INTRODUCTION TO ENGINEERING II Spring 2019

Course Syllabus

Catalog Description

This course continues the fundamentals of engineering problem definition and solving, emphasizing the use of computers and programming. Topics include: algorithm design; program flow and control structures; program development, debugging, and documentation; coding best practices; graphical user interfaces; engineering reporting and presentations. Students learn to solve mathematics and engineering problems using MATLAB scripts. Prerequisite: Introduction to Engineering I. 3 credit hours.

Schedule

Lecture/Studio:

Section 01: Tuesday 3:40pm-4:25pm, 4:35pm-5:20pm, 5:40pm-6:25pm, 4-212

Section 02: Wednesday 3:40pm-4:25pm, 4:35pm-5:20pm, 5:40pm-6:25pm 4-212

Section 03: Monday 1:50pm-2:35pm, 2:45pm-3:30pm, 3:40-4:25pm, 4-212

Instructors

Prof. Sam Ghalambor , sam.ghalambor@scu.edu.cn

Prof. Zheng Yang , zhengyang2018@scu.edu.cn

Teaching Assistants:

Ms. Iris Wen (温丰瑞) 410035507@qq.com
Mr. Keith Chen (陈冠伯) 2016141521017@qq.com
Mr. Pei Hongliang (裴宏亮) peihongliang@hotmail.com
Mr. Von (冯子建) 745427458@qq.com

QQ Group: (18-MATLAB) 731199671

When emailing the instructors, include "ENGR" in the subject field of your message. Use your university email account (xxx@stu.scu.edu.cn); the university spam filter impedes mail from qq.com and some other domains.

Textbook

MATLAB Programming for Engineers, by Stephen J. Chapman, 5th Edition

Reference Textbook

Introduction to Engineering Analysis, by Dr. Daniel Budny, 16th Edition

Software

We will use a powerful software tool, MATLAB, to perform calculations and draw graphs. MATLAB is installed on the class computers, and you need a copy for your own computer.

MATLAB is a potent tool, used worldwide by engineering and science professionals in many fields. It is not easy to learn, but the effort you put in to master it will repay you many times over in this class and others. To make learning it easier, there is a wealth of information, examples, and documentation available within the program and on the web. Learn to tap into these resources so you can make the best use of the program.

You will also use Microsoft Word to write up your assignments. Learn how to use the equation editor in Word and how to format documents.

Web Site

We will use the SCUPI Blackboard system, accessed through this web site:

https://learn.scupi.cn

There you will find the course syllabus, studio and homework assignments, and other materials. Current announcements and assignments will be posted on the home page. Assignments will be submitted electronically through the Blackboard site.

Class Format

Introduction to Engineering II will be taught using a combined lecture/studio format. Each class will begin with a short lecture to review material from the text and answer questions. During the remainder of the scheduled time you will work in teams to apply these concepts. Teams will be formed during the first week of class; team makeup will remain constant for the entire semester.

There will be two types of weekly assignments: studio problems, and homework problems. Studio problems will be easy to moderately difficult, and will require only a short writeup. Studio problems are to be solved as a team. Homework problems will be more difficult, and will require considerable thought and effort outside of class.

It is imperative that you come to class prepared. This will generally involve readings from the textbook, viewing tutorial videos, thinking, engaging with fellow students, practice using MATLAB, and performing preliminary calculations.

This is a three credit hour class, so you should expect to devote at least 9 to 12 hours of effort outside the scheduled class time every week.

Studio Assignments

Each week the class will be assigned a number of studio problems. You will work on and complete these problems as a team during the class period. The studio problem solutions will take the form of a short writeup and usually a computer program. Each team will submit a solution in electronic form by the end of class. The studio problems will be graded for correctness; computer programs will be graded for functionality and style. All members of the team will receive the same grade for the studio problems.

The filename for your studio problem solutions will follow this format:

studio_XX_GG.YY

where XX is the assignment number (01, 02, etc.), GG is the number of your team (01 through 54), and YY is the file extension (.doc for word files, .m for MATLAB scripts, etc.).

Procedures for submitting studio assignments through Blackboard will be discussed in class. Please bring a USB memory stick to class to facilitate data transfer.

Homework

Homework problems will be assigned every week. You may work with other people on homework, but all writeups must be individual efforts. Homework are due at 12:00 NOON Monday for all class sessions. Homework solutions must be prepared in electronic form.

The filename for your homework solutions will follow this format:

hwXX_NNNN.YY

where XX is the assignment number (01, 02, etc.), NNNN is the last four digits of your student number, and YY is the file extension (.doc for word files, .m for MATLAB scripts, etc.). Procedures for submitting homework assignments through Blackboard will be discussed in class.

Please adhere to these homework guidelines:

- Your writeup must be typeset using Word and submitted in electronic form. Handwritten or printed assignments will not be accepted.

- Put your name (English/Pinyin), class section, and student number at the top of the first page.

- List the names of other people you've worked with on the assignment.

- All work must be shown for each solution to receive full credit. Present your solution in a logical fashion, showing and explaining all steps in detail.

- Adherence to form is an important part of this course. This includes proper English grammar, spelling, and word usage. Your computer has a spell checker, use it!

- A significant amount of the homework points is associated with obtaining the correct answer. This includes getting the correct quantity, number of significant digits, sign, and unit. Pay attention to all of these, they are important!

- Most assignments require a computer program along with your writeup. We will check that your program functions and produces the correct output. It will also be graded for style and documentation; it is important that other people can read and follow how your program works.

All of the homework scores will be used in your grade computation. Unless otherwise indicated, you can work with your fellow students in the class, but you must submit a distinct and independent write-up to receive credit.

If you're sick, or have a compelling emergency that prevents you from turning in the homework on time, email Prof. Yang.

If you believe an error has been made in the grading of an assignment, you are to bring it to the attention of the TAs within ONE WEEK after grading.

Exams and Grading

There will be a single midterm exam during the semester in early May, and a comprehensive final examination at the end of the semester.

Your grade will be based on the test (20%), homework (30%), final examination (20%), and studio assignments/class participation (30%).

The instructor's role will be to guide you in learning how to define, solve, and present engineering problems. You will not be judged on your ability to recite memorized information, but on how well you make use of information and methods we cover in class. This should already be one of your primary educational goals in coming to university. The key to your success in this class is active participation.

Office Hours

If you don't understand something, and talking to your classmates doesn't help, then you should seek help from one of the instructors. Office hours are posted on the class website, but we are also available at other times; please email to make an appointment.

Plagiarism and Academic Misconduct

Collaboration on studio problems and homework assignments is permitted and encouraged. Studio assignments are to be done as a team, with a single solution and writeup. Your homework writeups are to be individually written and represent your independent efforts.

Plagiarism, copying, and any other form of academic misconduct or dishonesty will not be tolerated. Cite all references, such as books, technical reports, and web sites you have used. You may discuss the homework with other people currently taking this class, the instructors, and any teaching assistants.

Examples of disallowed sources include people who have taken this or a similar course in earlier semesters; websites that offer homework help; course documents from previous semesters.

You are not to share materials distributed in class with people outside the University. Uploading of course materials, including homework, handouts, homework and test solutions, etc. to the web is prohibited.

To reiterate: use of homework or test solutions from previous semesters or the web is not allowed. Getting homework help from the instructors and fellow students in the class is ok; looking up things on the Google, Baidu, and the Wikipedia is ok; getting help from websites offering homework help and problem solutions is NOT ok.

If you have any questions about referencing material, or the boundaries of acceptable collaboration, please talk to your instructors.

Class Participation

As members of an academic community, all students are expected to actively participate in and contribute to class discussions. You are expected to engage with the class during the lecture/studio time, and to be prepared to think and answer questions on your feet. There is no penalty for not knowing the answer to a question, but you need to be able to "think out loud" and demonstrate the procedure you will follow to arrive at a solution. So, if you're asked a question in class, be prepared to figure out the answer.

Cell Phones and Laptops

Out of respect for your fellow students, please mute and put away your cell phones, and close your laptops when class begins.

Web surfing, emailing, text messaging, and the like during lecture is distracting to other students and the instructor, and is likely to result in your missing some important information. Don't do it.

Other Useful Information

You are expected to know how, or learn how, to do the following:

- Use an internet browser to find things on the web.
- Use MATLAB to evaluate numerical results, make graphs, and do multistep calculations.
- Use Word to write up and print your assignments.
- Open, read, and print Acrobat pdf files.
- Find the logarithm of a number and understand what it is.

- Be proficient in basic pre-calculus mathematics, including plane geometry, trigonometry, algebra, and solution of simultaneous equations; basic knowledge of calculus.

For many of you, this will be your first introduction to using computer programs to solve engineering problems. It is not enough that your program function properly; your program must also be readable by other people. You will learn how to write programs so that they can be understood and maintained. This involves naming variables using a consistent scheme; ways of passing program control in an orderly and predictable fashion; and most importantly, documenting your code so it can be read and understood in the future.

By virtue of your being at this university, we know that you are smart, capable, and hardworking. You may find the course challenging and demanding, and might even wonder if you've made a mistake coming here. Don't worry, you will do okay if keep a few things in mind:

- This and other classes at SCUPI are being taught using a Western-style approach. This involves a lot of questioning and interaction with the instructor, probably much more than you are used to.

- It's okay to be frustrated. You will be learning a lot of new things, at a fast pace, in a language you're still getting comfortable with. The best way to learn is to ask lots of questions. If you don't understand something in class, ASK! Remember that if you're unsure about something, there is a good chance that many of the people around you are also unsure.

In this class, the notation log(x) refers to the common logarithm, base 10. This is the convention followed in most every engineering field (but not in mathematics). If the natural logarithm (base e) is intended, we will use the notation ln(x). HOWEVER, you need to use log10(x) for the common logarithm in MATLAB; log(x) will return the natural logarithm (the inventor was a mathematician).

Another important aspect of this class is introducing you to the culture of engineering. For example, expressing a result with the proper number of significant figures (e.g., 3.14 instead of 3.14159265358979323 85) is a sign that you understand the limits of validity of your result; ignoring this convention will cast doubt on your credibility. Expressing your answer with the appropriate and correctly formatted unit (e.g., 3.14 km, not 3.14 KM or 3.14 kilometers or 31,400 dm) helps to minimize confusion when communicating your results to others. Likewise, you need to present your results logically, explicitly state your assumptions, and verify your solution. We will place a great deal of emphasis on how your results are presented so that you can become familiar with engineering norms.

You should be having fun and learning something. If you're not, please tell us.

Course Goals

- To develop skills in engineering problem definition and solving.
- To learn how to design, write, and debug computer programs using a systematic, top-down approach.
- To inculcate good programming and coding practices.
- To illustrate the role of computer programming in solving engineering problems.
- To practice solving problems through teamwork.
- To learn how to acquire, judge, and use information in solving problems

Approximate/Tentative Schedule

Week	Topic

1	Introduction to Engineering Computing, MATLAB basics
2	MATLAB basics, array operation and matrix algebra
3	Symbolic math and examples from calculus
4	Logical functions, selection and repetition structures
5	Data types and examples from statistics
6	Plots and examples from calculus (part I)
7	Plots and examples from statistics (part II)
8	More applications in mathematics/review
9	Midterm exam
10-16	Selected topics in Engineering problem solving