Spring Semester 2014
MATH 6513: Applied Linear Algebra

Instructor: Dr. Vu Kim Tuan
Time & Location: TR, 5:30 PM - 6:50 PM, Boyd 304
Office: Boyd 325
Office Hours: TR, 4:30 PM-5:30 PM, 6:50 PM-7:20 PM, or by appointment. Please contact me only through campus MyUWG e-mail or in person.
Phone: 678-839-4135
E-mail: vu@westga.edu
Hours Credit: 3 hours
Prerequisites: MATH 2853 Elementary Linear Algebra


Course Description: This course gives a satisfactory discussion of main concepts of numerical linear algebra, such as Gaussian elimination, LU factorization, least square problems, and eigenvalue problems.

Topics:
1- General Techniques: Matrix factorizations, perturbation theory and condition number, roundoff error, speed of algorithms, floating point arithmetic.
2- Linear Equation Solving: perturbation, Gaussian elimination, the need for pivoting, condition numbers, practical error bounds, special linear systems such as band matrices, sparse matrices.
3- Linear Least Square Problems: QR decomposition, singular value decomposition, orthogonal matrices, perturbation theory and performance comparison of methods
4- Eigenvalue Problems: power method, inverse iteration, QR iteration, Hessenberg reduction.
5- Iterative methods: Jacobi’s method, Gauss-Seidel method and convergence on model problems, the Rayleigh-Ritz method, the Lanczos algorithm.

Learning Outcomes: It is expected that the student who completes this course will:
1- Be able to use different algorithms to solve large linear systems of equations, linear least square problems, and eigenvalue problems.
2- Be able to analyze and compare the complexity and stability of involved algorithms.
3- Be able to use standard software package such as Maple, Matlab, or Mathematica to solve large scale linear problems.

Tests: There will be three take-home tests and one in class test worth 100 points each. Take-home tests are supposed to be completed individually. The lowest of these test scores will be dropped. You can miss at most one test, and that test will be considered to be the test with the lowest score to be dropped.

Final Exam: No comprehensive final examination.
**Important Dates:**
- 1/30: Test 1, Due 2/4 at 5:30 PM
- 2/27: Test 2, Due 3/4 at 5:30 PM
- 4/3: Test 3, Due 4/8 at 5:30 PM
- 4/22: Test 4, 5:00 PM – 7:30 PM

**Grading:** The final letter grade will be determined by the following scale:
- A = 270-300,
- B = 240-<270,
- C = 210-<240,
- F = below 210

**Homework:** This is an important part of the course. At the end of most classes you will be given a list of problems – these are the minimum that you should work on. These problems will not be graded. Practice is important. An important part of each homework assignment is to read the corresponding material in the text. I encourage you to use my office hours if you have any questions. You should make sure to set aside some time every class day to work problems.

**Disabilities:** Students with documented disabilities (through West Georgia’s Disability Services) will be given all reasonable accommodations. Students must take the responsibility to make their disability known and request academic adjustments or auxiliary aids. Adjustments needed in relation to test-taking must be brought to the instructor's attention well in advance of the test (at least one week prior).

**Attendance Policy:** You are expected to attend every class. Although absences are not penalized, if a class is missed, you are responsible for all material and assignments.

**Academic Honesty:** You are expected to achieve and maintain the highest standards of academic honesty and excellence as described in the Graduate Catalog. In short, be responsible and do your own work.