ME 373 -- Introduction to System Dynamics

Instructors: I. Y. (Steve) Shen
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Office Hour: M,Tu,W,F: 1:30 pm to 2:30 pm, Th: 2:30 pm to 3:30 pm
Last Time I Taught ENGR 373: Winter 2006
Other Undergraduate Course I Taught Recently: ME 230, Spring 2007
Textbook: System Dynamics--An Introduction, by Derek Rowell & David N. Wormley
Lecture Notes: Available in UW Book Store
Prerequisite: MATH 307 (ODE), MATH 308 (linear algebra), EE 215 (circuits), and ME 230 (dynamics)

How Does It Work

Lectures: M,Tu,W,F, 11:30-12:20 (Johnson Hall 075) by Shen
Recitations: by Mr. Qing Guo
AA: F, 2:30-4:20, MEB 245
AB: Tu, 8:30-10:20, MEB 245
AC: Tu, 2:30-4:20, MEB 245
AD: Th, 1:30-3:20, MEB 245
AE: Th, 8:30-10:20, MEB 245
Laboratory: in MEB 115, TA by Mr. Woon Jong Yoon
Procedure: In each recitation session, the class is divided into two halves. One half will stay in MEB 245 for recitations, and the other half will go to MEB 115 for lab. After one hour, the two classes will switch. Please go the recitation for the first week, because TA will split the class and you need to choose your lab mates for the labs. It will take only 10 minutes for the first week.

How to Get Help

Mr. Qing Guo: qguo@u, Office Hours: Tu: 1:00-2:30 pm, Th: 12:00-1:30 pm at MEB 114.
Mr. Woon Jong Yoon: wjyoon@u, Office Hours: Wed, Fri 10-11:30 am at MEB 115.
ME 373 web site: http://courses.washington.edu/mengr373/wi08/.

General Policy

Homework: Weekly homework will be due every Friday at 4:30 pm at MEB 245. You can turn it in at Friday's class. Each homework set has 4-6 problems per week. No late homework will be accepted. Notify the instructor in case of emergency. Homework solution will be available via the web. Please write down the Section Number on your homework. Labs: You need to complete a prelab that it is due at the lab. A short lab summary is due immediately after the lab.
Grading Policy: Homework (15%), Lab Report (5%), Two Midterms (25% each), Final (30%).
Last Day of Lecture: 3/14/2008, Friday
Final Exam Time and Place: 3/19/2008, Wednesday, 2:30-4:20 pm at JHN 075

My Experience with ME 373 and 374

What do we learn in these two courses?

- Model dynamics of a "system" through ODE's.
- Determine the response of the system by solving the ODE's.

What are the challenges of these courses?

- Some of the contents are highly mathematical.
- It is quite difficult to understand the physics behind the mathematics.
- Often, it is not obvious why we need to learn this.
- It has too much material to cover.
- False expectation -- effort: 2 hrs/credit, expected grade: 3.4.

How could I get a good grade?

- Come to the lectures and read the class notes.
- Have a good study habit.
- Do homework problems yourself.
- Review lecture notes and do some problems before any exam.
- Make sure that you truly understand the physics.
- Remember this is a 5-credit course.

Syllabus

Week	Date	Section	Topics
1	1/7-1/11	 8.3 8.3.1 8.3.2-8.3.3	Introduction Review of ODE & Newton's 2nd law Homogeneous & particular solutions Matching initial conditions, first order systems, and time constant
2	1/14-1/18	9.2 9.3	Step response and impulse response Second-order systems: natural frequencies and viscous damping ratio Overdamped systems, Step response Impulse response, discussion & summary
3	1/21-1/25	 5.1 7.8 7.7	1/21, Martin Luther King Day Motivation for state and output equations Examples and definitions Getting state equations from ODE's Getting ODE's from state equations
4	1/28-2/1	Chap. 2 Chap. 3	Motivation for multi-domain elements One-port elements Through and across variables; sources Friday (2/1): First Exam
5	2/4-2/8	Chap. 4	Linear graphs: notation and examples Compatibility and continuity equations Linear graphs for translating elements Physical source modeling
6	2/11-2/15	Chap. 5	State equations from linear graphs: an heuristic example and trap #1 Trap #2 and #3, uncontrollable systems Trees, links, 1st & 2nd variables, normal trees
7	2/18-2/22	Chap. 5 Chap. 6	2/18, President Day State eqns from linear graphs, examples Two-port transducing elements: motivation Transformers and gyrators
8	2/25-2/29	Chap. 6	Linear graphs, Normal trees State equations from linear graphs Friday (2/29): Second Exam
9	3/3-3/7	Notes	Nonlinear Systems Linearization Lagrange equation
10	3/10-3/14	Notes Chap. 7	Lagrange equation Operational methods: block diagram Obtaining block diagrams from state eqns Teaching evaluation
	3/19, Wed		Final exam, 2:30 – 4:20