

CEE101S/201S
Science and Engineering Problem Solving using *MATLAB*
Summer Quarter 2014-15

Instructor: Derek Fong
Y2E2, Room 169
650-723-5174
dfong@stanford.edu

Office Hours: TBA

Teaching Assistant: TBA

General Course description:

This class serves as an introduction to the application of MATLAB as a powerful tool to solve a variety of science and engineering problems. Students will be exposed to computational and visualization tools available through MATLAB to analyze, solve, and visualize some common problems of interest in science and engineering. Along the way, students will hopefully develop an understanding of uncertainty and error, and improve programming skills.

Course objectives:

1. To become familiar with MATLAB as a tool for computations and visualization
2. To develop problem solving skills using computers
3. To cultivate efficient and effective programming skills
4. To illustrate how computers can be used to perform computations arising from problems of interest in science and engineering.

Ultimate objective: to teach oneself additional MATLAB skills and uses after leaving the class.

Prerequisites:

Students should have a working knowledge of algebra, trigonometry, vectors, and calculus and a willingness to use them in solving a variety of problems in science and engineering.

Grading:

The course grade will be based on overall performance on homework (40%), two midterm exams (30%), and a final project (30%).

Exams:

There will be two midterm exams which require the solution of a few short problems

Final project:

You will be required to complete a final project in teams of two, which will be randomly assigned. The project does not need to be complicated, elaborate, or sophisticated. However, the goal of the final project is demonstrate some of the skills learned in this class to do something useful, practical, and hopefully relevant to your own interests and experiences. The effort for the final project should be the equivalent of about one and a half to two times a typical homework effort.

Collaboration:

Students are expected to adhere to the *Stanford Honor Code* (<http://studentaffairs.stanford.edu/judicialaffairs/policy/honor-code>) which describes standards of acceptable and unacceptable student conduct. Of particular importance are the rules regarding receiving aid that is not explicitly permitted in exams and class work.

It is also important that students take an active part in seeing that the letter and spirit of the Honor Code are upheld by themselves and others.

It is OK to ask a fellow classmate for clarification on a problem or direction on its solution after a good faith effort. However, wholesale copying is strictly forbidden. Each student is responsible for handing in solutions to their homework and it should reflect their own understanding of the material and work. If you receive any significant help on an assignment or particular problem, you are required to document this assistance and who provided it to you.

Also of importance in these days of the ubiquitous Internet are the explicit prohibition of plagiarism. Penalties for violation of the Honor Code can be serious (e.g., expulsion from the University).

Late Homework policy: Homework deadlines are firm and due at class time on the day specified for each assignment. Homework turned in late will be penalized 10% per day up to a maximum of 30%. Solutions will be posted 3 days after the due date, after which, the maximum allowable score will be 70% of the original assignment value.

Textbook (recommended)

Hanselman and Littlefield, *Mastering MATLAB*, Prentice-Hall.

MATLAB: Stanford and CEE-cluster computers have MATLAB installed. Mathworks constantly upgrades MATLAB. For this class, any recent version will do. If you have your own personal computer, it is strongly recommended that you purchase your own copy of the latest student version MATLAB (see below). It is a true bargain at under \$100 and will serve you well beyond this class.

You are encouraged to purchase the MATLAB student version for your personal computer. This may be purchased from the Stanford bookstore or directly from Mathworks (http://www.mathworks.com/academia/student_version/)

CEE101S/201S Summer 2015: Tentative Course Calendar

| Week of | M | T | W | Th | F |
|---------|------------------------------|------------------------------|------------------------------|---------------------------------|----------------|
| 22-Jun | L1: Intro to Matlab | L2: Matlab Basics | <i>Section</i> | L3: Conditionals | |
| 29-Jun | L4: Flow Control | L5: Functions I | <i>Section</i> | L6: Functions II | <i>HOLIDAY</i> |
| 6-Jul | L7: Coding & Debugging I | L8: Coding & Debugging II; | <i>Section</i> | L9: Plotting and Graphics tools | |
| 13-Jul | L10: Image Processing | Exam #1 | <i>Section</i> | L11: Linear Algebra | |
| 20-Jul | L12: Calculus | L13: Interpolation | <i>Section</i> | L14: ODEs I | |
| 27-Jul | L15: ODEs II | L16: ODEs III | <i>Section</i> | L17: Nonlinear equations | |
| 3-Aug | L18: Basic Statistics | Exam #2 | <i>Section</i> | L19: Examples | |
| 10-Aug | <i>Project Presentations</i> | <i>Project Presentations</i> | <i>Project Presentations</i> | <i>Project Presentations</i> | |

All Homeworks due on Tuesday at 9am