SYLLABUS
SYST 221 201 – Systems Modeling Laboratory (13053)
Spring 2008

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Office Hours: Tuesdays at 6 PM and Thursdays at 3:30 PM in Student Union (by Radio Station). Others by appointment (see email and Phone Number)

Course Description: **SYST 221 Systems Modeling Laboratory (1:0:3)** *Corequisite: SYST 220*. Introduction to computer modeling using an engineering modeling environment such as MATLAB. Simulation and numerical solution of continuous dynamic systems. Discretization of continuous time systems. Use of built-in functions and construction of macros. Graphical presentation of results. Solution to systems of linear equations, numerical integration and differentiation, interpolation and curve fitting, solution of ordinary differential equations.

Text:
1. Same as for 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)

Grades: 20% - Group Project:
- Define the Project & Modeling Plan
- Build the Model and Execute Parametric Study
- Interpret and Present Results

40 % - Laboratory Reports (Groups)
15 % - Mid Term Exam
25 % - Final Exam

Group Project:

The Group Project is one focal point of student effort within this course. The majority of effort toward the group projects will be expended outside of class, with class time being reserved for reporting on activities. Each group of four students will select a complex system (second order ordinary differential equation), define a problem to be solved regarding that system, create a mathematical model of the system, build a simulation of the system, and solve the defined problem using parametric analysis. Additional criteria and guidance for these activities will be given in class. 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 open book and open notes since the examinations will test you on the application of principles learned. You will be expected to interpret the material of the course, not to repeat it via rote memory. Examinations are intended to enhance the student's laboratory experience and challenge the student to correctly apply the course material.

Laboratories:

Students are assigned to groups. Laboratories may be worked by the group or individually. 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.

CLASS SCHEDULE – Updated on 15 January 2008

Week 1	24 January	♦ Lecture: Introduction to Solving Dynamic Systems ♦ Laboratory 1: Parachute I
Week 2	31 January	♦ Introduction to MATLAB ♦ Laboratory 2: Parachute II ♦ Groups: Form and Organize Groups
Week 3	7 February	♦ Lecture: Displaying, Labeling, and Interpreting Results ♦ Laboratory 3: Parachute III, Parametric Analysis
Week 4	14 February	♦ Lecture: Numerical Integration and Differentiation ♦ Laboratory 4: Ballistic Trajectory
Week 5	21 February	♦ Lecture: Interpolation and Curve Fitting ♦ Laboratory 5: Determination of Accuracy of Numerical Integration
Week 6	28 February	♦ Lecture: Systems of Linear Equations. ♦ Laboratory 6: Solve 3 X 3 Systems of Equations
Week 7	6 March	♦ Mid-Term Exam
Week 8	13 March	♦ Spring Break
Week 9	20 March	♦ Lecture: Solution of Ordinary Differential Equations ♦ Laboratory 7: Mechanical Spring and Dashpot System ♦ Groups: Turn in Project Definition
Week 10	27 March	♦ Lecture: Simulation and Numerical Solution of Continuous Dynamic Systems ♦ Laboratory 8: Electronic System, Band Pass Filter
Week 11	3 April	♦ Lecture: Discrete Systems and Discretization ♦ Laboratory 9: Population Model ♦ Groups: Turn In Modeling Plan
Week 12	10 April	♦ Lecture: Descretization ♦ Laboratory 10: Descretization of Mechanical System
Week 13	17 April	♦ Lecture: Discrete Control Systems ♦ Laboratory 11: Proportional Control ♦ Groups: Turn In Parametric Study Plan
Week 14	24 April	♦ Lecture: Curve Fitting ♦ Laboratory 12: Curve Fitting
Week 15	30 April	♦ Lecture: Review for Final Exam ♦ Group 1 Presentation ♦ Group 2 Presentation ♦ Group 3 Presentation ♦ Group 4 Presentation
Week 16	1 May	♦ Lecture: Review for Final Exam ♦ Group 5 Presentation ♦ Group 6 Presentation ♦ Group 7 Presentation ♦ Group 8 Presentation
Week 17	8 May	♦ Final Examination

Note: Weekly minutes of group activities to be emailed to hcamp@gmu.edu. Format will be discussed in class.