

POLS 5591-02: Independent Problems

Introduction to Social Network Analysis

Fall 2015

Department of Political Science
Idaho State University

1 Instructor Information

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2 Course Description and Purpose

This independent study course is designed to provide an introduction to social network analysis. It is not, in and of itself, enough to give you an intimate understanding of the method- but it will give you a general working knowledge of the basics and a starting point for future courses in a PhD program or as a starting point for future study of social networks problems and methods.

3 Course Format

This course is largely self-directed, and the “week” format is merely a convenient way of organizing information. Please, feel free to work at your own pace. The “weeks” do not add up to a full semester. My expectation is some topics might take longer and/or you will spend some weeks working on your scripts/research paper.

4 Requirements

Text

There are two required books and two recommended books. You will also likely find the workshops and resources listed on the statnet project webpage (statnet.org) to be immensely helpful in the replication script weeks. Given that this is an independent study, none of these books will be ordered to the campus book store.

1. Wasserman, Stanley and Katherine Faust. 1994. *Social Network Analysis: Methods and Applications*. Cambridge University Press: New York. **(Required)**
ISBN: 978-0521387071
2. Knoke, David and Song Yang. 2007. *Social Network Analysis*. Sage: Thousand Oaks, CA.
(Required)
ISBN-13: 978-1412927499

3. Kabacoff, Robert I. 2015. *R in Action: Data Analysis and Graphics with R*. Manning Publications: New York. **(Suggested)**¹
ISBN-13: 9781617291388
4. de Nooy, Wouter, Andrej Mrvar, and Vladimir Batagelj. 2011. *Exploratory Social Network Analysis with Pajek*. Cambridge University Press: New York. **(Suggested)**²
ISBN-13: 978-0521174800

Assessment

This course is worth 100 points which are broken up over several different items

- Replication Scripts: 25 points
 - Research Paper: 50 points
 - Summary Notes: 25 points
1. **Replication Scripts (25 points)**— Over the course of the semester there will be two weeks where the assigned readings have step-by-step tutorials for the statnet package in R. For those weeks, recreate the scripts, with comments that make sense to you written into the script. I can show you some of my scripts to give you a sense of what *I* find useful in terms of comments. The idea here is that these scripts will instil good script writing practices and also prove a handy quick reference in the future.
 2. **Research Paper (50 points)**—Produce a research paper which uses social network analysis (either descriptive or ERGM). This paper can be an extension of something you have written previously or something you are working on for another class presently. Please note, you need the permission of the professor you wrote the paper for initially (or are also writing it for now) to use it again here. It is expected that revision will occur on that original document. Given the methodological focus of this course, you can go a little thin on the theory and delve into the social network model assumptions therein. Please also note, you must turn in a replication script with the paper.
 3. **Summary Notes (25 points)**— Produce an approximately two page summary of each “week’s” readings. These notes should be thought of as a quick reference on the topic when you need to know about it in future years. These can be abbreviated on those weeks where scripts are due.

Assessment Scale

A: 93-100	A-: 90-92	B+: 87-89	B: 83-86	B-: 80-82	C+: 77-79
C: 73-76	C-: 70-72	D+: 67-69	D: 63-66	D-: 60-62	F: <60

¹This is not a social networks book per se. It is, however, one of the most simple and direct “how-to use R” books available. The author maintains a stripped down version of the book at <http://www.statmethods.net> You can get a link to buy the book there.

²This book is a guide to Pajek, which is a social network software program. The book is, however, written in a very clear manner and is probably the best exposition of how the basics of descriptive social network analysis work. Reading the whole book (at least the relevant parts) will take you a few hours and is *well* worth it.

5 Course Policies

Meetings

We will meet weekly, though some weeks are heavier on material and can take up to two weeks. While rescheduling is fine, I encourage you to stick to a regular schedule of coming by to discuss the readings, particularly if you are struggling with one of the topics (and methods by definition are usually tough).

Due Dates

Due dates in this course are all flexible; though everything is due by finals week. I would encourage you to turn in notes weekly or as close to weekly as possible. This will allow me to read over your notes and correct any errors I see in your summary.

Academic Honor Code

Academic integrity is the expected norm for all academic activity at ISU, and all members of the ISU community are expected to act in accordance with this principle. Academic integrity is the pursuit of scholarly activity in an open, honest, and responsible manner. Consistent with this expectation is an ISU code of conduct that all students should act with personal integrity, respect other students dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts. Academic integrity includes a commitment not to engage in or tolerate acts of deception, falsification, or misrepresentation. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of the work completed by others.

Plagiarism is an act of academic dishonesty and shall be dealt with according to ISU policy. Plagiarism is any misrepresentation of another's work as your own. For example, copying portions of articles, papers, web pages, etc, or using portions of another person's work (either word for word or paraphrasing) without proper citations. If you have questions about plagiarism, please come talk to me, or refer to Plagiarism Statement written by the ISU Department of English and Philosophy: (<http://www.isu.edu/english/DeptDocs/PlagiarismStatement.pdf>).

I adhere to the University policy regarding academic misconduct and expect academic integrity. Academic misconduct will result in an "F" for the assignment, a possible "F" for the course, and the filing of charges with the University against the student involved. Academic misconduct includes, but is not limited to, taking credit for work done by others, cheating, and helping others to cheat. I encourage students to study together and exchange ideas and information, but you must do your own work when taking exams and completing writing assignments. If you are unclear on this topic, please let me know. I am happy to discuss it further.

Students with Disabilities

ISU is committed to providing equal opportunity in education for all students. If you have a diagnosed disability or if you believe you have a disability physical, learning, hearing, vision, psychiatric etc.) that might require reasonable accommodation in this course, please contact

the Disability Services Center, Rendezvous Building, Room 125 (282-3599) or on the web at <http://www.isu.edu/ada4isu>. It is the responsibility of students to contact instructors during the first week of each semester to discuss appropriate accommodations. Of course any communication with me about disabilities remains strictly confidential.

Syllabus Change Policy

This syllabus is a guide for the course and can be negotiated to add to or take away from.

6 Tentative Course Schedule

A few notes about reading the course schedule:

- “WF” refers to the Wasserman and Faust book.
- “KY” refers to the Knoke and Yang book.

Social Networks General Background

1– So Just Exactly What is Social Network Analysis?

- *Focus on:* How and why is social network analysis useful for the study of political science? How do these pieces speak to your research interests?
- WF ch. 1
- *PS: Political Science and Politics* Symposium on Network Analysis. January 2011 issue.

2– Data Basics

- *Focus on:* What are the characteristics of social network data? How does it differ from “regular” data? What are some issues associated with network data?
- WF ch 2
- KY ch 3
- Kossinets, Gueorgi. 2006. “Effects of Missing Data in Social Networks.” *Social Networks*. 28: 247-268.
- Marsden, P.V. 1990. “Network Data and Measurement.” *Annual Review of Sociology*. 16:435-463.

3/4– Graph Theory and Mathematical Notation

- *Focus on:* How should we conceptualize networks? What is the benefit of conceptualizing in this way? **Please note:** Do not hangup on the specifics of the notation... look to the big ideas here.
- WF ch 3-4
- KY ch 4

Descriptive Social Network Basics

5/6– Centrality

- *Focus on:* What can centrality tell us? Does it matter which kind of centrality we pick? What should guide our choices?
- WF ch 5, 9, 13
- Grannovetter, Mark. 1973. “The Strength of Weak Ties.” *American Journal of Sociology* 78: 1360-1380.
- Neal, Zachary. 2014. “The Backbone of Bipartite Projections: Inferring Relationships from Co-Authorship, Co-Attendance, and other Co-Behaviors.” *Social Networks*. 39: 84-97.
- Box-Steffensmeier, Janet M., Dino P. Christenson, and Matt P. Hitt. 2013. “Quality Over Quantity: Amici Influence and Judicial Decision Making.” *American Political Science Review*.

7– Clusters

- *Focus on:* Think back to Neal (2014). How might that work inform our study of clusters? More importantly, what do clusters tell us about a network?
- WF ch 6-7
- Paik, A., A. Southworth, and J.P. Heinz. 2007. “Lawyers of the Right: Networks and Organization.” *Law & Social Inquiry*. 32: 883-917.

8– Playing with Data: An Introduction to Statnet and Descriptive Social Network Analysis

- *Focus on:* How does Statnet work? Your summary notes for this week can be a little more thin since you’ll be writing your first replication script too.
- Handcock, Mark S., David R. Hunter, Carter T. Butts, Steven M. Goodreau, and Martina Morris. 2008. “statnet: Software Tools for the Representation, Visualization, Analysis and Simulation of Network Data.” *Journal of Statistical Software*. 24.
- Butts, Carter T. 2008. “network: A Package for Managing Relational Data in R.”
- Goodreau, Steven M., Mark S. Handcock, David R. Hunter, Carter T. Butts, and Martina Morris. 2008. “A statnet Tutorial.” *Journal of Statistical Software*. 24. (*only up to the ERG models*)

Getting Causal: Exponential Random Graph Models

9– Exponential Random Graph Model Basics

- *Focus on:* What do ERGMs add to social network analysis. What is their utility? What are their limits?
- KY ch 5
- Cranmer, Skyler J. and Bruce A. Desmarais. 2011. “Inferential Network Analysis with Exponential Random Graph Models.” *Political Analysis*. 19: 66-86.
- Box-Steffensmeier, Janet M. and Dino P. Christenson. 2014. “The Evolution and Formation of Amicus Curiae Networks.” *Social Networks*. 36: 82-96.
- Desmarais, Bruce A., Jeffrey J. Harden, and Frederick J. Boehmke. 2015. “Persistent Policy Pathways: Inferring Diffusion Networks in the American States.” *American Political Science Review*. *Forthcoming*

10– The Next Frontier of ERGMs

- Desmarais, Bruce A. and Skyler J. Cranmer. 2012. “Statistical Inference for Value-Edged Networks: The Generalized Exponential Random Graph Model.” *PLoS One*. 7: 1-12.
- Almquist, Zack W. and Carter Butts. 2013. “Dynamic Network Logistic Regression: A Logistic Choice Analysis of Inter- and Intra-Group Blog Citation Dynamics in the 2004 US Presidential Election.” *Political Analysis*. 21: 430-448.

11– Playing with Data: ERGMs and Statnet

- *Focus on:* How do ERGMs work? Where can *you* take them in your research? Your summary notes for this week can be a little more thin since you’ll be writing your first replication script too.
- Hunter, David R., Mark S. Handcock, Carter T. Butts, Steven M. Goodreau, and Martina Morris. 2008. “ergm: A Package to Fit, Simulate and Diagnose Exponential-Family Models for Networks.” *Journal of Statistical Software*. 24.
- Morris, Martina, Mark S. Handcock, David R. Hunter. 2008. “Specification of Exponential-Family Random Graph Models: Terms and Computational Aspects.” *Journal of Statistical Software*. 24.
- Goodreau, Steven M., Mark S. Handcock, David R. Hunter, Carter T. Butts, and Martina Morris. 2008. “A statnet Tutorial.” *Journal of Statistical Software*. 24. (*from ERG models onward*)