MATHEMATICS 2270
Introduction to Linear Algebra
Spring Semester 2010

Time: Tuesday–Thursday, 4:35-6:15pm, JTB 130

Instructor: Professor Grant B. Gustafson[1], JWB 113, 801-581-6879.

Office Hours: JWB 113, TH 3:30-4:20pm. Other times will appear on my door card. From computers, read the door card link at the course web site below.

Telephone: 801-581-6879. Please use email whenever possible.

Email: `ggustaf@math.utah.edu`

Web Site: `http://www.math.utah.edu/~gustafso/`

Texts:

Otto Bretscher, *Linear Algebra with Applications*, Fourth Edition, by Otto Bretscher. ISBN=978-13-600926-9. Prentice-Hall 2009 (the required text).

Student Solution Manual, for Otto Bretscher's text *Linear Algebra with Applications*, 4th edition. A copy is available in the math center.

Web documents for 2270, by GB Gustafson, at web site `www.math.utah.edu/~gustafso`. All are pdf or text documents that can be printed from `mozilla firefox`, `opera`, `safari` or `MS iexplorer` web browsers.

Prerequisites

Math 1210 and 1220 or the equivalent (Calculus I and II). This is first-year Calculus, with a very brief introduction to linear differential equations. The old Math courses 111-112-113 of 1997-98 fulfill the requirement. In addition, background is required in planar curves, velocity and acceleration vectors from Physics 2210 or Math 2210 (Calculus III), or their equivalent courses.

A passive knowledge of `maple` is assumed. Persons without the passive knowledge of `maple` and `unix` may attend one of the *tutorials* on the subject offered during the first two weeks of the term. The tutorials are organized by Angie Gardiner, 801-585-9478, `gardiner@math.utah.edu` . Angie's web page is `www.math.utah.edu/ugrad/tutoring.html`. Her office is MC 155A in building LCB.

Persons without computer training and no maple experience can survive for the first five weeks with a graphing calculator and Microsoft's `Excel` or the MathWork's `matlab`. Free software exists for PC Intel hardware to duplicate most of matlab's functionality. Only matlab has a licensed maple engine, and this is the main reason why matlab provides a route through the course, without learning a lot of maple details.

[1] Pronunciation: In the phrase *Gust of Wind* change *Wind* to *Sun*

Tutoring

The Math Department Tutoring Center is located in LCB, and it is open for free tutoring from 8 a.m. to 8 p.m. on M-Th, and from 8 a.m. to 6 p.m. on Friday. Some, but not all of the math tutors welcome questions from Math 2270 students. To see the times and specialities of various tutors, consult the web address `www.math.utah.edu/ugrad/tutoring.html`.

Course material and requirements

This course is an introduction to linear algebra for mathematics majors and science majors. Chapters 1-9 in the Bretscher text plus class notes and `www` documents will make up the course material. If you study in isolation, then please know that some topics are enriched in class. Your grade in the course may be reduced by isolation, because the enriched material is tested on exams.

Grading:

Final grades will be based on:

- **Dailies**.

  Textbook problems. They are the major part of the **dailies**. About 142 individual textbook problems will be graded.

  Three computer projects. They form the minor part of the **dailies**. Each project is counted like several textbook problems.

  About six of of the 150 total textbook and maple problems are dropped to make 144 required items. Dailies will be graded by G.B. Gustafson and possibly by Angie Gardiner's grading staff.

- **Midterms**. There are two written midterm examinations.

  Midterm 1: Thursday February 25, 2010 after 5pm, in JTB 130.

  Midterm 2: Thursday April 22, 2010 after 5pm, in JTB 130.

  Send notification in advance of the exam date, if know that you will miss the exam. Email `ggustaf@math.utah.edu` is best. Phone 801-581-6879 works too. Please know that once you miss the exam, the crisis has ended, and recovery is the next plan. Please respond ASAP.

- **Final exam**. This in-class 2-hour examination counts as two additional midterm scores. It is scheduled by the university, in JTB 130 from 6pm to 8pm, on the first Tuesday during exam week, May 4.

Records:

Accounting of exams and the dailies is initially on paper and ultimately by `excel` computer records. The electronic records are web-based, with keys replacing names. During the course, the currently available electronic record is printed and distributed in class like returned homework. This usually happens about the last day of class or shortly thereafter. Electronic records are available later, on the web.

If you ask for record information before it is electronic, then the request involves 10-15 minutes of your time, to retrieve it from my paper records. Please keep your own records. Correction of records, when required, can be made by email communication.

Homework, computer labs, midterms and final

Textbook problems

Those problems to be submitted for grading are listed on the `gradesheet` for the course and also at the end of the syllabus. Visit the web site for extra copies. The due dates for problems appear only on the web site. They are dynamically updated to reflect the reality of what was discussed in class. Generally, problems are submitted shortly after class discussion.

Homework problems, written in your own handwriting, are submitted in one stapled package with your name and class time 4:35pm in the upper right corner of the top page. A problem label is expected for each problem solved, e.g., **1.2-5** for problem 5 in section 1.2 of Bretscher's textbook.

There are certain **suggestions** for writing up the textbook problems. A full accounting of the *formal suggestions* contributed by students of 2250 appears on the internet course page as *suggestions for improving your submitted work*. Kindly apply the ideas therein to your written work. It is not a requirement that you follow any advice, but rather, a suggestion that you may rob successful ideas from the document aforementioned.

Computer projects

There will be three computer projects assigned during the semester, related to the classroom material. Each project counts the same as 2 or 3 daily problems from the textbook, for a total of 8 scores on the dailies. They will be written by hand and use the software package `maple`.

Packaging rules for homework problems apply to maple labs as well.

The reason for the maple labs is to give you a tool for checking answers, and for doing elaborate linear algebra computations, error-free.

There is a Math Department Computer Lab, part of the *Math Center* in building LCB, at which registered students automatically own accounts. There are other unix labs around campus where `maple` is also available, for example at the College of Engineering CADE lab. Most unix labs can launch remote X-windows sessions on math hosts using `ssh`. Remote files on math hosts can be transferred to your local unix computer with `sftp`. For information on how to do the same for personal computers, visit the campus computer help sites.

Drop-in tutoring in the *math center* in the basement of building LCB starts the second week of the semester. The staff there is best at elementary topics from algebra and calculus. A few of them can handle 2270 questions.

Midterm exam details

Past midterm in-class exams appear on the web. Your exam is modeled after the old exams. All parts of the exam will be in-class. There is no take-home portion during Spring 2010. The take-home exams you find on the web from Fall 2008 were caused by a week missed from work – it was an unusual event, unlikely to repeat.

A sample exam will be supplied. Available on the web page are solution keys to old exams. You may print these for reference. The final exam has a separate study guide, also available at the site.