

AE 030 - Computer Programming for Aerospace Engineers

Instructor Information:	Professor Long Lu long.lu@sjsu.edu
Class Times and Locations:	Section 1 (Lecture): R 13:30-14:20 in ENG 164 Section 2 (Laboratory): T 9:00-11:45 in ENG 407 Section 3 (Laboratory): R 15:00-17:45 in ENG 407
Office Hours and Location:	T 12:00-14:00 in ENG 272F
Prerequisites:	None
Textbooks:	[1] Attaway, Stormy, <i>MATLAB: A Practical Introduction to Programming and Problem Solving</i> , 3 rd ed., Elsevier Inc., 2013. [2] Kernighan, Brian W., and Ritchie, Dennis M., <i>The C Programming Language</i> , 2 nd ed., Prentice Hall, NJ, 1988.

Description:

Introduction to the fundamentals of programming in MATLAB/Simulink and C. Topics in MATLAB programming include variables, characters and encoding, vectors and matrices, input and output, user-defined functions, selection and loop statements, modular programming, debugging, and plotting techniques. Topics in Simulink programming include block diagrams and libraries, wiring techniques, modeling, and simulations. Topics in C programming include variables, data types, operators, expressions, statements, input and output, arrays, functions, arguments, control flow, and program structure.

Goals:

Introduce students to:

1. Developing algorithms, pseudocode, and flowcharts
2. Writing, compiling, analyzing, and debugging computer programs in MATLAB/Simulink and C
3. Applying computer programming in solving aerospace engineering problems

Learning Objectives:

Upon successful completion of this course, students should be able to:

1. Develop algorithms, pseudocode, and flowcharts
2. Define and manipulate variables in MATLAB
3. Define, index, and manipulate vectors and matrices in MATLAB
4. Write, compile, analyze, and debug user-defined functions in MATLAB
5. Incorporate selection and loop statements in MATLAB
6. Utilize modular programming to write a program in MATLAB
7. Plot and interpret data in MATLAB
8. Draw and interpret block diagrams
9. Derive transfer functions from block diagrams
10. Construct block diagrams in Simulink
11. Model and simulate dynamic systems in Simulink
12. Define variables, data types, operators, and expressions in C
13. Define and utilize control flow in C
14. Write, compile, analyze, and debug programs in C
15. Work effectively in teams to define, propose, and solve an aerospace engineering problem utilizing MATLAB/Simulink programming

Grading:

Laboratory reports (12x40 points):	480 points
Examinations (2x100 points):	200 points
MATLAB/Simulink project proposal presentation:	40 points
MATLAB/Simulink project progress presentation:	40 points
MATLAB/Simulink final project presentation:	40 points
MATLAB/Simulink final project report:	200 points

Grading Scale:

950 points < A+	700 points < B-
900 points < A	670 points < C+
850 points < A-	650 points < C
800 points < B+	600 points < D
750 points < B	Below 600 points = F

Course Project:

- You will work in teams to provide computer-programming support, utilizing MATLAB/Simulink, to one of our senior design teams (aircraft or spacecraft depending on your interest and availability of senior projects). Details will be announced in the course of the semester.
- You are free to form your own teams, which must be announced by week 4.
- You must follow the [AIAA technical conference paper format](#) when preparing your final project report.
- You must upload your final report to Canvas.
- You must email the final project MATLAB/Simulink code in a zipped folder to the instructor at <long.lu@sjsu.edu> for verification purposes.
- The deadline to submit final project reports is Tuesday 05/17/2016 (11:59 PM).

Notes:

1. No late laboratory reports or make-up examinations are allowed without a valid reason and proof.
2. All examinations must be taken in order to receive a passing grade.

Approximate Schedule:

Week	Lecture	Laboratory	Note
1	Welcome to AE 030		
2	Introduction to MATLAB	Lab 1: Algorithms, Pseudocode, and Flowcharts	
3	Introduction to MATLAB Programming	Lab 2: Introduction to MATLAB	Lab 1 report due
4	Selection Statements	Lab 3: Introduction to MATLAB Programming Team Announcement	Lab 2 report due
5	Loop Statements and Vectorizing Code	Lab 4: Selection Statements	Lab 3 report due
6	MATLAB Programs	Lab 5: Loop Statements and Vectorizing Code Project Proposal Presentations	Lab 4 report due
7	Plotting Techniques	Lab 6: MATLAB Programs	Lab 5 report due
8	Introduction to Simulink	Lab 7: Plotting Techniques	Lab report 6 due
9	Examination 1	Lab 8: Introduction to Simulink	Lab report 7 due
10	Spring Recess		
11	Introduction to C Programming	Project Progress Presentations	Lab 8 report due
12	Types, Operators, and Expressions	Lab 9: Introduction to C Programming	
13	Control Flow	Lab 10: Types, Operators, and Expressions	Lab 9 report due
14	Functions and Program Structure	Lab 11: Control Flow	Lab 10 report due
15	Examination 2	Lab 12: Functions and Program Structure	Lab 11 report due
16	Project Discussion	Final Project Presentations	Lab 12 report due

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