CAAM 454 / (Advanced) 554:
Numerical Analysis II (Spring 2016)

- **Instructor**

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  Office Hours: Mon: 4:00–6:00pm or by appointment.
  Webpage: `http://www.caam.rice.edu/~yzhang/caam554/`
  Textbook (TB): *Numerical Linear Algebra* by Lloyd Trefethen and David Bau
  Textbook (NW): *Numerical Optimization* by Nocedal and Wright

- **Topics**
  1) Iterative methods for numerical linear algebra (Notes,TB Part VI).
  2) Unconstrained optimization (NW Chaps. 1-9).
  3) Nonlinear least squares problems (NW Chap. 10).
  4) Nonlinear systems of Equations (NW Chap. 11).
  5) Primal-dual interior-point method for LP (Notes).
  (Not all the material within the above ranges will be covered.)

- **Prerequisites** Matrix analysis, multi-variable calculus, Matlab programming.

- **Reference Books**
  1) Kelley: Iterative Methods for Linear and Nonlinear Equations (free pdf file available)
  2) Kelley: Iterative Methods for Optimization (free pdf file available)
  3) Saad: Iterative methods for sparse linear systems (free pdf file available for 1st edition).
  4) Dennis and Schnabel: Numerical Methods for Unconstrained Optimization and Nonlinear Equations (QA402.5 .D44).

- **Homework Assignments**

  — Homework problems will be posted online roughly weekly on Thursdays and be collected the next Thursday in class unless otherwise specified. Late submissions are accepted until next Tuesday by 5pm. The first two late submissions are free of penalty; others are subject to 20% deduction.

  — Students can study homework problems in groups, but must eventually write out the solutions and/or Matlab programs on an individual basis (no sharing of identical solutions or copying codes from each others).

- **Grading** The course grades will be based on a weighted average of the homework assignments (60%) including computer programming problems, and 2 take-home, non-accumulative exams (20% each). Some more demanding homework assignments may be weighted more than others. Class participation will be a factor in borderline cases.

- **CAAM 554 and 445 Differentiation** CAAM 554 will include more theoretical homework/exam problems involving writing rigorous mathematical proofs, and may require studying additional theoretical materials. All students enrolled in the CAAM PhD program should take CAAM 554. Others who wish to take CAAM 554 are encouraged to consult with the instructor first. Students cannot take both CAAM 454 and 554 for credit.

Any student with a disability requiring accommodation in this course is encouraged to contact the instructor during the first week of class, and also to contact Disability Support Services in the Ley Student Center.