ENG EK 127 Introduction to Engineering Computation Spring 2015
SYLLABUS
(Classes and discussions listed; labs ALWAYS follow classes)

Date   **Topics**

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Week # 1

1/21   Class 1: Intro to MATLAB, Characters, Relational expressions (Chap 1)

1/23   Discussion 1: Problem-solving techniques; Mock Quiz

Week # 2

1/26   Class 2: Vectors, Matrices (Sec. 2.1-2.2, 2.6)

1/28   Class 3: Matrix operations, Logical vectors (Sec 2.3-2.5)

1/30   Discussion 2: Quiz 1

Week # 3

2/2   *Last day to add a course*

2/2   Class 4: Intro to Programming, Scripts, I/O, Plots (Sec. 3.1-3.6)

2/4   Class 5: Functions, Programs, Commands (Sec 3.7-3.8)

2/6   Discussion 3: Quiz 2

Week # 4

2/9   Class 6: If statement; switch statements; "is" functions (Chap 4)

2/11   Class 7: Loops: for, nested (Sec 5.1-5.2)

2/13   Discussion 4: Quiz 3

Week # 5

2/16   *Holiday; No Classes*

2/17   Monday Schedule; Class 8: Loops: while, vectorizing, Timing code (Sec 5.3-5.5)

2/18   Class 9: Exam Review

2/20   Discussion 5: Exam Review

2/20   ***   EXAM # 1   4-6 pm   Room: MOR 101

Week # 6

2/23   Class 10: User-defined functions, MATLAB program organization (Sec
                    6.1-6.3)

2/24   *Last day to drop a course (without a "W")*

2/25   Class 11: Scope, persistent variables, Debugging, Code cells (Sec 6.4-6.5)

2/27   Discussion 6: Quiz 4

Week # 7

3/2   Class 12: Strings (Chapter 7)

3/4   Class 13: Cell arrays, Intro to structs (Sec 8.1 – 8.2.3)

3/6   Discussion 7

3/7-3/15   *Spring Break*

Week # 8

3/16   Class 14: Nested structs, Vectors of structs (Sec. 8.2.4-8.2.6)

3/18   Class 15: File I/O (Chap 9)

3/20   Discussion 8: Quiz 5

Week # 9

3/23   Class 16: Advanced functions: anonymous functions, function handles,
                    variable # of arguments, nested functions (Sec. 10.1-10.4)

3/25   Class 17: Exam Review

3/27   Discussion 9: Exam Review

3/27   *   EXAM # 2   4 - 6 pm   Rooms: TBA**

Week # 10

3/30	Class 18: Plots, Handle Graphics (Chapter 11)
4/1	Class 19: Graphical User Interfaces (Section 13.3)
4/3	*Last day to drop a course (with a "W")*
4/3	Discussion 10

Week # 11

4/6	Class 20: Statistics, Set operations (Sections 12.1-12.2)
4/8	Class 21: Sorting, Indexing (Sections 12.3-12.4)
4/10	Discussion 11: Quiz 6

Week # 12

4/13	Class 22: Sound and Image Processing (Sec 13.1-13.2)
4/15	Class 23: Curve Fitting, Complex Numbers, Matrix operations (Section 14.1-14.3.1.2)
4/17	Discussion 12: Quiz 7

Week # 13

4/20	*Holiday*
4/22	*Substitute Monday Schedule* Class 24: Exam Review
4/24	Discussion 13: Exam Review
4/24	***** EXAM # 3 4 - 6pm Room: MOR 101**

Week # 14

4/27	Class 25: Course wrap-up and Evaluations
4/29	Class 26: What's Next
4/30	**Last Day of Classes; Final Project Due**

COURSE INFORMATION

<u>Cast of Characters</u>
Professor: Stormy Attaway
Department of Mechanical Engineering Faculty Coordinator for Special Programs[*]
110 Cummington Mall, Room 112
Office phone: (617) 353-5224   Office FAX: (617) 353-5866
Home phone: (603) 878-2760
email: sa@bu.edu
Office Hours: Vary weekly; posted on the board outside of my office every week
[*] Concentrations, LEAP (ME, MFG)

Learning Assistants (LA's):
- TBA; See list in the lab
- The LA's are undergraduates and LEAP students. Their duties are to help in the lecture, lab and the discussion sections, and grade the weekly quizzes. Some experienced LA's are designated as "Senior LA's"; they may lead lab and discussion sections.

<u>Course Material</u>

The goal of this course is to introduce first-year 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 numerical methods such as curve fitting. Homework assignments 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.

<u>Course Outcomes</u>

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
- Be able to document solutions to engineering problems

<u>Course Format</u>

All students must be registered for one Lecture section, one Lab section, and one Discussion section. The lecture/class sections are Mon/Wed. These are taught in PHO 117.   The labs in all cases follow the lectures; they are held Mon/Wed afternoons, 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 full, on a first-come-first-served basis.

The specific topics that will be covered in the classes are listed in the course syllabus. Students are expected to do the reading, view the lecture videos, and to complete all online practice problems before coming to class. The class period will consist of an active learning environment. During a majority of the class time, students will be actively working on problems in groups, either on paper or on the white board walls.

During the lab, there will be worksheet problems to work on, based on the material covered in the lecture earlier that day. All worksheet solutions must be tested in MATLAB. On some occasions, extensions of that material may be covered also. It is expected that most students will bring their own laptops to lab, although some computers will be available.

In the discussion sections on Fridays, the Senior LA 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, Third Edition" by Stormy Attaway, © 2013 Elsevier, Inc. ISBN: 978-0-12-405876-7. The sections to be read before each lecture are listed in the syllabus next to the topic. For best comprehension, it is very important to read through everything including the Quick Questions, and to work on the Practice problems. Note we are using the Third Edition, which is organized in a slightly different way and contains more material than the first two editions.

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 online and in-class Practice Problems)	18%
Lab (including Worksheets)	12%
Homeworks and Final Project	11%
Discussions (including Quiz Average)	12%
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** 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 completing all online material. Please note that the reading covers all of the material; the online slides do not necessarily cover everything. Therefore, the online materials supplement the reading; they do not replace the reading. During the class period, students will be given sets of Practice Problems. Individual Practice Problems are to be completed in the very beginning of the class period, without using any reference materials. These will be followed by Group Practice Problems to be done in small groups; reference materials may be used for these problem sets. Points will be deducted from the lecture grade if a student (a) arrives late; (b) is not prepared; (c) leaves early; or (d) does not answer Practice Problems. The lecture grade will be a combination of attendance, online, and in-class Practice Problem solutions. 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 12:30-2 really goes from 12:30-1:50, 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 in MATLAB, 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 homeworks 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 may 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, BEFORE THE NEXT LAB. Some problems are "edge Submit Problems." These problems must be submitted using the online version of MATLAB that is embedded in the course edX edge site. For these problems, test scripts have been written by the course staff to test whether your solution not only works in MATLAB, but does exactly what the problem specifies. The solutions to all problems 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 lab section 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 LA's for that section BEFORE the lab period in order to receive credit.

Homework Assignments

Homeworks will be assigned throughout the semester. Due dates and rules for working in groups will be specified on each homework description.

Final Project

The final project will be due on the last day of classes. This is a programming problem, which is larger in scope than the problems that can be done during the scheduled lab periods. It will also be an open-ended problem, for which there is no set answer. Specific guidelines will be provided at least two weeks before the project due date. The project is to be completed during the open lab hours. Late projects will NOT be accepted, for any reason. The final project will either be a group project, or students will have the option of working in groups. PROGRAMS THAT DO NOT RUN WILL NOT NORMALLY BE ACCEPTED.

Quizzes

There will be 7 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 closed book. 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, 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 February 20 from 4 -6pm. The second exam will be given on Friday, March 27 from 4-6pm. The third exam will be given on Friday, April 24 from 4-6pm. The first and third exams will all be in MOR 101 (Morse Auditorium); the rooms for the second exam are TBA. All exams are closed book. However, student will be allowed to bring one 8.5x11" piece of paper with notes, double sided; this will be handed in with the exam (Note: no staples or tape, just one sheet of paper). No electronic devices (calculators, cell phones, etc.) will be allowed during exams. All exams will be cumulative.

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 attendance grade will be dropped, one worksheet check grade will be dropped, one discussion attendance 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 before the next lab session. Worksheets may be submitted to an LA 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 should be submitted as soon as possible. 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 one of your lab or your discussion LAs. It will be reviewed, and returned to you.

Collaboration Policy

Students are allowed (in fact, encouraged) to work together on the Practice problems and on the lab worksheets, and in groups on the project. 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.**