Course Description
Interest in social network analysis has EXPLODED in the past few years, partly due to the latest advancements in statistical modeling and the rapid availability of network data and partly due to the recognition that many analytical problems can be re-cast as a network problem. Aiming to examine social connections and interactions from structural perspectives, network analysis has become an essential method and tool for studying a variety of issues in social and natural sciences, such as friendship formation, peer influence, social inequality, career mobility, social marketing, organizational competition, economic development, political alliance, diffusion of innovations, contagion of health outcomes, and even protein interactions, to name only a few. This course covers the major methods to collect, represent, and analyze network data. Selected topics include centrality analysis, positional analysis, clustering analysis, the exponential random graph model for modeling network formations, the stochastic actor-oriented model for dynamic network analysis, meta network analysis, weighted network analysis, text network analysis, causal analysis of network effects, and social network-based predictions and interventions. Examples are drawn from a wide range of disciplines including business, economics, education, political science, public health, and sociology. Students will learn hands-on skills to conduct their own research by using popular network packages in R such as “statnet” and “RSiena”. This course requires a basic knowledge of logistic regression. Programming in R is preferred.

Requirements
1. Class discussion (20%). Each student will lead one class discussion. The student will summarize the readings with ten or so slides and prepare 3-5 questions for discussion.
2. Five assignments (30%)
3. Midterm (20%)
4. Project presentation (10%)
5. Research project (20%)

Grading Scale

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<th>Grade</th>
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<td>A</td>
<td>94-100</td>
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<tr>
<td>A-</td>
<td>90-93</td>
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<td>B+</td>
<td>87-89</td>
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<td>B</td>
<td>83-86</td>
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<td>B-</td>
<td>80-82</td>
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<td>C</td>
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<td>D</td>
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<td>F</td>
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Textbooks
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<tr>
<th>Date</th>
<th>Topic</th>
<th>Lab</th>
<th>Assignment</th>
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<td>1/23</td>
<td>Network Data</td>
<td>Lab 1: Basic Analysis</td>
<td>Assignment I</td>
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<td>1/30</td>
<td>Network Formation</td>
<td>Lab 2: ERGM</td>
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<td>Random Network Models</td>
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<td>2/13</td>
<td>Network Effects I</td>
<td>Lab 4: Positional Analysis</td>
<td>Assignment III</td>
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<td>No Class</td>
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<td>Midterm</td>
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<td>Dynamic Network Analysis</td>
<td>Lab 5: SAOM</td>
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<td>3/20</td>
<td>Meta Network Analysis</td>
<td>Lab 6: Meta Network Analysis</td>
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<td>3/27</td>
<td>Special Networks</td>
<td>Lab 7: Special Networks</td>
<td>Assignment IV</td>
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<td>4/3</td>
<td>Interventions</td>
<td>Lab 8: SNI</td>
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<td>4/10</td>
<td>Predictions</td>
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<td>Assignment V</td>
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<td>Research</td>
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<td>4/24</td>
<td>Presentations</td>
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<td>5/1</td>
<td>Final Paper</td>
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Course Outline

1. Introduction
Briefly review the development and the basic concepts of social network analysis.

Readings:

Recommended:

2. Network Data
Measuring what and how to measure are two fundamental problems in collecting network data.

Readings:

Recommended:

3. Network Formation
How social networks are formed? What role does social context, social status, cultural taste, perception, and local social processes each play in the formation of social networks?

Readings:

Recommended:

4. **Random Network Models**
Exponential random graphic models (ERGMs) are the state-of-the-art for modeling networks.

Readings:

Recommended:

5. **Network Effects I: Relational effects**
The literature on relational effects can be divided into two groups. The social capital literature shows how a person’s social networks provide access to social resources or emotional support. The social contagion model shows social norms and behaviors can transmit through networks.

Readings:


Recommended:

6. Network Effects II: Positional and structural effects
Both network positions and network structures can affect individuals' outcomes. Understand the concepts of structural holes and structural equivalence.

Readings:

Recommended:
7. **Dynamic Network Analysis**
Longitudinal network data help estimate causal peer effects. Compare the advantages and disadvantages of the dynamic logit model and the stochastic actor-oriented model.

Readings:

Recommended:

8. **Meta Network Analysis**
Introduce meta network analysis for combing multiple network models and big network analysis.

Readings:

Recommended:

9. **Special Networks**
Introduce methods for analyzing weighted networks, two-mode networks, and text networks.

Readings:

Recommended:
10. Social Network-Based Interventions

Network intervention may be conducted at three levels. (1) At the contextual level, it aims to change the environment of a social network and examine the adaption of the social network. (2) At the structure level, it attempts to shape the structure of a social network in order to facilitate information diffusion or behavior changes. (3) At the individual level, it aims to utilize social network information to more strategically select opinion leaders to lead interventions.

Readings:

Recommended:

11. Social Networks and Predictions

There are two kinds of predictions related to networks. One is to infer network ties based on attributes or alter reports. The other is to use networks to predict or monitor social behaviors.

Readings:

Recommended: