MATH 5553 Numerical Analysis for Linear Algebra, Spring 2015

Class time : Tue,Thr: 10:30 - 11:45 MSCS 203 (Section 1)

Instructor : Dr. JaEun Ku

Office : 437 Mathematical Sciences
Phone: (405) 744-5694
Email: jku@okstate.edu

Office hours: M,W(1:30-2:20pm, MSCS 437), W(1:30-2:20pm, MLSC)(subject to change)

Class webpage : http://www.math.okstate.edu/~jku/5553.html

TEXT: L.N. Trefethen and D. Bau, Numerical Linear Algebra, SIAM, Philadelphia, 1997.

References : 1. Fundamentals of Matrix Computations, by D.S. Watkins, 2002.

2. MATLAB Guide, by D. Higham and N. Higham, SIAM.

3. Matrix Computation by G. H. Golub and C. F. Van Loan.

Course Objectives: The course focuses on Numerical Linear Algebra, which is fundamental for most areas of Scientific Computing. Many ideas and concept of importance in applied mathematics and computation will be discussed. These include several matrix factorization methods, such as QR- and LU-factorization, as well as the singular value decomposition. The sensitivity of the computed results to errors in the data, as well as to round-off errors introduced during the computations, will be investigated. It is the purpose of this course to introduce state-of-the-art numerical methods and provide an understanding of their performance through analysis and application.

Course Content:

- Vector norms, orthogonal vectors and matrices, orthogonal projections.
- Matrix factorizations : QR and LU factorization and singular value decomposition.
- Least-squares problems.
- Sensitivity to errors: Conditioning and stability.
- Eigenvalue and eigenvector computation.
- Iterative methods, such as conjugate gradients and Lanczos method.

Prerequisites : 1 MATH 3013 Linear Algebra(Algebra and Geometry of finite-dimensional spaces, Linear transformations, algebra of matrices, eigenvalues and eigenvectors.)

2. MATH 4513 or CS 4513. Numerical Mathematics(Machine computing, algorithms and analysis of errors applied to interpolation and approximation of functions solving equations and systems of equations, discrete variable methods for integrals and differential equations.)

3. Experience of programming.

Homework : Homework(including computing project) will be assigned regularly and collected during the class. There will be 5 homework sets. The due date for each homework will be announced in the class.

Quizzes : Be prepared for occasional 5-10 minute quizzes.

Attendance: Attendance of lectures is mandatory, but roll will not be taken every class. You are responsible for knowing the material, assignment, etc. presented in the class and the date of the exams announced in the class. The class schedule including the exam date is subject to change.

Talking among the students(using cell phone, reading newspaper etc) is not allowed in the class. All questions must be addressed to the instructor.

Exams : We will have one in class midterm(100 pt) and 1 final(150). (time and date will be announced in class)

Conflicts: If you will miss an exam, let me know as soon as you know(and in advance unless absolutely impossible). Depending on the reason, I **may** be able to give you an exam early or late, though I won't guarantee it. I require proof of the reason for your absence(e.g., a doctor's note, proof of involvement in an OSU-sponsored activity, etc).

The OSU Syllabus Attachment (http://osu.okstate.edu/acadaffr/aa/syllabus.htm) contains useful information concerning important dates, academic integrity and students with disabilities, and much else.

Grading - There will be no makeup exams. Your grade will be based on 100 for the midterm, 150 for homeworks and quizzes and 150 for the final. Students who achieve at least 90% are guaranteed to receive an A. A score of at least 80% will receive at least a grade of B. A score of at least 70% will receive at least a C, and students with scores at 60% or above will be assured of passing. Depending on the score distribution, these cutoffs may be lowered. Some discretion may be used in deciding borderline cases, based on my subjective judgment of students' effort and performance.

Office of Student Disability Services (315 Student Union) - According to the Americans with Disabilities Act, each student with a disability is responsible for notifying the University of his/her disability and requesting accommodations. If you think you have a qualified disability and need special accommodations, you should notify the instructor and request verification of eligibility for accommodations from the Office of Student Disability Services. Please advise the instructor of your disability as soon as possible, and contact Student Disability Services, to ensure timely implementation of appropriate accommodations. Faculty have an obligation to respond when they receive official notice of a disability but are under no obligation to provide retroactive accommodations. To receive services, you must submit appropriate documentation and complete an intake process during which the existence of a qualified disability is verified and reasonable accommodations are identified. Call 405-744-7116 or go to www.okstate.edu/ucs/stdis/

ACADEMIC INTEGRITY POLICY - Oklahoma State University is committed to the maintenance of the highest standards of integrity and ethical conduct of its members. This level of ethical behavior and integrity will be maintained in this course. Participating in a behavior that violates academic integrity (e.g., unauthorized collaboration, plagiarism, multiple submissions, c heating on examinations, fabricating information, helping another person cheat, unauthorized advance access to examinations, altering or destroying the work of others, and fraudulently altering academic records) will result in your being sanctioned. Violations may subject you to disciplinary action including the following: receiving a failing grade on an assignment, examination or course, receiving a notation of a violation of academic integrity on your transcript, and being suspended from the University. You have the right to appeal the charge. For a brief overview of the policy you can watch the video or contact the Office of Academic Affairs, 101 Whitehurst, 405-744-5627, academicintegrity.okstate.edu.

Any changes to this syllabus will be announced in class.