

MA 614 Numerical Methods for Linear Algebra. Spring 2016.

Lectures:	MW 2:20-3:40, 203 SC Mark Pekkér, 201N SC, ph. 824-6470 (Dept), 824-6879 (of.)
Instructor:	e-mail: mark.pekker@uah.edu Web: http://uah.edu/faculty/pekker
Office hours:	M,Tu,W,Th: 3:40-5:10 PM or by appointment.
Text:	D. S. Watkins, <i>Fundamentals of Matrix Computations, 3rd Edition</i> John Wiley and Sons, July 2010, ISBN:978-0-470-52833-4
Final:	M., April 25, 3:00 - 5:30 PM.

Policy: Regular homeworks assigned, including computer programs. You may discuss homework with your classmates, but it should be turned in individually with your own views and approaches. You may do and turn in (long) computer program in a group of two. Homeworks or programs turned in late will receive only half credit. Grade composition: homework assignments 40%, Mid-term exam 25%, Final exam 35%.

All computer programs are in MATLAB. Homework assignments and links to online MATLAB tutorials will be available from <http://uah.edu/faculty/pekker> (click MA614).

MATLAB. MATLAB is an interactive user-friendly interface to a large body of numerical and graphics software, including linear algebra, and is widely used for testing and prototyping algorithms. It is available on campus in several computer labs. Alternatively, a Student version of MATLAB can be purchased in the campus bookstore, the manual which comes with the PC version is very complete.

Prerequisites. MA 415 or MA 515, MA 508 or MA 544, and CS 121.

Goals of the course.

- The use of numerical methods continues to expand rapidly. At their heart lie matrix computations. The most important algorithms of numerical linear algebra are presented. We learn how the algorithms are developed and why they work. Many state-of-the art techniques are introduced.
- Building confidence in ourselves by putting the theory behind matrix computations into practice instantly.
- Learning basic principles applicable to a variety of numerical problems.
- The course covers all the material required for the Joint Program in Applied Mathematics Ph.D. exam.
- Preparation to use MATLAB to solve real-world problems in science and engineering.

Contents of the course.

1. **Introduction** (Parts of Ch. 2): standard problems, general techniques, review of some linear algebra, floating point arithmetic.

2. **Systems of linear equations** (Parts of Chapters 1 and 2): perturbation theory, Gaussian elimination and its variations, error analysis, special linear systems.
3. **The Linear least squares problem** (Ch. 3): orthogonal matrices, projection, QR decomposition.
4. **The Singular value decomposition** (Ch. 4): SVD, Applications to the least squares problem.
5. **Eigenvalues and Eigenvectors** (Ch. 5, Parts of Ch. 6): Canonical forms, algorithms, perturbation theory.

Withdrawal Policy. The student is responsible to determine the dates for withdrawing from the course. The student should be familiar with those policies and dates set by the university. Class non-attendance does not constitute withdrawal nor does notification to the instructor. Any student failing to follow the established procedure for withdrawal will continue to be enrolled in the class and may receive a failing grade in that course.

Academic Misconduct. Institutional policies will be followed regarding cheating or any other forms of academic misconduct in the class. These policies are stated in the student handbook. In any instance of misconduct, the student in question will be granted Due Process by the instructor in all proceedings.

College of Science Complaint Procedures: If you have difficulties or complaints related to this course, your first action usually should be to discuss them with me. If such a discussion would be uncomfortable for you or fails to resolve your difficulties, you should contact Professor Jia Li, Chair of the Department of Mathematical Sciences. Professor Li's office is SC 258A. His telephone number is 256-824-6470. If you still are unsatisfied, you should discuss the matter with Emanuel Waddell, Associate Dean of the College of Science. The Associate Dean's office is MSB C207, telephone number is 256 824 6844 and email address is adeancos@uah.edu.

Students with Disabilities: Your instructor would like to hear from anyone who has a disability that may require a modification of seating, testing, or other class procedures. Please see me after class or during office hours to discuss appropriate modifications. You should also contact Disability Support Services in Madison 131 (Ph. 824 1997) for further assistance.

UAlert Emergency Notification System:

UAHuntsville has implemented the **UAlert** emergency notification system. UAlert allows you to receive time-sensitive emergency messages in the form of e-mail, voice mail, and text messages.

Everyone who has a UAHuntsville e-mail address will receive emergency alerts to their campus e-mail address. In order to also receive text and voice message alerts, you are asked to provide up-to-date phone contact information. Participation in UAlert text and voice messaging is optional, but enrollment is strongly encouraged. **You can't be reached through UAlert unless you participate.** The information you supply is considered confidential and will not be shared or used for purposes other than emergency notification.

To review your UAlert account, add or update phone and alternate e-mail addresses, and set the priority for your contact methods, please visit the UAlert web site: <http://ualert.uah.edu>.