration is permitted during examinations, and if violated, is subject to UMCP's Academic Integrity policy.
- Assignments and Exercises**
- i) The assignment questions will be posted online via Canvas and Gradescope.
 - ii) Homework assignments will be submitted and graded using Gradescope. You are encouraged to seek assistance from any legitimate source in understanding homework, including collaboration with other students. The written work, however, must be your own. **No late submissions will be accepted.**
 - iii) All work must be neat, legible, and contain the following at the top of the first page: printed name, student number, signature, assignment number, and due date. Your signature is your acknowledgment that you have understood and complied with the requirements of this policy statement and that you have acted honorably in the preparation of submitted work.
 - iv) For computer work, sufficient documentation must be provided to validate and reproduce the results. Typical documentation includes MATLAB m-files, input and parameter data, and results. Source code and scripts should include your name and brief descriptive text (i.e. comments). Plots must contain descriptive titles and appropriate labels.
- Absences/Makeups:** Class attendance is a prerequisite to success. **It is your responsibility to turn in any course work when due** and to obtain notes and announcements from another class member for classes you have missed. No late submissions will be accepted. If there are extenuating circumstances, discuss with the professor **prior to the due date** and alternate arrangements may be made. Due to the compressed schedule of the summer session, **no makeup exams will be offered.**
- Collaboration Policy** Collaboration of any kind or the use of references and other sources of external information on exams is forbidden unless otherwise stated in this policy or as indicated in writing on assignment cover sheets. Selective collaboration on learning assignments (homework and in-class exercises) can often assist in the learning process. This should be done in moderation, however, since the ultimate measure of this course (and your final grade) is the level of the individual's knowledge, not the collective knowledge of all of his/her associates.

Academic Integrity By enrolling in this course, each student assumes full responsibility as a participant in UMCP's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. **You will be cheating if you turn in anyone's work (homework, exam answers, schematics, figures, etc.) but your own.** Students caught cheating will receive a zero on the assignment and will immediately be referred to the Office of Student Conduct. Facilitating cheating is the same thing. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.shc.umd.edu>.

ABET Program Criteria In addition to teaching the subject material, accreditation of the Department of Mechanical Engineering at UMCP by ABET requires the curriculum to meet certain criteria. This course is designed to provide the students with the following ABET originated concepts:

- a) An ability to apply knowledge of mathematics, science, and engineering.
- b) An ability to design and conduct experiments, as well as to analyze and interpret data.
- c) An ability to design a system, component, or process to meet desired needs within realistic constraints.
- d) An ability to function on multi-disciplinary teams.
- e) An ability to identify, formulate, and solve engineering problems.
- k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Syllabus Note This course syllabus is subject to change. The most recent version is available on the course Canvas website. ***Please check regularly for updates.***

ENME 462 – Vibrations, Controls, & Optimization II Summer 2017 Class Schedule
 Department of Mechanical Engineering

Week	Date	Day	#	Topic/Event	Reading
1	5/29	Monday		Campus Closed: Memorial Day Holiday	
	5/30	Tuesday	1	Course Introduction Laplace Transforms	Chapter 1 Chapter 2.1 – 2.2
	5/31	Wednesday	2	Transfer Functions Modeling Mechanical Systems Assignment #0.1 Due Assignment #1 Due	Chapter 2.3 – 2.6
	6/1	Thursday	3	Modeling Electrical Systems Linearization Assignment #2 Due	Chapter 2.3 – 2.6 Chapter 2.10 – 2.11
2	6/5	Monday	4	Transient Response: 1 st Order Systems Assignment #3 Due	Chapter 4.1 – 4.3
	6/6	Tuesday	5	Transient Response: 2 nd Order Systems Assignment #4 Due	Chapter 4.4 – 4.6
	6/7	Wednesday	6	Review & problem solving Assignment #5 Due	
	6/8	Thursday	7	-- Midterm 1 --	
3	6/12	Monday	8	Review of Midterm 1 Block Diagrams	Chapter 5.1 – 5.3
	6/13	Tuesday	9	Steady State Error	Chapter 7.1 – 7.6
	6/14	Wednesday	10	Steady State Error Stability Assignment #6 Due	Chapter 7.1 – 7.6 Chapter 6.1 – 6.4
	6/15	Thursday	11	Stability Assignment #7 Due	Chapter 6.1 – 6.4
4	6/19	Monday	12	Introduction to Root Locus Assignment #8 Due	Chapter 8.1 – 8.8
	6/20	Tuesday	13	Root Locus Sketching Generalized Root Locus Assignment #9 Due	Chapter 8.1 – 8.8
	6/21	Wednesday	14	Review & problem solving Assignment #10 Due	
	6/22	Thursday	15	-- Midterm 2 --	
5	6/26	Monday	16	Review of Midterm 2 Design via Root Locus	Chapter 9.1 – 9.6
	6/27	Tuesday	17	Compensation: PI & PD	Chapter 9.1 – 9.6
	6/28	Wednesday	18	Compensation: PID Assignment #11 Due	Chapter 9.1 – 9.6
	6/29	Thursday	19	Bode Plots Assignment #12 Due	Chapter 10.1 – 10.2
6	7/3	Monday	20	Gain & Phase Margins Assignment #13 Due	Chapter 10.6 – 10.7
	7/4	Tuesday		Campus Closed: 4th of July Holiday	
	7/5	Wednesday	21	Review & problem solving Assignment #14 Due	
	7/6	Thursday	22	-- Final Exam --	