SYST 221
SYSTEMS MODELING LABORATORY

Spring 2015
Department of Systems Engineering and Operations Research
George Mason University

Course Description: This course introduces students to fundamental principles of computer modeling using an engineering modeling environment such as MATLAB® and Simulink. Students will learn how to develop computer solutions to solve and interpret mathematical models. Problems from topics covered in Dynamical 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 working on exercises involving concepts covered that day.

Class Details

Prerequisites: CS 112
Co-requisites: SYST 220 – Dynamical Systems I

Classes
* Room 223 of the Innovation Hall.
* Tuesdays and Thursdays, from 1:30 p.m. to 2:45 p.m.

Instructor: Abbas K. Zaidi
Contact data: (703) 993-1774 / szaidi2@gmu.edu (preferred)

Office hours
* Room 2237 of the Engineering Building.
* Tuesdays & Thursdays, from 3:00 p.m. to 4:00 p.m., or by appointment (email preferred).

Administrative
* Registration and Drop without Tuition Penalty Deadline: January 27, 2015
* Drop with Tuition Penalty Dates: Jan. 28 to Feb. 20, 2015
* Selective Withdrawal Period: Feb. 23 to March 27, 2015

Examination Dates
* Midterm: March 05, 2015
* Final: Tuesday, 1:30 p.m. to 4:15 p.m., May 12, 2015

Course Logistics

1. All course communication will be done via the Blackboard system. Students are expected to have access and be able to use the system before classes start. Blackboard is accessible via MyMason portal at https://mymasonportal.gmu.edu/. Instructions for using the Blackboard system are provided on the Help button at the top right of the portal page.

2. Volgenau School Computing Resources has answers to many questions about school systems on their web site: http://labs.vse.gmu.edu and will try to help you if have problems connecting to school computing systems. However, they will not provide assistance with general computing

questions or course assignments. Please contact me if you have any questions about how to use software to complete your assignments.

3. Accommodations for disability: If you have a documented learning disability or other condition that may affect your academic performance you should: a) make sure this documentation is on file with Office for Disability Services (SUB I, Rm. 4205; 993-2474; http://ods.gmu.edu) to determine the accommodations you need; and b) let me know about your accommodation needs as soon as possible. If you have contacted the Center for Disability Services and are waiting to hear from a counselor, please keep me updated during the whole process.

4. Inclement weather: Class sessions may be cancelled due to inclement weather or other University emergencies. Check the Announcements area of the course website for updates.

Expected Behavior

1. Attendance in class is essential. Information will be presented that will not necessarily be in the book, and is almost certain to be in both the midterm and final exams.

2. You are allowed to enter or leave at any time, provided you do your best to avoid disturbing other students in the lab.

3. Please make sure you have your cell phone, tablet, pager, etc., in silent mode. Should you find yourself in extreme need to answer an incoming call, just leave the room to do so.

4. With a few exceptions, almost the entire course deliverables are submitted electronically (e.g. class-work and homework), scheduled in advance, and with some flexibility for students to change. Should any scheduled event impact a student's participation in class activities and assignments, it is the student's responsibility to coordinate with me in advance.

5. Students must submit their class-work at the end of each lecture, which will count towards the homework grade.

6. Students are permitted to interact on homework assignments, but your write-up must be your own. Assignments are intended to provide practical, hands-on experience with the ideas presented in the course.

7. Late assignments, when properly justified, will receive partial credit in accordance with the late assignment policy (below in this document). No points will be awarded if a homework is turned in after solutions have been posted.

8. The exam dates and scheduling provided below are tentative, and it is the students' responsibility to keep abreast of changes.

9. Make-up exams will *only* be given for extreme situations, and *only* if I am contacted before the exam is given and full arrangements are established. Full adherence to this policy is the responsibility of the student.

10. Religious observances are one common example of events that might impact students' activities. Students are responsible for planning ahead. Please, refer to the GMU's calendar of religious holidays at http://ulife.gmu.edu/religious_calendar.php.

11. Academic Policy: All academic policies as given in the Honor System and code will be strictly followed. These are available at http://catalog.gmu.edu/content.php?catoid=19&navoid=4113.

12. General Policies: All general policies defined in the University Catalog are in place for this course. You can access those at http://catalog.gmu.edu/content.php?catoid=19&navoid=4114.

13. George Mason University is an Honor Code university. Please see the Office of Academic Integrity website (http://academicintegrity.gmu.edu/honorcode/) for a full description of the honor code and the honor committee process.

Course Outline (Tentative):

Week 1 Introduction	1/20 1/22	Course administration. Overview of the course. Introduction to the MATLAB environment. Mathematical operations.
Week 2 Scripts and Plots	1/27 1/29	involving scalars, working with variables. Introduction to linear algebra. Arrays, and array operations in MATLAB.
Week 3 Functions	2/3 2/5	Writing MATLAB scripts, plotting and formatting graphs, built-in library functions. Solving systems of linear equations.
Week 4 Function Identification	2/10 2/12	Examples from Chapter 1 & Appendix C (including polynomials, curve fitting, interpolation).
Week 5 User-defined Functions	2/17 2/19	Writing function files, invoking functions. Solving differential equations.
Week 6 Programming with MATLAB	2/24 2/26	Programming using MATLAB (relational and logical operators, built-in functions).
Week 7 Midterm	3/3 3/5	Loops, conditional statements, switch-case statements.
Spring Break		*No classes on 3/9 and 3/15*
Week 8 Numerical Methods	3/17 3/19	fzero, fminbnd, and fminsearch commands.
Week 9 Higher Order Diff. Equations	3/24 3/26	Transfer function analysis, Higher order differential equations. Examples from Chapters 2, 3 & 4.
Week 10 ODE Solvers	3/31 4/2	The ode45 solver: first order differential equations. Examples from Chapter 5
Week 11 Simulink	4/7 4/9	Introduction to Simulink and Linear Models
Week 12 Simulink	4/14 4/16	More blocks, sine, cosine, etc.
Week 13 Simulink	4/21 4/23	Non-linear models
Week 14 Course Review	4/28 4/30	More Simulink examples
Week 15	5/12	**Final Exam (1:30 – 4:15 pm)**

Textbook: Same as prescribed in SYST 220

Students are encouraged to also refer to the following resource:

- Introduction to MATLAB for Engineers (Paperback), William J. Palm III. McGraw-Hill Science; 3rd edition (February 8, 2010). ISBN-10: 0073534870.

Software

MATLAB with Simulink, V.14 with service pack 05 or later (available in GMU bookstore)

IN CASE YOU DO NOT WANT TO BUY THE SOFTWARE:

Matlab is installed on the computers in the classroom, our open lab (ENGR 1506) and on the campus virtual computing lab (http://www.vcl.gmu.edu). Matlab is also installed on our Linux server which is accessible from off campus, but that would require the students to know how to install and use an X-server.

Evaluation Criteria

The grading structure of this course is as follows:

- Assignments (35% of grade)
- Midterm (30% of grade)
- Final Exam (35% of grade)

- Letter grades will be decided as follows:

97% and above	A+	73-75%	C
94-96%	A	70-72%	C-
90-93%	A-	66-69%	D+
86-89%	B+	63-65%	D
83-85%	B	60-62%	D-
80-82%	B-	at or below 59%	F
76-79%	C+		

Assignments

There will be assignments posted on Blackboard every week. Each assignment will have its respective due date clearly mentioned on the assignment. I might sometimes not grade the assignments in detail, but will always use it to gain insight on how well students understand the subject.

You are not prevented to work with your peers on the class work exercises, and are even encouraged to do so. However, each student must provide his/her own answers, and I might

verify whether he/she actually worked in his/her respective exercise and understood the solution provided. In any case, past experience consistently shows that students who didn't keep up with the assignments have had a hard time in the exams.

Assignments must be submitted via Blackboard and can be of three types:

Weekly Assignment*:* Each weekly assignment is out of 10 points. Unless stated otherwise, I will present the solutions at the beginning of the next class after the assignment was due. For this spring 2015 semester this usually means I post it on Thursday classes and present the solutions on the Tuesday class following the submission deadline. If you submit your assignment after it is due but before I present the solutions you can earn a max of 7 points. An assignment submitted after the solutions are posted will earn no points.

Tests, Quizzes, or Challenges*:* These are conducted in class and each will be out for an amount of points to be disclosed prior to the class. The details of each test, quiz, or challenge will be explained during its respective announcement.

Files should be named with the following convention:

Syst221_Assigment#_LastnameFirstname.
Examples: Syst221_Hwk02_DoeJohn, etc.

Always check for grades on Blackboard. If you don't see the grade, report to me by the next class after assignments have been returned. I will not entertain missing grade requests that come later in the semester.

Examinations

Both the Midterm and the Final will be in-class exams.

"The mind is not a vessel that needs filling, but wood that needs igniting."

– Plutarch

(from Ian Kidd's translation of Essays)