SYLLABUS
SYST 221 – Systems Modeling Laboratory
Spring 2011

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Office Hours:	Mondays 3:00 to 4:00 and Tuesdays 6:00 to 7:00 at the Jazzman Cafe in the Johnson Center (by Radio Station). Others by appointment (see email and Phone Number)
Course Description:	**SYST 221 Systems Modeling Laboratory (1:0:3)** *Corequisite: SYST 220*. This course introduces students to fundamental principles of simulation and modeling using an engineering modeling environment such as MATLAB® and Simulink. Students will learn how to develop solutions to solve and interpret mathematical models. Problems from topics covered in Dynamic Systems I (SYST 220) will be taken up for class examples and lab assignments. Throughout the course we will discuss different features and capabilities of the MATLAB® software. Each lecture will be followed by a laboratory time to work on exercises involving concepts covered that day.
Text:	1. System Dynamics by William J. Palm III, Mc Graw Hill (same as SYST 220) 2. Mathlab with Simulink, Release 14 with service pack 05 or later (available in GMU Bookstore). 3. University of Texas On-Line MATLAB Tutorial (link to be provided in class). 4. Recommended: Introduction to MATLAB 7 for Engineers (Paperback) by William J Palm III. 5. Recommended: How to Solve It, George Polya, Available from Amazon for nominal price.
Grades:	25% - Group Project: • Define the Project & Modeling Plan • Build the Model and Execute Parametric Study • Interpret and Present Results 35 % - Laboratory Reports (Groups) 15% -- Mid-Term 25 % - Final Exam

Group Project:

The group projects will be executed outside of class. Each group of four students will select a complex system (second order ordinary differential equation), define a problem regarding that system, create a mathematical model, build a simulation, and solve the defined problem using parametric analysis. Each group will present their project to the class.

Examinations:

Examinations are comprehensive over the work performed during the course and the course lecture material. Examinations will be test you on the application of principles learned. Exams interpret the material of the course, not to repeat it via rote memory. Examinations enhance the student's experience and challenge the student to apply course material.

Laboratories:

Students are assigned to groups. Laboratories will be worked by the group. Please turn in only one Laboratory Report with all the names of the individuals who contributed to the report. Caution: one who relies on the group and does not learn for him/herself probably does not perform well on the examinations (or in life).

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CLASS SCHEDULE

Week	DATE	TOPICS	LAB DUE
1	Jan 24	♦ Introduction to the MATLAB environment, plotting and formatting graphs, Form Groups, Problem Solving	
2	Jan 31	♦ Mathematical operations involving scalars, working with variables, Introduction to linear algebra, Arrays, and array operations in MATLAB, Programming using MATLAB (loops, conditional statements, switch-case statements)	1
3	Feb 7	♦ Writing MATLAB scripts, built-in library functions, Examples from Chapter 1 (including polynomials, curve fitting, interpolation)	2
4	Feb 14	♦ Writing function files, invoking functions, Examples from Chapter 2, Assign Group Projects	3
5	Feb 21	♦ Solving algebraic equations, systems of linear equations, solving differential equations, Examples from Chapter 3	4
6	Feb 28	♦ Transfer function analysis, Higher order differential equations, Examples from Chapter 3	5
7	Mar 7	♦ Mid-Term Exam	
8	Mar 14	♦ SPRING BREAK	
9	Mar 21	♦ Numerical methods, Examples from Chapter 4	6
10	Mar 28	♦ Introduction to Simulink and Linear, Begin Group Projects	7
11	April 4	♦ Simulink Features, State Model Block	8
12	April 11	♦ Simulink Features	9
13	April 18	♦ Simulink and Nonlinear Models	10
14	April 25	♦ Examples from Discrete Dynamical Systems, Group Presentations (3)	
15	May 2	♦ Review for Final, Group Presentations (3)	
16	May 16	♦ FINAL EXAM	