



DEPARTMENT OF MECHANICAL ENGINEERING AND MATERIALS SCIENCE
RICE UNIVERSITY

MECH 343: MODELING DYNAMIC SYSTEMS

**Laboratory #1
Matlab/Simulink**

Due: At start of Assigned Lab Session for Lab #2

Matlab

Matlab, which stands for MATrix LABoratory, will be used extensively in the course. Matlab is available in the PC labs on campus, and on OwlNet UNIX machines. Tutorials that you try for yourself are an excellent way to teach you how to use this valuable tool. Some suggested web tutorials are:

- Controls Tutorial for Matlab: <http://www.engin.umich.edu/group/ctm/> (Do only Matlab Basics for now. In the future, you may find the other tutorials useful, after we have covered the material in class.)
- More Basics, for your reference (not required for this assignment):
 - <http://www.math.utah.edu/lab/ms/matlab/matlab.html>
 - <http://spicerack.sr.unh.edu/~mathadm/tutorial/software/matlab/>
 - <http://www.math.mtu.edu/~msgocken/intro/intro.html>
 - <http://www.math.ufl.edu/help/matlab-tutorial/>
 - <http://www.me.pdx.edu/~gerry/MATLAB/>

Note that you can also type "help x" at the command line to get more information about a particular command. "x" could be replaced by "plot", "subplot", "exp", etc.

Simulink

Simulink is a software package that enables you to model, simulate, and analyze systems whose outputs change over time. Such systems are often referred to as dynamic systems. Simulink can be used to explore the behavior of a wide range of real-world dynamic systems, including electrical circuits, shock absorbers, braking systems, and many other electrical, mechanical, and thermodynamic systems. Simulating a dynamic system is a two-step process with Simulink. First, you create a graphical model of the system to be simulated, using the Simulink model editor. The model depicts the time-dependent mathematical relationships among the system's inputs, states, and outputs. Then, you use Simulink to simulate the behavior of the system over a specified time span. Simulink uses information that you entered into the model to perform the simulation. Simulink is executed by typing 'simulink' at the Matlab command prompt. Here are some web tutorials for Simulink:

- Simulink Tutorial: <http://www.owlnet.rice.edu/~mech343/schedule.html>
- More tutorials, for your reference (not required for this assignment):
 - <http://www.mathworks.com/access/helpdesk/help/toolbox/simulink/simulink.shtm> (Do the Quick Start)
 - http://rclsgi.eng.ohio-state.edu/~he/me481/simulink_tut.doc (through page 10 for now)

Assignment

1. Review the Controls Tutorial for Matlab "Matlab Basics", along with a minimum of TWO examples from Modeling. Do not worry about how to put equations in state space form, but follow along with the procedures. You should follow along with an open Matlab Command window, and save your workspace.
2. Review the Simulink Tutorial. Work out any examples and save your model windows.

Sign the next page when you have completed the assignments. This page must be turned in by the due date. Be prepared to turn in your saved files as they may be requested by the instructor or TA.

Name: _____



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I have completed the Matlab Basics tutorial [30 points].

Signed: _____

In addition, I completed the following Controls Tutorial for Matlab examples (list them):

Examples completed (2 required, 10 points each. No bonus for extra examples, but the instructor and TA will think highly of you.):

- 1.
- 2.
- 3.
- 4.

Signed: _____

I have completed the Simulink Tutorial [50 points].

Signed: _____

Note: Points will be deducted if your files are requested by the instructor or TA and you cannot produce them in a timely manner.