SYLLABUS
SYST 221 201 – Systems Modeling Laboratory (12296)
Spring 2006

Instructor: Dr. Harold Camp
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Office Hours: Mondays before and after class, others by appointment

Course Description: **SYST 221 Systems Modeling Laboratory (1:0:3)** *Corequisite: SYST 202*. Introduction to computer modeling using an engineering modeling environment such as MATLAB. Solution to systems of linear equations, numerical integration and differentiation, interpolation and curve fitting, solution of ordinary differential equations. 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.

Text:
1. "System Dynamic" by William Palm, McGraw-Hill (same as for SYST 202)
2. Mathlab with Simulink, Release 14 with service pack 05 or later (available in GMU Bookstore)

Grades: 20% - Group Project:
- Define the Project & Modeling Plan
- Build the Model and Execute the Plan
- Results and Interpretation of Results

40 % - Laboratory Reports
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, define a problem, create a mathematical model of the system, build a simulation of the system, and solve the defined problem using parametric analysis. 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. The examinations are intended to enhance the student's laboratory experience and challenge the student to correctly apply the course material. Examinations are not designed to punish the student.

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 will not pass the exams.

CLASS SCHEDULE – Updated on 21 January 2006

Week 1	22 January	♦ Lecture: Introduction to Solving Dynamic Systems ♦ Laboratory 1: Parachute I
Week 2	29 January	♦ Introduction to MATLAB ♦ Laboratory 2: Parachute II ♦ Groups: Form and Organize Groups
Week 3	5 February	♦ Lecture: Displaying, Labeling, and Interpreting Results ♦ Laboratory 3: Parachute III, Parametric Analysis
Week 4	12 February	♦ Lecture: Numerical Integration and Differentiation ♦ Laboratory 4: Ballistic Trajectory
Week 5	19 February	♦ Lecture: Interpolation and Curve Fitting ♦ Laboratory 5: Determination of Accuracy of Numerical Integration
Week 6	26 February	♦ Lecture: Systems of Linear Equations. ♦ Laboratory 6: Solve 3 X 3 Systems of Equations
Week 7	5 March	♦ Mid-Term Exam
Week 8	12 March	♦ Spring Break
Week 9	19 March	♦ Lecture: Solution of Ordinary Differential Equations ♦ Laboratory 7: Mechanical Spring and Dashpot System ♦ Groups: Turn in Project Definition
Week 10	26 March	♦ Lecture: Simulation and Numerical Solution of Continuous Dynamic Systems ♦ Laboratory 8: Electronic System, Band Pass Filter
Week 11	2 April	♦ Lecture: Discrete systems and discretization ♦ Laboratory 9: Population Model ♦ Groups: Turn In Modeling Plan
Week 12	9 April	♦ Lecture: Descretization ♦ Laboratory 10: Descretization of Mechanical System
Week 13	16 April	♦ Lecture: Discrete Control Systems ♦ Laboratory 11: Proportional Control
Week 14	23 April	♦ Lecture: Review for Final Exam ♦ Group 1 Presentation ♦ Group 2 Presentation ♦ Group 3 Presentation ♦ Group 4 Presentation
Week 15	30 April	♦ Lecture: Review for Final Exam ♦ Group 5 Presentation ♦ Group 6 Presentation ♦ Group 7 Presentation ♦ Group 8 Presentation
Week 16	7 May	♦ No Class, Reading Day
Week 17	14 May	♦ Final Examination

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