ENG EK 127 Introduction to Engineering Computation
Fall 2009

COURSE INFORMATION

Cast of Characters

Professor: Stormy Attaway
             Associate Chair for Manufacturing, Department of Mechanical Engineering
             110 Cummington Street, Room 112
             Office phone: 353-5224   Office FAX: 353-5866
             Home phone: (603) 878-2760
             email: sa@bu.edu
             Hockey games in Agannis Arena: Section 112, Row Q, Seat 1
             Office Hours: Vary weekly; posted on the board outside of my office every week

Graduate Teaching Fellows (GTF's) and Undergraduate Teaching Assistants (TA's):
* TBA; See list in the lab
* The GTF's are graduate students; their duties are to be in charge of the lab and grade projects for their sections
* The TA's are undergraduates. Their duties are to help in the lecture, lab and the discussion sections, and grade the weekly quizzes. Some experienced TA's are designated as "Senior TA's"; they may lead lab and discussion sections.

Course Material

The goal of this course is to introduce freshman engineering students to engineering problem solving using a modern computational environment. In the context of engineering applications, basic procedural programming concepts will be covered including input/output, branching, looping, functions, file input/output, and data structures such as arrays and structures. Additionally, the course will introduce basic linear algebra concepts such as matrix operations and solving sets of equations, and numerical methods such as least squares solutions and their use for curve fitting. Programming projects provided by all College of Engineering departments will reinforce these concepts and introduce engineering freshmen to the various disciplines. Specific topics are listed in the course syllabus.

Course Outcomes

As an outcome of completing this course, students will:
* Gain knowledge of basic procedural programming concepts
* Become proficient in the use of a modern computational tool
* Develop basic problem solving skills
* Develop experience in specifying and designing a solution to an engineering problem using a software tool
* Gain familiarity with basic linear algebra concepts
* Be able to express algebraic equations governing engineering systems in a modern computational environment
* Be able to document solutions to engineering problems

Course Format

All students must be registered for one Lecture section, one Lab section, and one Discussion section. The lecture sections are Mon/Wed mornings. These are taught in PHO 201.   The labs in all cases follow the lectures; they are held either Mon/Wed afternoon or Tue/Thu, in PHO 117. The discussion sections are all on Friday, in PHO classrooms. Many sections become full quickly, so it is imperative that you only attend those sections for which you are officially registered. Prof. Attaway will maintain waiting lists in the beginning of the semester for anyone who wishes to change into a section that is closed, on a first-come-first-served basis.

The specific topics that will be covered in the lectures are listed in the course syllabus. Students are expected to do the reading and to prepare a one-page synopsis of the reading before coming to lecture. The basic material will be reviewed, along with examples, using an overhead projection system. Periodically there will be breaks in the lecture for students to work on Practice Problems.

During the lab, there will be worksheet problems to work on, based on the material covered in the lecture earlier that morning or the day before. On some occasions, extensions of that material may be covered also.

In the discussion sections on Fridays, the Senior TA in charge of the section will review the week's material, and answer any questions that students may have. In some cases, extensions of the material will be covered also. In most of the discussions, there will then be a short (15 minute) quiz on the material covered that week (the exact dates are listed in the syllabus).

Textbook

The text is "MATLAB: A Practical Introduction to Programming and Problem Solving" by Stormy Attaway, © 2009 Elsevier, Inc. ISBN: 978-0-75-068762-1. A Reading List for each lecture will be handed out separately. For best comprehension, it is very important to read through everything including the Quick Questions, and to work on the Practice problems.

Grading

Letter grades are given only for the entire course, not for individual assignments or tests. Numerical grades will be calculated for every student, based on the following percentages:

Lecture (including Synopsis & Practice Problems)	13%
Lab (including Worksheets)	15%
Projects	12%
Quiz Average	13%
Exam 1	15%
Exam 2	17%
Exam 3	15%

The cut-offs for the different letter grades will depend on the distribution of numerical grades at the end of the semester. Usually, the ranges are: 90 and above is an A (A- or A), 80 + is a B, 70+ is a C, 60+ is a D and below 60 is an F. (There may be a curve, but if so it would be in the favor of the students, e.g. an A- might go as far down as 89, but it would not be raised to 91.) The cutoffs between the letter grades for a given range (e.g., B+, B, B-) will depend on the actual numerical grades and will not be determined until the end of the semester. In addition to the numerical average, students **must demonstrate a mastery of the material by having a passing average on the exams and on the projects** in order to earn a passing grade in the course.

Lecture Grade

Students are expected to be on time for every class, and are expected to be prepared for every class by doing the reading and having a prepared Synopsis at the beginning of the lecture period. Electronic devices (cell phones, laptops, PDA's, etc.) are not allowed in the lecture sections. During the lecture, students will be given a set of Practice Problems. After each segment of the lecture, a short break will be taken for students to answer the next Practice Problem. Points will be deducted from the lecture grade if a student (a) arrives late; (b) does not have a prepared Synopsis; (c) leaves early; (d) does not pay rapt attention ;-) or (e) does not answer Practice Problems. The lecture grade will be a combination of attendance, reading Synopses, and Practice Problem solutions. The answers on the Practice Problems and Synopses will not be graded for correctness. All Practice Problems and Synopses that are collected in lecture sections will be returned in the lab sections. One lecture grade will be dropped.

Lab Attendance

For the lab, students will be given worksheet problems to work on during the lab period (until 10 minutes before the hour; e.g. a class that is listed from 9:30-11 really goes from 9:30-10:50, so that students can get to their next class, and the next section of EK127 can get into the lab). Students will receive full credit for every lab for arriving on time and either completing all of the **current** worksheet problems, or spending the full amount of time diligently working on these problems. Points will be deducted from the lab attendance score if a student (a) arrives late; (b) is not prepared for lab; (c) leaves early without completing all of the minimum set worksheet problems; (d) does not spend the time diligently working on the current problems; or (e) spends time working on other worksheets (e.g. old ones not yet completed) or projects (or doing anything online) instead of the current worksheet. Missed labs must be made up in the lab, during the open lab hours, as soon as possible. On many worksheets, students must complete all problems. Some worksheets will have a designated Minimum Set. This means that only those problems must be completed. For the lab attendance grade, students must only work diligently on the problems during the lab, and may not use the computers for any other purpose until the minimum set has been completed. If the minimum set is not completed during the lab period, students must return to the lab during open hours to complete at least those problems (this becomes part of the worksheet grade; see below). The problems after the minimum set are for extra practice, and do not have to be completed. One lab attendance grade will be dropped. Students must swipe in and out of the lab; ID cards will be held during the lab period.

Worksheets

For full credit on the worksheet, at least the solutions for the worksheet problems designated "Minimum Set" must be completed, WITHIN ONE WEEK. The solutions must be completed by the **beginning** of the lab period (when you walk in the door). Sometimes the worksheet problems will be simply checked off, and sometimes particular worksheet solutions will be graded. This will not be announced in advance; students should always be prepared with all worksheet solutions from the lab one week prior. The grading will be on both the correctness of the solution and style. One worksheet grade will be dropped. If a student knows that s/he will not be able to attend a lab, the entire worksheet that is to be checked may be submitted by email to one of the TA's or GTF's for that section BEFORE the lab period in order to receive credit.

Projects

Projects will be assigned periodically during the semester. These are programming problems, which are larger in scope than the problems that can be done during the scheduled lab periods.

They will also be open-ended problems, for which there is no set answer. The due dates are listed in the syllabus. Specific guidelines will be provided with each project. The projects are to be completed during the open lab hours. Late projects will NOT be accepted, for any reason. Most projects will either be group projects, or students will have the option of working in groups. For group projects, students must submit a cover sheet stating that all members of the group contributed, signed by each group member. Students are allowed to work only with members of their group on the projects, not with other students in the class. All group members must be in the same Lab section; the exact size that will be allowed for the group will be specified on each project description (this will vary, depending on the length and level of difficulty of the assignment). PROGRAMS THAT DO NOT RUN WILL NOT NORMALLY BE ACCEPTED.

Quizzes

There will be 8 quizzes this semester, given during the discussion sections. The exact dates are listed in the syllabus. Each quiz will be on the material covered that week. There will be NO make-ups for quizzes for any reason; however, one of the grades will be dropped before the quiz average is calculated. All of the quizzes will be open book, open notes. All quizzes must be taken in the discussion section for which the student is officially enrolled; otherwise, the grade will not count. No electronic devices (calculators, cell phones, PDAs, etc.) will be allowed during quizzes.

Exams

There will be three exams, given on Friday afternoons. These are common exams, given to all sections of this class at once. Since they will not be during the regularly scheduled class time, mark the dates on your calendar! The first exam will be given on Friday October 2 from 4:15-6pm. The second exam will be given on Friday, November 6 from 4-6pm. The third exam will be given on Friday, December 4 from 4-6pm. All exams will be in MOR 101 (Morse Auditorium). All exams are open book, open notes. No electronic devices (calculators, cell phones, PDAs, etc.) will be allowed during exams.

Exam study sessions will be held on the evenings before the exams.

Make-ups

As explained in previous sections, there are no make-ups for projects or quizzes. Since most students will have a valid reason for missing a class during the semester (for example, due to illness), one lecture grade will be dropped, one lab grade will be dropped, one worksheet check grade will be dropped, and one quiz grade will be dropped. Missed lab attendance must be made up during the open lab hours by completing the worksheet problems (for full credit if the lab was missed for a valid reason, otherwise half credit). Worksheet solutions (to all Minimum Set problems) must be completed within one week of the lab. Worksheets may be submitted to a TA or GTF before lab if a lab is to be missed, but there are no make-ups after the lab for the worksheet checks.

Make-up Exams

Make-up exams will be more difficult than the regularly scheduled exams. The only valid reasons for missing an exam are: death in the immediate family, serious illness (documented by a physician), or a conflict with a scheduled Boston University event. If you feel that you have a valid reason for missing an exam, you must petition to Prof. Attaway for permission to take the

make-up. This petition must be received BEFORE the regularly scheduled exam (except in cases of extreme emergency). Petitions are not always granted! If the petition is granted, a mutually convenient time for the make-up exam will be arranged.

Incompletes

Incompletes will ONLY be given for those students who miss the third exam and whose petitions for the make-up have been granted, and for whom the make-up has been scheduled for a time after the final grades for the semester have been determined. An incomplete contract must be filed in that case before the end of the semester.

Grievance Procedure

If you disagree with any grade received in this course, you must write a short note explaining your reasons on a separate sheet of paper, attach it to the paper in question (project, exam, quiz, etc.) and give it to your lab TF or your discussion TF. It will be reviewed, and returned to you.

Cheating

Students are allowed (in fact, encouraged) to work together on the Practice problems and on the lab worksheets, and in groups on the projects. Working together means truly working together, exchanging ideas, NOT copying. Copying another's work is cheating, as is allowing someone else to copy your work. All quizzes and exams must be done by each student individually. Falsifying information on a group project cover sheet will also be considered to be cheating. Anyone caught cheating may be subject to disciplinary action by the Committee on Student Conduct of the College of Engineering. Also, anyone found guilty of cheating will receive a 0 for that particular grade. Please note that these are policies for ENG EK 127; other courses may have different policies. When in doubt, ask before you collaborate!

Cell Phone Abuse

It is not appropriate to have a cell phone on during any class (lecture, lab, discussion), exam, or while in the lab. Therefore, **cell phones must always be turned off**. Any violation of this will result in a 0. For example, if a cell phone is used during class time, the student will receive a 0 for that day's attendance. If a cell phone is used during a discussion section, the student will receive a 0 on that day's quiz. If a cell phone is used during an exam, the student will receive a 0 on the exam. **Leaving a class/discussion/exam to use a cell phone elsewhere (e.g., in the hallway) will be considered to be the same as using it in the class.**

ENG EK 127 Introduction to Engineering Computation Fall 2009
SYLLABUS
(Lectures and discussions listed; labs always follow lectures unless otherwise noted)

Date   **Topics**

===

Week # 1

9/2   Class 1: Introduction to EK 127; Assignment statements, variables,
             expressions, operators, precedence, function calls

9/4   No Discussions

Week # 2

9/7   HOLIDAY; No classes

9/9   Class 2: Constants, type, random numbers, characters, vectors

9/11   Discussion 1: Problem solving techniques; Mock quiz

Week # 3

9/14   Class 3: Matrices, algorithms, scripts

9/16   *Last day to add a course*

9/16   Class 4: Input/Output, Plots, File I/O

9/18   Discussion 2: Quiz 1

Week # 4

9/21   Class 5: Functions that return values

9/23   Class 6: If statements, Relational expressions; switch statements; "is"
             functions

9/25   Discussion 3: Quiz 2

Week # 5

9/28   Class 7: Loops: for, nested, vectorizing

9/30   Class 8: Exam Review

10/2   Discussion 4: Exam Review

10/2   ***   EXAM # 1   4:15 - 6 pm   Room: MOR 101

Week # 6

10/5	Class 9: While loops; error-checking
10/7	*Last day to drop a course (without a "W")*
10/7	Class 10: More on functions, Program organization
10/9	Discussion 5: Quiz 3
10/11	**Project 1 Due**

Week # 7

10/12	*Holiday; No Classes*
10/13	*Monday schedule at BU; No EK 127 labs*
10/13	Class 11: Scope, persistent variables
10/14	Class 12: Strings, Cell arrays
10/16	Discussion 6: Quiz 4

Week # 8

10/19	Class 13: Structs, Nested structs, Vectors of structs
10/21	Class 14: File I/O
10/23	Discussion 7: Quiz 5

Week # 9

10/26	Class 15: Advanced functions: anonymous functions, function handles, variable # of arguments, nested functions
10/28	Class 16: More on plots
10/30	Discussion 8: Quiz 6

Week # 10

11/2	Class 17: Matrix Operations
11/4	Class 18: Exam Review
11/6	Discussion 9: Exam Review
11/6	***** EXAM # 2 4 - 6 pm Room: MOR 101**

Week # 11

11/9   Class 19: Solving sets of Equations: Gauss, Gauss-Jordan Elimination

11/11   Holiday; no classes

11/12   *Last day to drop a course (with a "W")*
11/12   No EK 127 Labs

11/13   Discussion 10: Quiz 7

11/15   Project 2 Due

Week # 12

11/16   Class 20: Symbolic Math; Statistics, Set operations

11/18   Class 21: Sorting, Indexing, Searching

11/20   Discussion 11: Quiz 8

Week # 13

11/23   Class 22: Curve Fitting, Handle Graphics

11/25-11/29   Holiday; Thanksgiving Recess

Week # 14

11/30   Class 23: Sound and Image Processing

12/2   Class 24: Exam Review

12/4   Discussion 12: Exam Review

12/4   *   EXAM # 3   4 - 6pm   Room: MOR 101**

Week # 15

12/7   Class 25: Graphical User Interfaces; Course Evaluations

12/9   Class 26: What's Next

12/11   Project 3 Due