Math 2041 - Symbolic Computation Lab I

Professor: Mike Zabrocki
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Meetings: Tues and Thurs 11:30am-1pm - Gauss Lab Ross S110
Office hours: TEL/DB 2026 - Monday 12-1pm, Thursday 2-3pm and by appointment

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Course description:

Calendar copy: An introduction to symbolic computing in the Maple environment. Topics from single-variable differential and integral calculus, including simple ordinary differential equations, are covered. Both mathematical understanding and applications are emphasized. Three lecture hours, open laboratory hours. One term. Three credits. Prerequisites: LE/EECS 1560 3.00 or equivalent computing experience; SC/MATH 1014 3.00 or SC/MATH 1310 3.00 or SC/ISCI 1401 3.00 or SC/ISCI 1410 6.00. Prior to Summer 2013: Prerequisites: SC/CSE 1540 3.00 (formerly COSC) or equivalent computing experience; SC/MATH 1014 3.00 or SC/MATH 1310 3.00.

Many of the technological advances that come from scientific innovation depend on efficient means of computation and analysis of large amounts of data. Before digital computers became widely available, these sorts of computations were largely done by hand or with the aid of mechanical calculation tools or tables. However, for every computation tool that we have available, there are always mathematical problems that are beyond the limits of our computational power. For example, the ability to factor an 800 digit integer which is the product of two primes or find the determinant of a large matrix is out of the reach of our current computational tools.

This course will use the program Maple to answer numerical and discrete computation questions which would otherwise be too difficult to do by hand or the use of a simple calculator. Maple is an example of a Computer Algebra System (CAS) but other examples such as Sage, Mathematica and Matlab are similarly capable of doing a wide range of computations and other many specialized programs (such as R, GAP and Macaulay) are particularly efficient at certain types of computations.

Your assignments will be to complete worksheets and computation tasks and the grade for the class will also include the results of in class tests.

There will be four components to this class: assignments (40%), three midterms (10%) each and a final (30%).

assignments - will be given roughly once per week. You are encouraged to work together with other students to get the answer, but each person should follow along on a different computer and hand in their own work and hand in/upload their own answer. Each assignment will have its own instructions for what you need to do to complete the assignment and there will be mathematics associated to the problem which I will explain in class.
midterm - the midterms are relatively short assignments that you will be expected to do within the class period and hand in DURING THE CLASS TIME. They will be related to the assignments.
final - this will be held during the final exam period and will be similar to the assignments and midterms but longer.

I really like it when you work together in groups to solve these problems. I won't be able to answer everyone's questions as they come up so it is helpful to have people to talk to to ask questions about. Some of you have lots of questions and don't get the kind of attention that I would like to give you. While I want you to ask your neighbor and get help solving the question, I DRAW THE LINE AT SHARING FILES. It is easy to see when this happens and I will refer cases to the undergraduate program director and there is an automatic penalty of 0 for everyone involved. On the midterms I am very explicit and you must work alone on those problems.
If you miss a test, NO make-up will be given. If a valid explanation is provided (such as a medical note), the final marks will then be adjusted accordingly.

Course schedule

Lecture	dates	Topic/sections in text
1	Thurs, Sept 6	Maple is a calculator; main goal today: get set up, assignment 1
2	Sept 11, Tues	Go over all the different ways to solve assignment 1
3	Sept 13, Thurs	lists, second assignment
4	Sept 18, Tues	functions and lists, third assignment
5	Sept 20, Thurs	
6	Sept 25, Tues	Midterm #1
7	Sept 27, Thurs	
8	Oct 2, Tues	
9	Oct 4, Thurs	
	Oct 9, Tues	Reading week
	Oct 11, Thurs	Reading week
10	Oct 16, Tues	
11	Oct 18, Thurs	
12	Oct 23, Tues	
13	Oct 25, Thurs	Midterm #2

14	Oct 30, Tues	
15	Nov 1, Thurs	
16	Nov 6, Tues	
17	Nov 8, Thurs	
18	Nov 13, Tues	
19	Nov 15, Thurs	
20	Nov 20, Tues	
21	Nov 22, Thurs	
22	Nov 27, Tues	Midterm #3
23	Nov 29, Thurs	
23	Dec 4, Tues	

Announcements:

(Thursday, September 6, 2018) - There is a lot of information needed to get started.
You will need to get a key card for access to this lab. Here are the instructions.
I am not going to recommend a book for this class. We will mostly use the online help system. Some people like to have a textbook to follow along with, but the goal here will be to complete some tasks and learn how Maple (and other Computer Algebra Systems) can be used as a calculator.

(Thursday, September 6, 2018) - There will be an additional site for this course called a Moodle where you can log in an submit your assignments in a Maple worksheet format but typically I will post all announcements here.

(Thursday, September 6, 2018) - I will talk to you at the next class about how to connect to Maple from your home computer. This is done through WebFAS. You will probably need to download and install some software in order to get it to work.

(Thursday, September 13, 2018) - There is no required textbook for this course. I will try to explain all of the commands that I would use to solve the problems I will ask you to do and you will use the online help to find examples and documentation. If you do want a text there are two that were recommended in the past for this course: Introduction to Maple, Andre Heck, 2003 and Maple and Mathematica, a problem solving approach for mathematics; Inna K. Shingareva and Carlos Lizarraga-Celaya , 2007

(Tuesday, September 18, 2018) - The problems that we were having with saving files in the lab are persistent. I think that the best way to avoid them is to run Maple through WebFAS. It seems to be a bit more stable (although even there it is recommended that you try to save your work often). You might need to save your files on a thumb drive.