

APM 153: Introduction to Computing Methods for Engineers and Physical Scientists

Lecture: MWF 8:25–9:20 am

Computer Workshp: F 8:25–9:20 am

Instructor:

Dr. Gary M. Scott
208A Walters Hall
Phone: x6501
Email: gscott@esf.edu

Teaching Assistants:

Ms. Winnie Tsui
Email: wtsui@syr.edu
Ms. Qiong Song
Email: qiong@syr.edu
Mr. John Buyondo
Email: jpbuyond@syr.edu

Course description: “Introduction to programming structures: flowcharts, language statements, and subprograms. Introduction to data structures: arrays, scalars, and others. Introduction to data codes: numbers and characters, ‘natural’ and binary. Introduction to algorithms at the procedural level.”

APM 153 is a computer-based course in mathematics and problem-solving. The most important skill to be learned in this course is algorithm design. An algorithm is a step-by-step set of instructions used to solve a problem or to write a computer program. The course teaches you how to develop algorithms to solve increasingly sophisticated problems in mathematics and engineering and to convert your algorithms into programs in MathCad, Matlab, Excel, and Visual Basic. The goals of the course are to (1) help you develop new skills in mathematics, computer science, and problem-solving, (2) to increase your confidence in your ability to use mathematics and computers, and (3) to prepare you for subsequent coursework at ESF which will rely upon the computer and mathematics skills taught in this course.

Expected background: Although this course has no prerequisites, a certain amount of background knowledge is expected for this course. Specifically, each student should have a passing knowledge in the areas listed below. A late afternoon lecture will be given the first week of class to answer questions on these topics for students that wish or need to review them.

1. Computer and information technology

- (a) General computer knowledge and skills (how to turn it on, how to start applications, how to log in to laboratory computers...)
- (b) How to organize files into folders/directories (create folders, move files, ...)
- (c) Internet (how to access the Internet, find web pages, search the web, ...)
- (d) Email (how to use your student account, send and receive messages, attachments...)
- (e) Word processor (how to prepare documents, format and print them ...)
- (f) Spreadsheets (how to enter data, perform simple calculations...)
- (g) How to use your calculator (basic functions, using the memories, creating graphs, editing entries...)

2. Mathematics

- (a) Mathematical computation and order of precedence (which comes first, multiplication or addition)
- (b) Basic algebra and trigonometry (how to solve for a variable, basic functions, logarithms)
- (c) Solving systems of linear equations (solve a 3 equation system by hand...)
- (d) Matrix algebra (add, multiply, transpose, and invert matrices)

Course outcomes: Every course that a student takes should further his knowledge, building on what was learned previously. By the end of this course, each student should be able:

1. To design structured algorithms using systematic problem solving techniques;
2. To implement their algorithm in Matlab, Visual Basic, and a programmable calculator language, and be able to choose the most appropriate implementation;
3. To solve problems using spreadsheets (e.g., Excel) and other software (e.g., Mathcad);
4. To properly document their solutions to problems both internally and externally.

Relation to curricula: APM 153 is a freshman level course intended to be taken during your first year of college at ESF. The skills that are learned in this class will help with the problem solving that occurs in many of your subsequent engineering classes.

Textbook: The text for the course is:

Engineering Computations: An Introduction using Matlab and Excel Joseph C. Musto, William E. Howard, and Richard R. Williams, McGraw Hill Higher Education, Boston (2009).

The text may be available from Syracuse University Bookstore and/or Follett's Bookstore. It is also available (and probably cheaper) from online booksellers such as textbooks.com, amazon.com, and www.bn.com. If you do order the book from an online seller, you should use overnight or express shipping to receive the book in a timely manner. It is also available in an online format at www.coursesmart.com. It is expected that most of the text will be covered in the course.

Recommended Course Software: We will be using a number of software packages in the course including Matlab, Mathcad, and Excel. While these packages are available on the campus laboratory computers, students may wish to invest in their own copy, which, as students, can be purchased as student versions of these packages relatively inexpensively. Many of the student versions of the packages can be purchased at the SU bookstore. Alternatively, Matlab is available from Mathworks at http://www.mathworks.com/academia/student_version/; Mathcad is available from PTC at <http://www.ptc.com/products/mathcad/>; and Excel (and Microsoft Office) is available from Microsoft at <http://www.microsoft.com/student/discounts/theultimatesteal-us/default.aspx>.

Exams and student assessment: The grading will consist of 2 hour exams, the final exam, homework (and quizzes), a design project, and class participation, preparation, and attendance. The hour exams will consist of two parts: an inclass part and a take-home part. The take-home part will be available on a Monday and due the following Friday and will be handed in together with the inclass part. The inclass part will be taken on the Friday of the same week and will begin at 8:00am. The take-home exam is expected to be more problem-solving oriented with longer, more involved problems. All students must do their own work on the take-home exam without consultation. Collaborators on exams will result, at a minimum, of the grade being split amongst the collaborators, but could also result in judicial action under the ESF Student Code of Conduct at the discretion of the instructor. It is important that you be present for all the exams because makeup exams will only be given under exceptional circumstances. Makeup inclass exams are given by prior arrangement only and must be taken before the scheduled exam. Since it is the nature of this course to build upon previously learned material, all exams will potentially be cumulative back to the kindergarten. Exams will be closed or open book as announced before the exam.

Homework: Homework problems will be assigned and they will be collected. I cannot overemphasize the importance of promptly completing every homework assignment. The type of problems that you see in the homework assignments will be similar (not identical!) in concept to the one on the tests and quizzes. Students are encouraged to work together in completing the homework assignments, however, each student must hand in his or her own work.

No homework will be accepted after they have been handed back to the class or the have been grades posted. It is your responsibility to see that homework assignments are handed in on time. Assignments are due at the beginning of class on the due date in the format specified; assignments handed in later that day are considered one day late. Each day a homework is late will result in a reduction of your *course* grade by 1%. Homeworks not handed in will be considered five days late. Each student is allowed four “free” late days: Use them wisely.

Students are expected to submit all homework. If fact, the penalties for not handing in homework in a timely fashion extend beyond the grade on the homework (see the preceding paragraph); missing homework will negatively affect your final grade. *It is nearly impossible to pass the course without submitting homework.*

Design project: During the course of the semester, a design project will be assigned. This problem will be more open-ended and more vaguely defined, requiring engineering judgment in their solution. The details of these problems will be handed out in class.

Discussion sessions: In the past, I have found that informal discussion and problem solving sessions before the exams have been very helpful for the students that attended them. The teaching assistant will also hold optional weekly problem-solving sessions to discuss homework problems in more depth that we can in class and to ask specific questions regarding homework problems. A time and day will be chosen early in the semester for these sessions.

Grading: The tentative grading for the class will be 30% for the hour exams, 20% for the final exam, 15% for the design problems, 25% for the homework and quizzes, and 10% for class and laboratory participation, attendance, and listserver discussion participation. The final letter grade will be based on a curve, but generally 60% is required for a D, 70% for a C, 80% for a B, and 90% for an A.

Topics: We will be covering most of the textbook in this class. Reading assignments and homework assignments will be provided during the class. Supplemental material may be posted on the course website.

Class Policies

Attendance: Attendance is expected at all class meetings; roll call may or may not be taken at the discretion of the instructor. Students missing a lecture are expected to get the missed material and notes from their classmates. Individual makeup lectures will not be given and lecture notes are not available from the instructor. Reading assignments and homework assignment due dates are given on a separate handout and posted on the course website or announced during class. Lectures begin at the time stated in the class schedule unless otherwise announced. Students are expected to arrive to class on time.

Computer, disk, and storage failure: Computer, disk, and storage failures are a fact of life in the computer world. You should make multiple copies of all your work so that if there is a failure, your work is not lost. *The failure of a disk, a computer, or other storage media is not an acceptable excuse for late or missing homework assignments or late take-home exams.*

Viruses: Computer viruses are also a fact of life in the computer world. It is the students responsibility to keep their assignments and diskettes virus-free. You should regularly scan your diskettes (and your computer) with up-to-date virus software. All college computers have virus software installed. Assignments handed in or brought in for consultation on infected media will be given a score of 0 for that assignment. Students submitting infected files multiple times will have their *course* grade reduce by one full grade per incident.

Cell phones: The use of cell phones is not allowed during lectures and other class activities. Cell phones must be turned off or left at home so as not to disturb the other students in the class. The consequences of using a cell phone or a cell phone ringing during class can include one or both of the following:

- The owner of the cell phone will be immediately asked to leave the classroom and may not return during that class period.
- The entire class will be given a quiz.

Quizzes: The instructor reserves the right to give both announced and unannounced quizzes, if necessary, to encourage preparation for class. There will be *no* makeup quizzes. Quiz scores become part of the homework portion of the course grade.

Help on assignments: The instructor and teaching assistants are very willing to help with the various assignments in the class. However, students must demonstrate that they have made a good-faith effort at solving the problem before consulting with the instructor or teaching assistant. When asking questions, be prepared to demonstrate the efforts that you have made in solving the problem and be prepared to discuss your plan of attack. Statements such as “I don’t understand the problem, please show me how to do it” will probably not be answered. You will be asked about what you do understand about the problem. Questions should be brought to the instructor or teaching assistant well before the due date: Neither the instructor nor the teaching assistant are obligated to make extensive homework consulting time available the day before the due date.

Computer-graded solutions: We may grade your assignments by computer on a number of occasions. In these cases, it is very important that you follow the directions for handing in your assignment. Nonconforming submissions will probably receive a grade of zero.

Collaboration: You are encouraged to discuss the homework assignments with your classmates. However, each student is expected to hand in their own work. Students handing in substantially similar assignments will have the single grade divided amongst the students, but could also result in judicial action under the ESF Student Code of Conduct at the discretion of the instructor. For computer solutions, simply changing the variable names, prompt strings, and comments does not make programs substantially different.

Course website: The instructor maintains a course website that can be accessed through the following website: gscott.mysite.syr.edu. Course information (assignments, handouts, etc.) will be regularly posted on this site. If you miss and lose an assignment sheet, it may be posted here. You will also be able to access your grades through this site if you have supplied the instructor with an appropriate pin number.

Email accounts: E-mail will be used extensively as a communication tool in this class. Please refer to cns.esf.edu and its.syr.edu for more information on email accounts, computer laboratories, wireless access, and other computing concerns on the ESF and SU campuses.

I expect to use a listserver (Yahoo!Group) to communicate with the class and to facilitate communication amongst the students. You will need to sign up for this group to be a part of it. Instructions for signing up will be given in class and be available on the course website.

Copyrights: All material authored and provided by the instructor is protected under the Copyright Law of 1976 and subsequent amendments. The text of this law is available on the Internet at www.copyright.gov/title17/. Proper use of course materials protected by copyright is expected of all students.

Academic Expectations: Students are expected to conduct themselves in a professional manner at all times. This expectation extends to all course related activities including the use of email and the course listserver. Email communications should be professionally written. The course listserver is to be used for course related communications only. Misuse of email and the course listserver could result in your access to these services being curtailed.