Introduction to Linear Algebra and Matrices
FALL 2020, MA405-003

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MA405 offers a rigorous treatment of linear algebra, including systems of linear equations, matrices, determinants, abstract vector spaces, bases, linear independence, spanning sets, linear transformations, eigenvalues and eigenvectors, similarity, inner product spaces, orthogonality and orthogonal bases, factorization of matrices. Compared with MA 305 Introductory Linear Algebra, more emphasis is placed on theory and proofs. MA 225 is recommended as a prerequisite. Credit is not allowed for both MA 305 and MA 405.

Course text

There is no required textbook for this course. Lectures are based on my Lecture note (on-line). It is self-contained.

Reference Book: Steven J.Leon, Linear Algebra with Applications, Pearson2015.pdf
https://d1b10bmlvqabco.cloudfront.net/attach/k45embmtszq5kl/k45ec4ewuxs71a/k5qppgehy42y/

Also, several textbooks available through the NC State Libraries are good resources:

1. https://link-springer-com.prox.lib.ncsu.edu/book/10.1007, Nair M.T., Singh A. (2018) Linear Algebra. Springer
2. https://link-springer-com.prox.lib.ncsu.edu/book/10.1007, Olver P.J., Shakiban C. (2018) Applied Linear Algebra. Undergraduate Texts in Mathematics. Springer
3. https://catalog.lib.ncsu.edu/catalog/NCSU4062886, Said-Houari B. (2017) Linear Algebra. Compact Textbooks in Mathematics. Birkhauser
4. https://doi-org.prox.lib.ncsu.edu/10.1007/978-3-319-11080-6, Axler S. (2015) Linear Algebra Done Right. Undergraduate Texts in Mathematics. Springer
5. https://doi-org.prox.lib.ncsu.edu/10.1201/9780429425479,Chahal, J. (2019). Fundamentals of Linear Algebra. New York: Chapman and Hall/CRC

Course overview

The main purpose of this course is to introduce the basic concepts from lin-

ear algebra, explain the underlying theory, the computational techniques, and study how these concepts and results can be productively used in other areas of mathematics and physical sciences, especially in applied mathematics, all sciences and statistics where multivariable models are involved. Among the topics covered in this course will be: solving systems of linear equations using Gauss elimination, row echelon form, determinants, vector spaces, linear independence, bases, dimension, linear transformations, orthogonality, eigenvalues, and reduction of matrices to diagonal forms. specifically, QR method SVD (singular vale decomposition) and applications are discussed. If time permits, we will discuss applications of linear algebra to differential equations, quadratic forms and Markov chain model. The subject involves a mixture of both the practical and the theoretical, and will also provide in particular a good introduction to mathematical proofs.

Homework: Every Week Accumulated Homework Assignments.

Two Mid Term Exams and Final Exam (Comprehensive).

Grade: 25% (Homework, Quizzes), 25% points (Final Exam) and 25%points (Mid Terms).

Lectures are based on On-Line Lecture Notes and Zoom Recorded

Office Hours: MWF 11:00-12:00 a.m., Appointment.

Course Delivery Changes Related to COVID-19: Please be aware that the situation regarding COVID-19 is frequently changing, and the delivery mode of this course may need to change accordingly. All lectures are recorded and uploaded. Regardless of the delivery method, we (instructor and students) should all strive to provide a high-quality learning experience.