

**WORKSHOP SYLLABUS**  
**POLI 279: Special Topics in Methodology: Social Networks**  
Winter 2016  
Monday 9:00am – 11:50am, Social Sciences Building 104  
Prof: James Fowler, SSB 392  
<http://fowler.ucsd.edu>  
Office Hours: by appointment

### **Workshop Description**

This workshop is designed to give students an opportunity to publish a paper using network methodology. The course provides a brief introduction to social networks concepts and then focuses on the projects students are working on. By the end of the course, each student team will have produced a core set of results that will form the basis of an article to be submitted for publication.

The format of this workshop is social. Science is a *social* activity, so there will be a very large emphasis on working with, soliciting feedback from, and providing feedback to your peers. *All papers must be coauthored.*

### **Main Text**

From a Physicist's point of view:

- Newman, Mark. *Networks: an Introduction*. Oxford University Press, Inc., 2010.

<http://www.amazon.com/Networks-Introduction-Mark-Newman/dp/0199206651>

Please try to at least skim the sections assigned before doing the readings for each week.

### **Other Texts (All Optional, but Very Helpful)**

From a Sociologist's point of view:

- Wasserman, Stanley, and Katherine Faust. *Social network analysis: Methods and applications*. Cambridge university press, 1994.

From a Computer Scientist's point of view:

- Easley, David, and Jon Kleinberg. *Networks, crowds, and markets*. Cambridge University Press, 2010.

From an Economist's point of view:

- Jackson, Matthew O. *Social and economic networks*. Princeton University Press, 2010.

From another Physicist's point of view:

- Barabasi, Laszlo. *Network Science*. <http://barabasilab.neu.edu/networksciencebook>

## Format of the Workshop

Each week we will read one or two studies that illustrate network concepts. I plan to walk through the methods I used in these studies and in some cases I will provide R code and data so you can see exactly how things were implemented. I have provided links to each paper – please also read the supplementary material for each paper carefully since that is where description of methods takes place.

Starting in Week 2, groups will be assigned to present papers related to their topics and lead a discussion (see requirements).

In the last two weeks, groups will present the first drafts of the methods and results sections of the papers you are writing.

## Data

The most important thing you must do, and quickly, is to decide on a data source for your project. This will help you figure out who to work with. You are more than welcome to use your own data, but here are some existing sources you may also decide to use:

*Judicial Citations* – <http://fowler.ucsd.edu/judicial.htm>

*Cosponsorships* – <http://fowler.ucsd.edu/cosponsorship.htm>

*Roll Call Affiliations* - <http://www.voteview.com/>

*Legislative Committee Assignments* - [http://web.mit.edu/17.251/www/data\\_page.html](http://web.mit.edu/17.251/www/data_page.html)

*Campaign Contributions* - [http://www.fec.gov/finance/disclosure/ftp\\_download.shtml](http://www.fec.gov/finance/disclosure/ftp_download.shtml)

*IR Data / Correlates of War* - <http://www.correlatesofwar.org/>

*Add Health* - <http://www.cpc.unc.edu/addhealth> (You must get permission from Add Health before you use this data – tell me ASAP if you intend to use it)

Other possibilities include Twitter data, academic citations, placements in political science, and students on Facebook (ask me if you are interested in these).

## Tools

The next important thing is to get your data into a package for analysis and visualization.

For analysis I use R: <http://cran.r-project.org/>

Here's a nice (but old) tutorial on the igraph package in R:

<http://cneurocv.s.rmki.kfki.hu/igraph/NIPS08.html>

For more recent implementations look here: <http://www.r-bloggers.com/?s=igraph>

For network movies I use SoNIA: <http://www.stanford.edu/group/sonia/> which has recently been implemented in R.

A nice R package that implements exponential random graph models (ERGM) is <http://statnet.org> with a tutorial here: <http://www.nips2008.statnet.org/>

## Websites with Good Sources of References

Lada Adamic - <http://www.ladamic.com/>  
Albert-László Barabási - <http://www.barabasilab.com/>  
Mark Handcock - <http://www.stat.washington.edu/handcock/>  
Matthew Jackson - <http://www.stanford.edu/~jacksonm/>  
Jon Kleinberg - <http://www.cs.cornell.edu/home/kleinber/>  
David Lazer - <http://www.davidlazer.com/>  
Jure Leskovec - <http://snap.stanford.edu/>  
Mark Newman - <http://www-personal.umich.edu/~mejn/>

## Networks in Political Science Conferences

[http://www.hks.harvard.edu/netgov/html/colloquia\\_NIPS.htm](http://www.hks.harvard.edu/netgov/html/colloquia_NIPS.htm)  
[http://www.hks.harvard.edu/netgov/html/colloquia\\_HPNC2009.htm](http://www.hks.harvard.edu/netgov/html/colloquia_HPNC2009.htm)  
<https://web.duke.edu/pn/index.html>  
<http://sitemaker.umich.edu/fordschool-pnc/home>  
<http://socsci.colorado.edu/~stwo0664/workshops.html>  
<https://polnet2013.indiana.edu/>  
<http://polnet2014.cs.mcgill.ca>  
<http://conference.polinetworks.org>

## Listservs

SOCNET - <http://www.insna.org/pubs/socnet.html>  
PN-L - [PN-L@listserv.siu.edu](mailto:PN-L@listserv.siu.edu)

## Requirements

- 1. First Group Presentation.** Your research group will be required to present your topic to the class. You should assign 1 reading for your topic (distribute to class listserv, preferably from *Nature/Science/PNAS*). You will also be required to demonstrate the use of a tool for network analysis and/or visualization (the demonstration must not significantly overlap with prior presentations).
- 2. Class Participation.** Ask questions! Ask questions of me and ask questions of your fellow classmates. Did I mention you should ask questions?
- 3. Final Group Presentation.** On the last two class days, each group will present their results and answer questions.
- 4. Final Group Paper.** This paper should describe the data, methods, and results of your network analysis. It will help if you also provide at least 1-2 pages of context (briefly sketch the topic, main literature, importance of your question) but my main interest is in your analysis and results.

## Tentative Schedule

- Jan 4            Introduction: Meet, greet, and brainstorm.
- Data introduction
- Tools introduction
- Citation Networks  
[http://fowler.ucsd.edu/network\\_analysis\\_and\\_the\\_law.pdf](http://fowler.ucsd.edu/network_analysis_and_the_law.pdf)
- Newman Text:  
                  4.2 Citation networks  
                  6.1 Networks and their representation  
                  6.2 The adjacency matrix  
                  6.3 Weighted networks  
                  6.4 Directed networks  
                  6.6 Bipartite networks  
                  6.9 Degree  
                  6.10 Paths  
                  7.1 Degree centrality  
                  7.2 Eigenvector centrality  
                  7.4 PageRank  
                  7.5 Hubs and authorities  
                  7.6 Closeness centrality  
                  7.7 Betweenness centrality  
                  6.11, 8.1 Components  
                  8.3 Degree distributions  
                  8.4 Power laws and scale-free networks  
                  8.5 Distributions of other centrality measures
- Jan 11            Cosponsorship Networks  
[http://fowler.ucsd.edu/best\\_connected\\_congressperson.pdf](http://fowler.ucsd.edu/best_connected_congressperson.pdf)
- Newman Text:  
                  3.5 Affiliation networks
- Network Communities  
[http://fowler.ucsd.edu/community\\_structure.pdf](http://fowler.ucsd.edu/community_structure.pdf)
- Newman Text:  
                  11.2, 11.6, 11.7 Community detection

*No class Jan 18 – Use class time to meet with your project groups*

- Jan 25 Social Contagion Theory  
[http://fowler.ucsd.edu/spread\\_of\\_obesity.pdf](http://fowler.ucsd.edu/spread_of_obesity.pdf)  
[http://fowler.ucsd.edu/social\\_contagion\\_theory.pdf](http://fowler.ucsd.edu/social_contagion_theory.pdf)
- Newman Text:  
3.1 The empirical study of social networks  
3.2 Interviews and questionnaires  
3.3 Direct observation  
3.4 Data from archival or third-party records  
7.13, 8.7 Homophily and assortative mixing
- Feb 1 Small Experiments  
[http://fowler.ucsd.edu/cooperative\\_behavior\\_cascades.pdf](http://fowler.ucsd.edu/cooperative_behavior_cascades.pdf)
- Big Experiments  
[http://fowler.ucsd.edu/massive\\_turnout.pdf](http://fowler.ucsd.edu/massive_turnout.pdf)
- Big Natural Experiments  
[http://detecting\\_emotional\\_contagion\\_in\\_massive\\_social\\_networks.pdf](http://detecting_emotional_contagion_in_massive_social_networks.pdf)
- Feb 8 Network Models  
[http://fowler.ucsd.edu/turnout\\_in\\_a\\_small\\_world.pdf](http://fowler.ucsd.edu/turnout_in_a_small_world.pdf)  
[http://fowler.ucsd.edu/genes\\_and\\_social\\_networks.pdf](http://fowler.ucsd.edu/genes_and_social_networks.pdf)
- Newman Text:  
12.1, 12.8 Random graphs  
15.1 The small-world model  
14.1, 14.2 Preferential attachment  
3.6 The small-world experiment  
3.7 Snowball sampling, contact tracing, and random walks  
8.2, 10.4 Shortest paths and the small-world effect
- ERGMs/Dyadic Independence Models  
[http://fowler.ucsd.edu/hunter\\_gatherer\\_social\\_networks.pdf](http://fowler.ucsd.edu/hunter_gatherer_social_networks.pdf)
- Newman Text:  
15.2 Exponential random graphs  
7.9, 8.6 Transitivity / Clustering Coefficient  
7.10 Reciprocity
- No class Feb 15 – Use class time to meet with your project groups*
- Feb 22 Networks as Sensors  
[http://fowler.ucsd.edu/social\\_network\\_sensors.pdf](http://fowler.ucsd.edu/social_network_sensors.pdf)  
<http://arxiv.org/abs/1211.6512>  
17.1, 17.2, 17.3, 17.4 Models of the spread of disease  
7.8  $k$ -Core centrality

Feb 29	Group presentations
Mar 7	Group presentations
Mar 14	(No class) <i>email me a copy of your final results by Noon.</i>
Apr-Sep	Finish up full draft of paper and solicit feedback
Oct-Dec	Submit!