

Social Network Analysis (SNA)

CLASS SESSIONS

Monday, June 5 – 9, 2017

8:30am – 12:30 pm

Location: TBD

Hammer Health Sciences Library (HSC) is located at 701 W. 168th St. New York, NY 10032

Directions can be found here: <https://www.cuepisummer.org/contactpage>

INSTRUCTORS:

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COURSE DESCRIPTION

This course lays the groundwork of Social Network Analysis (SNA) from a conceptual, mathematical and computational perspective. SNA differs from other analytic perspectives in requirements for data collection, storage, descriptive, and statistical analysis. The course will address each of these by sampling from a range of the most commonly used classes of analytic concepts, demonstrating for each their implementation in primary data collection efforts and empirical analyses (in R).

We will address these concepts around two organizing principles: (1) the two primary theoretical frameworks capturing reasons networks “matter”; and (2) how each class of measures can be applied across different units of analysis: individuals, groups and “whole” networks. While by no means exhaustive, this course will provide students with the beginning toolkit for SNA. SNA is a rapidly advancing field, and these tools are intended to provide the orienting frameworks that can guide further study of SNA on your own.

PREREQUISITES

No formal statistical training or prior experience with R is assumed. However, students' prior familiarity with statistical and computing principles will enhance the course experience, easing the extension of coursework to your own research. Each course module's presentation will conceptually build only from prior material covered in this course. Code templates will be provided for the measurement and computation of each of the introduced concepts. All slides, scripts and data will be posted to dropbox (http://bit.ly/EPIC17_SNA). Participants should bring a computer for personal use (Windows, Mac or Linux), with R previously installed. We will use a number of R packages, which will require that you have privileges on your machine that allow you to install programs/applications. If this is not possible, please contact me in advance for a complete list of the packages you should be sure to have pre-installed.

COURSE LEARNING OBJECTIVES

By the end of the course, participants will be able to:

1. Understand the primary theoretical & analytic frameworks that underpin SNA.
2. Grasp the primary strategies for gathering & storing social network data.
3. Compute & interpret several primary classes of measures, for varying analytic levels.
4. Describe some of the most commonly observed patterns in empirical networks
5. Run descriptive & statistical analyses (in R) to identify these patterns in real data.

COURSE READINGS

Strongly Recommended:

- O'Malley JA & Marsden PV. The Analysis of Social Networks. *Health Services Outcomes Research Methodology* 2008;8(4): 222–269.

Recommended:

- Marsden, PV. 2011. "Survey Methods for Network Data." Pp 370-388 in J Scott & PJ Carrington (eds.) *The Sage Handbook of Social Network Analysis*; Sage.
- Olgnyanova, Katherine. 2015. "Network Visualization with R." POLNET Workshop. Available here: <https://goo.gl/mimlNB>.
- Snijders TAB. Statistical Models for Social Networks. *Annual Review of Sociology* 2011;37:129-151.

NOTE: These readings are available in the course's shared drive space http://bit.ly/EPIC17_SNA

As needed:

- Torfs, P & C Brauer. 2014. "A (very) Short Introduction to R." <https://goo.gl/j82hKu>.

Additional Background Readings:

There are numerous "overview" books available from a variety of perspectives on SNA. These can be helpful if you'd like a bit more of an introduction to a network perspective prior to the course. By no means are you expected to have read these, but I wanted to provide some pointers for those who so desire since there are so many out there. Several I recommend, in approximately descending order of their fit for purposes of our course:

- Kadushin, C. 2012. *Understanding Social Networks: Theories, Concepts, and Findings*. Oxford University Press.
- Scott, J. 2012. *Social Network Analysis: A Handbook*. (3rd Edition) Sage.
- Christakis, NA & JH Fowler. 2009. *Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives*. Little, Brown & Co.
- Valente, TW. 2010. *Social Networks and Health: Models, Methods and Applications*. Oxford University Press.
- Hanneman, R, & M Riddle. 2005. *Introduction to Social Network Methods*. Riverside, CA. Available here: <https://goo.gl/XYhAzx>.

During the course, I will also recommend materials that provide further elaboration on each of the concepts covered - for both their conceptual development and empirical applications.

COURSE STRUCTURE

Class meets from 8:30 AM – 12:30 PM Monday – Friday for a week (20 hours total). Each meeting will be interspersed with combinations of structured lecture and hands on applications of course material.

COURSE SCHEDULE

Session 1 – Frameworks, Data Structure & Data Collection	
June 5	<p><u>Learning Objectives:</u> <i>Conceptual:</i> Overview of theoretical frameworks, levels of analysis, modes of data storage, and strategies of data collection. <i>Computational:</i> Introduction to R & the igraph package, data types, transformation between storage strategies, matrix manipulations, network visualizations.</p>
Session 2 – Descriptive Measures I: Composition, Density, Distance, Balance	
June 6	<p><u>Learning Objectives:</u> <i>Conceptual:</i> Introduction to descriptive compositional measures - including those of ego-network composition, density, distance and social balance / transitivity. <i>Computational:</i> Estimate ego-level, small group and network-wide statistics for these measures (where appropriate) using R's igraph package.</p>
Session 3 – Descriptive Measures II: Equivalence, Centrality, Clustering, Cohesion	
June 7	<p><u>Learning Objectives:</u> <i>Conceptual:</i> Continuation of descriptive measures for describing position and group-identification strategies, e.g., equivalence, centrality, clustering/cohesion. <i>Computational:</i> Introduction to the statnet package. Estimate each measure using a combination of R's packages igraph and statnet.</p>
Session 4 – Applications: Influence, Diffusion & Search	
June 8	<p><u>Learning Objectives:</u> <i>Conceptual:</i> Putting the measures introduced on Tues/Wed "to work" on empirically motivated problems addressing frequent applications of SNA in epidemiologically-oriented research. <i>Computational:</i> Replicate several simple analyses of "classic" studies, and explore similar possibilities on other constructed examples. If you have some data of your own, work through some preliminary analyses.</p>
Session 5 – Statistical Models	
June 9	<p><u>Learning Objectives:</u> <i>Conceptual:</i> Introduce Network Autocorrelation, MRQAP, ERGM and Stochastic Actor Oriented (SIENA) Models. <i>Computational:</i> Work through a few tutorials demonstrating ERGM and SIENA models in R. Understand data needs, model fitting strategies, interpreting output, and run a few exemplar models.</p>