

Engineering 12 Fall Term, 2003

Welcome to Engineering 12, the successor to Engineering 11. Engineering 12 is an introduction to computer programming with engineering applications. The course has four main goals:

1. To teach you to program a computer using general-purpose programming languages.
2. To teach you to design programs using a "top-down" approach.
3. To promote and encourage good programming practices.
4. To illustrate the role of computer programming in solving engineering problems.

Programming a computer is a skill, like playing the piano. It can be learned well only by constant, repetitious practice.

Many programming languages are available. Most large scale scientific computing is done in FORTRAN or C. However, lesser scale problems are frequently programmed in languages that are part of a more general software package, e.g., MATLAB. We will start with MATLAB - learning how to use it as a calculator, use it to run simple programs, called scripts, and finally, to run more complex programs that require separate functions (called m-files) to aid the program in calculations. We will then move to the C programming language - where the similarities and differences with MATLAB will be explored.

In-class activities:

As with Engineering 11, there will be two 2-hour active learning sessions each week. Each class will consist of a brief informal lecture, roughly 20-30 minutes long, followed by an *active-learning session* in which you will be required to complete one or two relatively simple programming problems. A printed copy of your solution to designated in-class activities must be handed in at the start of the following class. They will not be graded in detail, but must be completed successfully, using acceptable programming style.

The in-class activities are intended to illustrate important concepts in computing that you are expected to master. As such, 10 percent of your final grade will be based upon timely submission of working solutions.

Programming assignments:

There will be approximately 12 programming assignments, about one each week. These may, or may not, be team assignments. Regardless, for each assignment, you will be required to turn in a top-down program design, in the form of an outline or pseudo-code, a printed program listing and a printed copy of some representative output. You will also be required to submit a copy of your program electronically. The electronically submitted programs will be run to verify that they run in accordance with the printed paperwork that you submit. Your programming grade will be based upon programming style as well as accuracy.

The first few programming assignments will be easy, but they will quickly become more complex. The programming assignments will comprise 30 percent of your final grade. All programming assignments will be equally weighted in determining the 30% component.

Quizzes and exams:

Weekly short quizzes (**10%**) and two-exams (**25% each**) will determine the remainder of your grade. Quizzes, generally on Wednesday, will mostly cover material from the preceding two or three classes. The first exam will test you on your understanding of the material covered in MATLAB; the second exam on the material covered in C.

Instructor:

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Texts:

1. Budny, *Introduction to MATLAB and C*, available at the Pitt bookstore.

Software:

We will be using MATLAB and Microsoft Visual C++ 6.0 in this course. Both MATLAB and C++ are available in the Freshman Computing labs (621 BEH, 669 BEH and Gardner Steel) and CIS computer laboratories about campus. Check with CIS to see what software is available for your personal use on your own computer.

Program maintenance:

You are responsible for obtaining appropriate disks (3.5 inch floppies or zip disks) to maintain copies of your work. Alternatively, you can use FTP to copy and/or download your work to/from your personal filespace on the Pitt network. Whichever you choose, do not leave a computer in the Freshman Computing labs without saving your work. It will be lost when the machine is rebooted or logged in by another user.

Grading:

In-Class Programming Problems.:	10 %
Programming assignments:	30 %
Quizzes	10%
Exam 1:	25 %
Exam 2:	25 %

Students with disabilities:

If you have a disability for which you are or may be requesting an accommodation, please contact both Dr Patzer and Disability Resources and Services, 216 William Pitt Union, 412.648.7890/412.383.7355 (TTY), as early as possible. DRS will verify your disability and determine reasonable accommodations for this course.

How to Get Through This Course

1. ***Plan to spend two or three sessions, of about 1 to 1-1/2 hours each, in the computer lab for each programming assignment.***
2. ***Don't do any actual programming until you have first developed a top-down program strategy and have roughed out the program design in pseudo-code.***
3. ***After you have developed your program design, plan on several sessions to get the program to execute correctly.*** Remember that very few programs run on the first few tries. You need some time between sessions to figure out what went wrong.
4. ***Think about your program between sessions, and avoid the temptation to ask someone else for help whenever your program does not run.*** One of the goals of this course is to develop a sense of independence and self-reliance.
5. ***Make frequent use of the debugging techniques that you will learn in this course.*** They will help you find and correct programming errors.
6. ***Be sure that your programs are logical and well documented.*** Use comments, program indentation, etc. freely to enhance the logical clarity of the program.
7. In preparation for the exams, be sure that you understand all of the fundamental concepts that were applied to the programming assignments.