# Numerical Analysis 2 - Linear Algebra (Math 442/642) – Spring 2015

- **Instructor**: Dr. Scott Sarra
- **Office Hours**: By appointment on Tues. and Thurs. from 12:15 to 2:00 and 3:15 to 5:00 in ML 110
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**Textbook**: Fundamentals of Matrix Computations by D. Watkins. ISBN 978-0470528334

**Course Description**: Orthogonal matrices, Householder transformations, QR factorization, least squares problems; the singular value decomposition (SVD); symmetric positive definite matrix factorizations; eigenvalues and pseudospectra; iterative methods for linear systems. Topics in scientific computing. (3 credit hours)

**Prerequisites**: MTH 443 or 643. Previous computer programming experience and willingness to use a computer.

**Attendance Policy**: In 400/600 level classes, attendance at every class is expected. I do not "read the text book'' to the class during lectures. The material presented in lectures is meant to supplement the text book.

**Computer Programming**: An essential part of Numerical Mathematics is implementing algorithms on a computer. The HW sets and the final project will require some (relatively) simple computer programs to be written. Computer languages that are appropriate for and that are commonly used in scientific computing include Fortran, C/C++, Python, Matlab, and Julia. Python will be the language that is primarily used in class examples. Python is also suggested for use in HW problems and projects since you should be familiar with it from CS 205 which is a prerequisite to MTH 443/643. However, any other (appropriate) language of your choice may be used.

**Grading**: Grades will be determined from homework assignments and a final project. There will be no in class exams.

**Homework:** Approximately 6 homework sets will be given in 2 to 3 week intervals. All solutions must be turned in in hard copy form. Electronic versions will not be accepted. A followup oral questioning may be given after HW solutions are submitted. This is to both clear up any misunderstandings on the HW solutions and to ensure that the solutions submitted are indeed the work of the particular student. HW due dates may be extended due to rare circumstances for the class as a whole, but not for individuals.

**Project**: Students will select a topic of interest during the semester and prepare a final project on the topic.

**Collaboration policy:** Collaboration on HW sets is not only allowed, but is encouraged. Each student must write up and turn in their own solutions. For problems involving computer programs, a listing of the computer code and its output must be submitted. If the computer program is a collaborative effort, each student in the group must separately type in and execute the program and then generate printed code and output. In addition to working with other students in the class, you are encouraged to use resources such as text books other than the official class text, journal articles, and internet searches. No matter whom you talk to or what you read, HW solutions should be written up on your own, without having the solutions produced by the entire group or other source in front of you. There is a huge difference between collaborating and copying. Copied HW solutions will be given zero credit. Copied HW solutions are usually very easy to identify. Even if copied solutions can not be identified in written form, the fact that they were copied always comes out in the follow-up oral questions on the HW.

**University Policies**: By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy by going to www.marshall.edu/academic-affairs and clicking on “Marshall

University Policies." Or, you can access the policies directly by going to www.marshall.edu/academic-affairs/policies/. Academic Dishonesty/Excused Absence Policy for Undergraduates/Computing Services Acceptable Use/Inclement Weather/Dead Week/Students with Disabilities/Academic Forgiveness/Academic Probation and Suspension/Academic Rights and Responsibilities of Students/Affirmative Action/Sexual Harassment