CSE/MATH 6644 **Iterative Methods for Linear and Nonlinear Equations, Fall 2016**

This course covers two closely-related topics: 1) iterative methods for solving linear systems; and 2) iterative methods for solving nonlinear systems. The emphasis is placed on numerical issues as well as convergence properties of various iterative methods for solving linear and nonlinear systems.

Students are expected to have a good background in calculus, linear algebra, numerical analysis and familiarity with a high-level programming language.

There are three primary objectives for the course:

To provide a broad survey of approaches and techniques in the state of the art of iterative methods for solving linear and nonlinear systems

To develop a deeper understanding of convergence properties of iterative methods for solving linear and nonlinear systems

To develop the design and programming skills that will help you to solve linear and nonlinear systems using iterative methods

Class 12:05 am – 1:25 am, TR, 423 Clough Undergraduate Commons

Instructor: Hongyuan Zha, zha@cc.gatech.edu, 1314 KACB, office hours: R: 2:30-3:30

TA: Shenshen Wu, shenshenwu1992@gatech.edu

Prerequisites: CSE/MATH 6643

Required Textbook:
Iterative Methods for Linear and Nonlinear Equations: J. Kelley — SIAM.

There are SIX homework assignments including paper-pencil problems and

Matlab implementations. Late homework policy: 20% penalty. There are NO midterms and NO final. The course grade will be based on (approximately). Students in Q sections should submit their homework follow the regular schedule and deadline.

Homework assignments: 90%
Class attendance and participation: 10% (not applicable to students in Q sections)

Class Time	Topics	Textbook	Homework
08/23	Introduction	Ch1	
08/25	Introduction	Ch1	
08/30	Introduction	Ch1	
09/01	CG	Ch2	HW1/A
09/06	CG	Ch2	
09/08	CG	Ch2	
09/13	CG	Ch2	
09/15	GMRES	Ch3	HW1/D, HW2/A
09/20	GMRES	Ch3	
09/22	GMRES	Ch3	
09/27	GMRES	Ch3	
09/29	GMRES	Ch3	
10/04	Fixed Point Method	Ch4	HW2/D, HW3/A
10/06	Fixed Point Method	Ch4	
10/13	Fixed Point Method	Ch4	
10/18	Newton's Method	Ch5	
10/20	Newton's Method	Ch5	
10/25	Newton's Method	Ch5	HW3/D, HW4/A
10/27	Newton's Method	Ch5	
11/01	Inexact Newton	Ch6	
11/03	Inexact Newton	Ch6	
11/08	Inexact Newton	Ch6	
11/09	Inexact Newton	Ch6	HW4/D, HW5/A
11/15	Broydon's Method	Ch7	
11/17	Broydon's Method	Ch7	
11/22	Broydon's Method	Ch7	
11/29	Broydon's Method	Ch7	HW5/D, HW6/A
12/01	Global Convergence	Ch8	
12/06	Global Convergence	Ch8	HW6/D

Assignment and due dates of home works are tentative and are subject to change.