

# Engineering Analysis ENG 3420 Fall 2009

Dan C. Marinescu

Office: HEC 439 B

Office hours: Tu-Th 11:00-12:00

# Lecture 15

- Last time:
  - Discussion of pivoting
  - Tri-diagonal system solver
  - Examples
- Today:
  - Symmetric, Hermitian, Positive matrices
  - Matrix multiplication
    - Non-commutative
    - Associative
    - The transpose of a product of two matrices
  - LU Factorization (Chapter 10)
  - Cholesky decomposition
- Next Time
  - Midterm - Exams are open book and open notes. Computers are not allowed.  
There is no make-up for any exam; if you miss an exam and have a good reason you need to go to the Academic Services and bring a letter stating that your absence was motivated and then discuss with the instructor.

# *LU* Factorization

- *LU* factorization involves two steps:
  - Decompose the  $[A]$  matrix into a product of:
    - a lower triangular matrix  $[L]$  with 1 for each entry on the diagonal.
    - and an upper triangular matrix  $[U]$
  - Substitution to solve for  $\{x\}$
- Gauss elimination can be implemented using *LU* factorization
- The forward-elimination step of Gauss elimination comprises the bulk of the computational effort.
- *LU* factorization methods separate the time-consuming elimination of the matrix  $[A]$  from the manipulations of the right-hand-side  $[b]$ .