EE 559

Optimization of Networks and Graphs

MW, 12:30pm-2:20pm, EEB 042

Instructor: Baosen Zhang
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Office: EEB M310
Office Hours: Wednesday after class

Course Description: Networks and graphs are used in almost all engineering disciplines, from communication to power systems to transportation. This class develops theoretical and algorithmic understanding of networks and graphs. Discussions of both geometric description (nodes and edges) and algebraic discussion (eigenvalues and eigenvectors) and how they are related to each other. The first part of the class will concentrate on the fundamentals of networks and the second part would be application to various engineering domains.

Prerequisite(s): There are no formal prerequisites to this class, but students should be very comfortable with advanced linear algebra. Knowledge of linear programing is a plus, but not necessarily required.

Text(s): There are no required texts. Some books that maybe useful are:

1. "Spectral Graph Theory" by Fan Chung
2. "Networks: An Introduction" by Mark Newman

Exams, Labs and Assignments:

1. Final Project: Students are expected to do a final project in this class. It can be (ideally should be) related to your research.
2. Homework Assignments: There will be 4 or 5 homework assignments in this class.
3. Exams: No exams in this class.

Grade Distribution:

1. Final Project, 50%
2. Homework, 30%
3. Class Participation, 20%

Notes: This is a graduate level class being taught the first time. I find this topic interesting and hope you do as well. However, I make no claim that I understand everything that I want to cover that well, so the outline represents what I think I will teach, but the topics I actually teach will likely be different.

This is a graduate course, so it is not as "user friendly" as undergraduate classes. I assume that you can learn the elementary topics on your own if needed. On the bright side, for graduate classes, if you make an honest attempt, you will get a high grade (not that it matters that much for graduate students).

Tentative Course Outline:

The weekly coverage might change depending on the progress of the class.

Week	Content
Week 1	• Introduction, basics of graph theory
Week 2	• Basics of spectral graph theory
Week 3	• Basics of combinatoric optimization
Week 4	• Basics of linear programming
Week 5	• Start to put things together
Week 6	• Algorithms
Week 7	• Applications to Power Systems
Week 8	• Applications to Communication and Transportation
Week 9	• Application to Social Networks and Biological Networks
Week 10	• Final Project Presentations

Course Policies:

- **No late assignments will be accepted!**
- **Academic Honesty Policy Summary:**
  All students are expected to follow the student conduct code at
  http://www.washington.edu/admin/rules/policies/WAC/478-120TOC.html.
  Every member of the class is expected to conform to the highest standards of academic integrity. **Offering** and **accepting** solutions from others is an act of **cheating**, which is a serious offense and **all involved parties will be penalized according to the student conduct code**. Discussion about homework assignments are encouraged, but anything you hand in must be your own work. If you use any results from published literature, you must cite it clearly. Violation of the conduct code can lead to failure of the course and possibly expulsion from the University. Not knowing the policy is not an excuse for cheating.