CS 221 Computer Science for Engineers Fall 2011

Course Syllabus

Keep this for future reference! *30 August 2011*

Lecture Time and Place: Tuesday 2:00–3:15pm in Chem-Phys 153
Instructor: Professor Ken Calvert, `calvert@netlab.uky.edu`, 859-257-3961
Instructor Office Hours: Tue 11–12 noon **(in 102F Davis Marksbury Building)**.
Wed 9–10:30 a.m.
other times by appointment

Required Textbook: *Engineering Computations: An Introduction Using MATLAB and Excel*, by Musto, Howard and Williams, McGraw-Hill Higher Education, 2009. ISBN: 0-07-338016-4.

Course Web Page: `http://protocols.netlab.uky.edu/~calvert/classes/cs221/`

Teaching Assistants:

Sections 1 & 2:	Mehmet Onur Ascigil (onur@netlab.uky.edu)
Sections 3 & 9:	Pavel Tariqul Islam (pavel.ducse@gmail.com)
Sections 4 & 5:	Ju Shen (jushen.tom@gmail.com)
Sections 6 & 7:	Manish Sapkota (manish.sapkota@uky.edu)
Section 8:	Tom Allen (thomas.allen@uky.edu)

TAs will hold office hours in the **Multilab** (203 Engineering Annex), times TBD.

1 Course Description

This course provides a basic background in the use of computational tools for Engineers, including basic programming. It is intended to familiarize you with tools you are likely to encounter in your job, and to equip you with basic problem-solving skills with those tools.

The official course description says:

> Characteristics of a procedure-oriented language; description of a computer as to internal structure and the representation of information; introduction to algorithms. Emphasis will be placed on the solution of characteristic problems arising in engineering. Not open to students who have received credit for CS-115.

1.1 Expectations (Preconditions)

Students should already have basic computing skills, like being able to copy files from one place to another, renaming files, printing files, browsing the Web. In addition, students are assumed to have adequate mathematical ability to succeed in calculus, and in particular to manipulate algebraic expressions.

1.2 Learning Outcomes (Postconditions)

By the end of the course, the successful student will be able to:

1. Use modern computing software to solve problems in engineering;

2. Understand and apply basic control and data structures to construct simple programs;
3. Apply testing and debugging techniques to identify and correct errors in programs;
4. Understand and implement some basic algorithms, including numerical methods.

In this course students will gain familiarity and facility with the MATLAB[1] and Excel[2] software packages.

1.3 Format

The course consists of one 75-minute lecture on Tuesday, plus one 50-minute lab section on Thursday each week. This is a **two credit-hour course**, so you should expect to spend, on average, four to six hours per week *outside* of class on homework and study. Lectures will focus on general concepts and computer science principles, and will include examples of problem-solving with computers. Labs will present specific tool-oriented details, hints and tricks, and hands-on experience solving problems. Some lab exercises will be taken from the textbook. Therefore **ALWAYS BRING YOUR TEXTBOOK TO LAB**.

2 Policies

If you have questions or concerns about any of the following policies, or if anything is not clearly explained, **ask about it now**. It is far easier to deal with such matters *before* they become important.

2.1 Grading.

Your grade in the course will be determined by your performance on the homework/programming assignments, laboratory assignments, two in-class quizzes (given in lecture), and the comprehensive final exam. The contribution of each component to your grade is as follows:

Homework Assignments	30%
Lab exercises	18%
In-class Quizzes (3@6%)	18%
Lab Quizzes (3@7%)	21%
Comprehensive Final Examination	13%

The cutoff for an A is 90%; for a B is 80%, C is 70%, and D is 60%.

The comprehensive final examination for this class will take place **Tuesday, December 15, 10:30am–12:30pm** in the room where lectures take place. No substitute final exams will be given except for reasons stated in the bulletin, i.e., you have three exams scheduled in one day. If that applies to you, and CS 221 is the one you are allowed (and want) to reschedule, please inform the instructor as soon as possible (but after drop date).

2.2 Problem-solving Assignments

Problem sets will be assigned and are to be completed **individually**, outside of class. Each assignment will be posted on the class web page, along with a grading sheet. Assignments will be turned in via the CS portal.

[1] Trademark of The MathWorks (which is also a trademark).
[2] Trademark of Microsoft.

Problem set assignments will be graded and returned to you in lab. There will be five or six problem sets assignments, each containing multiple problems.

2.3 In-Class Quizzes

There will be three in-class quizzes on concepts and principles covered in the course. Each will be about 20 minutes in duration. No notes, books, or electronic devices may be used.

2.4 Lab Exams

Three lab exams will be given during the lab session. Students will work individually to complete the examination. Students *may* use resources (textbook, class notes) on these exams.

2.5 Lab Exercises

Lab exercises will be assigned weekly. Each lab will be posted before the lab date; it will be due the *second* lab period after it was posted. A description of what must be turned in and demonstrated will given in each assignment.

Each lab task must be demonstrated **in lab class** on or before the due date, in order to get credit. Once your TA has signed off on your demonstration in class, you can upload the assignment via the CS portal (reachable via the class web page); this serves as proof that you completed the lab successfully.

Some lab exercises will use parts of the textbook. **ALWAYS BRING YOUR TEXTBOOK TO LAB**.

Lab Exercises will *not* be graded or returned. You either get credit for doing it or you don't.

2.6 Attendance

Note: there *will* be lecture on the Tuesday before Thanksgiving.

I do not take attendance in lecture, but you are nevertheless expected to be there. The number one factor that correlates with success in engineering is *going to class*. Attendance in lecture **is required** on the days of in-class quizzes. Attendance in labs **is required** in order to complete the weekly lab exercises.

Students must take quizzes and exams at the scheduled times. In case of a legitimate unforeseen conflict (for example, illness or death in the immediate family), if the student contacts the instructor within a few days of the test date and provides proof of the legitimate excuse, the student may take the exam (or a substitute exam) at a later time.

In case of other conflicts, the student **must** inform the instructor in advance as far as possible, and must take the exam before the scheduled time. Advance notification of such a conflict does *not* automatically guarantee a special exam will be scheduled; the instructor will make the final decision.

2.7 Late Turn-ins

If you have to miss lab for a legitimate reason (e.g., illness or death in the immediate family), contact your TA as soon as possible to arrange a demo of your lab exercise. Otherwise, lab exercises cannot be accepted late.

Each problem set will specify its due date/time and its penalties for late submission. Under no circumstances can assignments be turned in after solutions have been posted or handed out.

2.8 Accomodation

If you have a documented disability that requires accomodation in some form, please contact the instructor at the beginning of the course. In order to receive accomodation, you must provide the appropriate letter from the Disability Resource Center on campus.

2.9 Withdrawing

If you decide not to complete the class, please, **PLEASE** do the paperwork to officially withdraw **before** the drop date. We would much rather give a "W" than an "E" grade. If you just stop coming to class you will get an "E".

2.10 Changes

From time to time it may be necessary to modify policies, dates, etc. Reasonable notice will be given; check the course web page for the latest information.

3 Academic Conduct

I expect each student to act honestly and to do his or her own work. It is my responsibility and my intention to protect the interests of the honest students. Therefore **CHEATING IN ANY FORM WILL NOT BE TOLERATED.** Now, I don't mind if you help each other with understanding the material; in fact, I encourage it. The key point is this: **Anything that you turn in—homework, examinations, whatever—with your name on it *must be your own work*, composed and written by you without looking at others' work.** If you need to refer to someone else's work, or if you collaborate with someone, **cite them explicitly**, like this: "I collaborated with Ben Bitdiddle on this assignment. We discussed alternative ways of structuring the program."

Plagiarism, including misrepresenting others' work as your own, will not be tolerated in any form. Academic offenses are defined in Section 6.3 of the University Senate Rules. You are expected to have read and abide by those rules. When academic dishonesty is suspected, the procedures specified in Section 6.4 of the University Senate Rules will be followed.

4 Topics

A list of topics is posted on the course web page; it will be updated from time to time.

5 Getting Help

Many resources are available to help you in this class. The wise student will take advantage of them as needed.

For **help with MATLAB or Excel**, your first and best resource is the built-in help functions. The MathWorks also has video tutorials that are a great intro to the use of various features of MATLAB.

For **help with assignments**, the best approach is to *ask a question in lab*. The lab section is structured for you to be able get help. If you have a question, many other people likely have the same question, so by asking you will do everyone a favor. Note that this requires that you have thought about the assignment enough to ask the question.

Another way to get help on an assignment is to *go to office hours and ask your question*. The instructor and each teaching assistant holds office hours at various times during the week. You are welcome to go to anyone's office hours; that is, you don't have to only see the TA of your lab section.

Another way is to *ask your classmates*. You are welcome to use the class mailing list for this purpose. Lab section i (for $i = 1, 2, \ldots, 7$) has a mailing list `cs22100`i`@cs.uky.edu`. Send your question to that list.

Finally, implicit in all of the above is a very important point: In order to get help *you need to be prepared to ask a question*. If you come us and say "I'm lost", we probably aren't going to be able to help. But if you invest just a little more effort to figure out exactly *where* you are getting lost ("I'm having trouble with the concept of types." "I don't understand how for-loops work." "How do you determine what kind of program to write, based on the problem statement?"), you are much more likely to get what you need.

6 Access to MATLAB

This course requires that you have access to the MATLAB software. The default method is to use it in one of the computer labs on campus.

Version R2011 of MATLAB is installed in all of the computer labs run by Engineering Computing Services, including machines in Shaver Engineering Library and Ingels Hall. It is also available in the following labs run by the *campus* computing services:

Civil Engineering Computer Lab (228 O. H. Raymond)
Mechanical Engineering Computer Labs (114 & 111 RGAN)
Business and Economics Instructional Lab (100 BE)
CS Instruction Labs (102 & 103 RGAN)
Engineering Workstation Lab (211 RGAN)
Science Lab (213 M. I. King Library)
Nursing (6th Floor, Nursing Bldg)
W. T. Young Library

Most of these labs are open weekday evenings until at least 10:00pm. During the week, Science Lab is open until midnight, EWL until 2:00 a.m., and W.T.Young is **open 24 hours**. (But note also that the Civil, EWL, and CS instruction Labs are often reserved for classes during the day.)

For a fee, you can also arrange to run MATLAB on your very own computer or laptop (Windows, Linux or Mac). There are two ways to do this, each with different advantages and drawbacks:

1. Buy a **student version** of MATLAB directly from the MathWorks. (You may also be able to get this from the bookstore if they have it in stock.) It costs $99 and includes MATLAB, Simulink, six toolboxes—symbolic, control system, signal processing, statistics, optimization and image processing—and the signal processing blockset for simulink. Additional toolboxes are available for $29 each. (This is a good deal. For professionals, the cost is $500 for standalone MATLAB, and toolboxes are over a hundred dollars each.) The license is good forever, but you don't get any updates or support. Note: I do not expect we will use Simulink or other toolboxes in this class, but they may be useful for other classes later.

2. Buy access through SSTARS on campus. It costs $60 and is good for only one year (July 1–June 30). It includes the latest version of MATLAB, Simulink, 16 toolboxes (including all of the above except control system), and the MATLAB compiler. However, you have to be connected to the campus network (e.g., via VPN) so you can contact the license server when you want to use the program.

To summarize: the advantage of buying directly from The Mathworks is that it works without an Internet connection, and lasts forever. The downside is you don't get updates. The advantage of getting it through SSTARS is that it's cheaper and you get access to more toolboxes. The downside is it only lasts for one year, and you have to connect to the campus network to use it.

In addition, there are two free software programs that are intended to be similar to MATLAB:

FreeMat `http://freemat.sourceforge.net/`

Gnu Octave `http://www.gnu.org/software/octave/`

Note that in general these programs offer only *partial* compatibility with the original MATLAB. I cannot guarantee that they have the functionality you need for assignments in this class. For example, FreeMat doesn't have MATLAB's "magic" function, and some of the plotting functions are buggy. On a Macintosh, Octave runs in a terminal window by default, you may have to install another program to do plotting, etc.. These programs are likely to be "good enough" if you just want something to fill in when you are occasionally away from campus. Note, however, that there *is* a separate learning curve associated with these other programs, and in general we will not be able to provide help with them.