Math 511: Linear Algebra

MWF 9:30-10:30 in Rec 307

Instructor: T. T. Moh Office: 638 Mathematics Building Phone: 49–41930
E-mail: ttm@math.purdue.edu
Web: http://www.math.purdue.edu/~ttm
Office Hours: **MWF** 10:30–11:20 or by appointment

General Information

Course title " Linear Algebra with Applications". Linear algebra is second only to calculus/differential equations in terms of mathematics of importance to engineering applications. There are three parts of Linear Algebra: (1) the theoretical part, (2) the application part, (3) the computational part. We will mix the three parts in this course. For the theoretical part, we will discuss the finite dimensional vector spaces, matrices and then the inner product spaces, including the elementary theory of Hilbert spaces. We will study the eigenvalues and the eigenvectors. We study the Schur's lemma, the Spectram theorem, SVD etc. Especially we will emphasis on symmetric matrices. For the applications, we will discuss the self-correcting codes, the least square method, Fast Fourier transform, Google's search engine, quantum mechanics and positive definite matrices, a generalization of the second derivative test for minimal problem to many variables. For computational part, we discuss the problems of solving Ax=b, and Ax=λx. The methods are the approximations, the power method as in the Google engine, and the well-known QR. The goal of this course is to enable you to recognize linear algebra problems when you see them , to use the linear algebra you know to solve them and even do some reseach eventually. Other goals are to enable you to read and understand descriptions of other people's solutions to problems that use linear algebra and to read the documentation for the linear algebra features of the mathematical software you need to use.

This is a course describing applicable mathematics. While we will occasionally mention some specific applications. Most of you already know or will soon learn the application material and need to better understand the tools.

The stated prerequisite, Math 262, is accurate in spirit in that students who know absolutely nothing about linear algebra are likely to have a hard time, but is not literally accurate because most students did not do their undergraduate work at Purdue and much of the linear algebra learning that I expect you to know will have come informally from a variety of engineering sources. The course will be complete, but basic material on computational topics such as row operations will be covered quickly.

References

TEXT: Strang's book *Linear Algebra and Its Applications,4th edition* which has been used in the past, is a good reference and is in the library. The problems in Strang tend to be less difficult both computationally and theoretically than the text's, but Strang develops the subject very well and presents excellent intuition for the subject and its applications.

Grading Policies

There will be two one–hour in class tests, each counting 20% of your grade, and 30% of your grade will come from the two–hour final exam given during the 16^{th} week . Both one–hour tests will be an in–class test. "You may bring one letter size cheat sheet (double sided) to the exams."

Weekly homework (collected Friday except the first Friday) will make up 20% of your grade. Late homeworks will be accepted only in the case of extended absence. A series of quiz will make

up 10% which will be usually on every Friday except the First Friday. You should show your all your work on homework, quiz and tests.

Academic Adjustments

If you have been certified by the Disability Resource Center (DRC) as eligible for academic adjustments on exams or quizzes see http://www.math.purdue.edu/ada for exam and quiz procedures for your mathematics course or go to MATH 242 for paper copies.

In the event that you are waiting to be certified by the Disability Resource Center we encourage you to review our procedures prior to being certified.

For all in-class accommodations please see your instructors outside class hours before or after class or during office hours to share your Accommodation Memorandum for the current semester and discuss your accommodations as soon as possible.