

AMS 10 – Mathematical Methods for Engineers 1

Instructor: Nic Brummell

brummell@soe.ucsc.edu,

Office: BE 125

Phone: (831) 459 2122

Teaching Assistant 1: Jacob Colvin: jcolvin@ucsc.edu

Teaching Assistant 2: Michael Lubinsky: mlubinsk@ucsc.edu

Graders: X1: x1@ucsc.edu

X2: x2@ucsc.edu

X3: x3@ucsc.edu

Class web-site: www.soe.ucsc.edu/classes/ams010/Spring09/

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Course contents and objectives

Our main goal is to introduce the main concepts in linear algebra to engineering students. The course will cover complex numbers, systems of linear equations, their matrix form, the properties of matrices (including rank, inverse, determinant, eigenvalues and orthogonality). Finally, we will introduce the basic ideas of vector spaces¹. All of these ideas will be taught in a context of applied problems and with frequent use of computational resources. In particular, students will be introduced to the use of the software MATLAB[®].

Required Text

Hardy, Kenneth (2005), *Linear Algebra for Engineers and Scientists Using MATLAB[®]*. Pearson/Prentice-Hall. ISBN 0-13-906728-0.

There will be 1 book on reserve at the Science Library.

¹AMS10A students will **not** cover the last three areas: orthogonality with matrices, eigenvalues and vector spaces

Lectures

Kresge Classroom 327 (check a campus map at <http://maps.ucsc.edu/>), Tuesdays and Thursdays from 10:00am to 11:45pm.

Discussion sections

These are times set up for you to get help solving the weekly practice problems. These problems are **fundamental** to help you do the homework problems well.

Double check times and locations at <https://pisa.ucsc.edu/prd/sr0060/>. Check a campus map at <http://maps.ucsc.edu/> for locations.

Discussion section 01A to be held at JBE 109 on Mondays, from 9:00-11:00am. Discussion section 01B to be held at JBE 109 on Wednesdays, from 2:00-4:00pm. Discussion section 01C to be held at JBE 109 on Fridays, from 12:00-2:00pm. Discussion section 01D to be held at Soc Sci 1 135 on Wednesdays, from 3:00-5:00pm.

Sections are **not** optional. They are part of the requirements to pass this course and attending them is paramount to getting a satisfactory result.

There will be a quiz during all sections. This is mostly a way to reward the students who take the time to come to sections and, at the same time, to allow them to see how they are doing in class with very easy, quick tests².

Office hours

These times will be very important for your work, because these are the only places where students can discuss the homework problems that are to be graded later in the week. These are also a wonderful opportunity to discuss previous homework problems and find out why you missed some of the points in the grading.

Tentative schedule: (Please get in touch with us in case you cannot make any of the times below. Office hours are an important part of the learning process, and we want to make sure that everyone has access to at least one of the office hours sessions per week.)

Nic: Wednesdays from 4:00 to 5:00pm in my office JBE 125 (or Jack's Lounge outside my office if there are too many to fit in my office).

Teaching Assistants: Jacob Colvin will be available on xxxx in JBE 142. Michael Lubinsky will be available on xxxx in JBE 142.

Tutoring

This class has several forms of support from the Academic Resource Center (ARC), check their website at <http://www2.ucsc.edu/arc/>.

Modified Supplemental Instruction (MSI) is our main tutoring support from the AR-Center. More news during lectures. Their web site is at: <http://www2.ucsc.edu/lss/msi.shtml>.

²AMS10A students will only have to attend 5 sections

Additional free tutoring services can be found at www.cse.ucsc.edu/advising/undergraduate/current/tutor.html

Quizzes

There will be one quiz per section, they will be very easy and short. The intention is to both reward the students for attending section and also to give everyone an idea on how well they are doing on a very basic level.

Quizzes will account for 10% of the final grade. Everyone will be allowed to drop the lowest score (to account for possible incidents that might keep you from attending a particular section, therefore **there is no need to ask to re-take quizzes**)³.

Any questions regarding the quizzes or their grading should be addressed to your own TA.

Homework

There will be one set of homework problems per week. These will work very much like small weekly tests, although you are allowed to discuss questions during office hours, and you are actually encouraged to work with one or two colleagues.

Homework is **fundamental** to helping you prepare for the exams.

It is therefore very important you find out the reason why you missed points in the homework problems because otherwise most likely the same difficulties will arise in the exams.

The homework will always be due on Friday by 5:00pm. Homeworks should be deposited in the AMS10 drop-box with the name of your TA in Jack's Lounge (see map on class website).

Homework solutions will be posted in the glass showcase in Jack's Lounge above the drop-boxes shortly after the deadline.

The homework scores will be posted on using WebCT. You can access WebCT through my.ucsc.edu or through ic.ucsc.edu/webct. A link to the course should appear in your WebCT course list.

Graded homework will be given back in section. We have a precise system for grading your homework quickly and efficiently. This system does not work with late homework. As young engineers-in-the-making you should already know how important it is to make deadlines. Therefore, we ask you to take the homework deadlines seriously and professionally. **We cannot accept late homework.**

The average of homework scores will account for 10% of the final grade. Everyone will be allowed to drop the lowest homework score⁴.

Any questions regarding homework's scores or grading should be addressed to your TA.

List of priorities when working on homework:

³AMS10A students will only have to hand in 5 quizzes, one for each section they attend

⁴AMS10A students will only have to hand in 5 homeworks

1. Understanding each problem. This includes checking the corrections and solutions when you get your homework back. If there is anything you do not understand, talk to us about it in Office Hours.
2. Try to complete as much of the homework list as early as possible. If you cannot do it before the deadline for grading, just give us whatever you were able to complete. Make sure, though, that you finish all the problems eventually, even if it is after the deadline.
3. If you have difficulties in a particular set of problems, choose extra problems and work on them together with the instructor, a TA or your favorite tutor.
4. **By the time you get to the exam, make sure you understand all the problems in the homework list.**

Midterm⁵

This test is mostly a midterm "reality-check", to confirm whether you are understanding the concepts correctly. It will contain questions similar in complexity to what you will find later on in the final exam. It is therefore important to understand all the mistakes you may have made in the midterm, so that you do not repeat them in the final

The midterm will take place on XXXth in class. This exam will cover all that was taught up until the last class before the date of the exam.

The exam's score will contribute 30% to the final grade.

For the test, you are allowed only **a 4-function calculator, a pencil and an eraser.**

Official solutions will be posted in the glass case at Jack's lounge in JBE just after the exam.

The final will include problems of the same type as the ones in the midterm (ie. the final will include all what was taught in the quarter), so make sure you understand all the mistakes you (eventually) made in the midterm, so that you don't repeat them in the final.

Important note. Unfortunately we cannot set up midterm re-takes. If you cannot make it to the midterm for some real reason, we will calculate your final grade with 10% of your average homework score, 10% of your average quiz score and 80% of your final exam.

Any questions about the scores on the midterm should be addressed to the instructor.

Final exam

This is the most important item in your final letter grade.

The exam's score will account for 50% of the final grade⁶. Since the final exam is the only chance we have of testing you (individually) on your knowledge of the full content of the

⁵AMS10A students do not have a midterm

⁶For AMS10A students: their final exam will account for 80% of their final score

course, we require a minimum of 60% in the final exam in order to pass the class (regardless of your total final average).

The final will cover everything that was taught during the quarter. You should consider this as an opportunity to show how much you have learned about linear algebra in the quarter.

The test will take place on XXXXth from 4:00 to 7:00 pm in class reg.ucsc.edu/soc2088sched.html#Spr

For the test, you are allowed only **a 4-function calculator, a pencil and an eraser.**

Official solutions will be posted in the glass case in Jack's lounge in JBE just after the exam.

Important note: Before you enroll in this class, make sure you check the date of the final exam and that you can make it. We will only allow final exam make-ups in the case that a truly disastrous event keeps you from taking it. And we mean **truly** disastrous events only, not the fact that you want to take an earlier flight home, or that it is just not convenient.

Any questions about the scores on the final should be addressed to the instructor.

Passing this class

The final grade is calculated with the following formula:

$$0.1*(\text{average homework score}) + 0.1*(\text{average quiz score}) + 0.3*(\text{midterm score}) + 0.5*(\text{final exam score})^8$$

You will have a C (or a 'Pass') if you have at least 60% as your final score **and** 60% in the final exam.

Course's web page

Address: <http://www.soe.ucsc.edu/classes/ams010/Spring09/>

The web page will contain general information about the course, latest announcements about the course, the list of homework due etc.

Protected material can be accessed by using the following information,

username: ams010

password: ZmM5MD

Disability Resource Center students

If you qualify for classroom accommodations because of a disability, please get an Accommodation Authorization from the Disability Resource Center (DRC) and submit it to me in person outside of class (e.g., office hours) within the first two weeks of the quarter. Contact DRC at 459-2089 (voice), 459-4806 (TTY), or <http://drc.ucsc.edu> for more information on the requirements and/or process.

⁷AMS10A students will have their final exam at the same time AMS10 have their midterm scheduled

⁸AMS10A students have their final score calculated in the following way: $0.1*(\text{average homework scores}) + 0.1*(\text{average quiz scores}) + 0.8*(\text{final exam score})$

Class Rules

No type of collaboration between students is allowed in quizzes, the midterm or the final exam. Not complying with this rule will initiate a very unpleasant procedure for both the students and us, so please do not let yourself get to the point where illegal collaboration becomes an option. Start working from the first day of class and stay engaged in sections, office hours and tutoring sessions.

You can work together on homework, but 'carbon copies' are not acceptable. Submit individual work. Not complying with this rules will result in a score of zero and a serious conversation with the instructor.

Always substantiate any answer you give to any question in this class, even if you are not explicitly asked to justify your answer. "True" or "false", "yes" or "no" answers have to be justified, either with words or calculations. We put a strong emphasis on actual understanding and this requires more than one work answers. If you find it difficult to justify a particular course of action in a particular exercise, most likely you need to do some more work on that area (a quick conversation during section or office hours might be all that you need).

Late homework is never accepted. We have an efficient system set up for grading homework, where graders pick them up on Fridays at 5pm sharp and we publish the solutions at that time, so obviously accepting late homework is impossible. Remember that the main goal of homework is to get it done and understood, not necessarily getting it graded (even though obviously getting both is the ideal).

How to improve your chances to get a good result in this course

We are well aware that each person is an individual and has different studying strategies. However, allow us to suggest a few ideas on how to maximise your efficiency in studying of mathematics:

- Read the book. Many people get frustrated during a first read of the book and give up. **No one expects you to understand everything on a first read.** Most typically, people need to read the material 2-4 times before they start feeling comfortable with the new concepts.
- Study the examples and practice problems. These are the "doors" that lead to the solution of most of the exercises. If you have difficulties with a specific example, try re-reading the theory.
- Work out the problems given in the book. Feel free to do as many as you feel like. Start with the easy ones first. If you have problems, go back to the examples, maybe you just skipped something important.
- Organized work. Be organized and write down your calculations in a clean and ordered way, problem solving is much simpler if one has organized, clear calculations. Usually "messy writing" \implies "messy thinking".

- Make full use of lectures, sections, office hours and labs. Do not be afraid to ask questions. Be active, not passive! The more you interact with the instructors the more likely you will be able to absorb more knowledge. But come prepared, with specific questions and problems. Keep a list.

I look at this course as a team effort with the main goal for all of us (the instructors, the TAs, you, your colleagues) being to help you to learn some important mathematics. This should be a collaborative effort, not a competition between you and the instructors. We want you to get a good grade and will do our best to get you there, but it requires some co-operation from you too!

Welcome to the course!