**ECE 530 –** **Analysis Techniques for Large-Scale Electrical Systems  
Fall 2015 MW 11-12:20pm 3081 ECEB**

**Instructor** Prof. Hao Zhu, 4056 ECEB, 244-5958, [haozhu@illinois.edu](mailto:haozhu@illinois.edu)

**Office Hours:** Tuesdays 11-12 or by appointment

**Prerequististies:** ECE 476 and ECE 464 or consent of instructor

**TA** Cecilia Klauber, ECEB 4068/15, klauber2@illinois.edu

**TA Office Hours** Tuesday 2-3p, ECEB 4036 or by appointment

**Course Syllabus**

**Analysis of nonlinear electrical systems:** structural characteristics, large-scale nature and computational requirements; sensitivity analysis

**Static system analysis:** solution of large-scale algebraic systems; decomposition; application to the study of power flows

**Data issues in large systems:** sparsity; storage; data management including visualization

**Nonlinear parameter estimation in electrical systems**: least-squares minimization techniques and their application

**Modeling for dynamic analysis:** hybrid system representation; time-scale decoupling; modal analysis of large sparse systems; model order reduction: computation of dominant eigenvalues and eigenvectors; Krylov subspace applications

**Dynamic performance analysis:** solution of differential-algebraic systems; solution of stiff systems; accuracy and numerical stability issues

**Evaluation:** Midterm Exams 25%

Final exam 40%

Bi-weekly homework 35%

+/- grading will be used for the final course grade

**Tentative Dates for Midterm:** Wednesday, October 14, 11-12:20pm

**Final Exam:** TBD

**NoteSheets for Exams:** All exams are closed-book, closed-notes. You may bring in one notesheet (8.5” by 11”), and may use standard calculators.