

**E10.2014: Advanced Topics in Quantitative Methods:  
Statistical Analysis of Networks**

Nicole Bohme Carnegie  
Interession 2010 – January 4-15, 2010

---

Lecture:	MTWThF 10-12; lab session 1:00-2:15	Office:	3 <sup>rd</sup> Floor Kimball Hall
Location:	TBD	Phone:	
Office Hours:	TBD	email:	nicole@stat.washington.edu
Text:	There is no required text; course readings are available online.		
Software:	R with <i>statnet</i> package. This course will use <b>Blackboard</b> .		

---

COURSE DESCRIPTION: This course is an introduction to the analysis and modeling of network data. Network analysis is a key tool in understanding relational data – data describing the relationships between pairs and groups of individuals, as well as the global structure of relationships. We will focus on applications to and building tools for research in the social sciences, but the methodology can be extended to other areas. By the end of the course, you should have a working knowledge of basic network analysis tools and be able to use them to analyze your own data.

COURSE REQUIREMENTS:

Participation:	10%	You are expected to attend class and participate in class discussions
Homework problems:	40%	There will be several assigned problems intended to give you practical experience with the methods discussed.
Data Analysis Project:	50%	You will be expected to perform, write up and present an analysis of network data; data may come from your own work or one of several public datasets in the <i>statnet</i> package.

Lab section: A lab section runs from 2-3pm each day. The lab will be a combination of instruction in the use of available software tools and guidance for data analysis projects.

Late assignment policy: Assignments are to be handed in on time.

COURSE READINGS: Required reading will be from either Hanneman and Riddle, "[Introduction to Social Network Methods](#)" (online text) or the [statnet User's Guide](#). Any supplemental readings will be posted to Blackboard at least two days in advance.

Recommended texts for further reading:

1. Jackson, *Social and Economic Networks* - for those who are interested in economic and game theoretic applications of networks
2. Wasserman & Faust, *Social Network Analysis: Theory and Methods* - for a very thorough review of network structures, prestige/centrality and other node-based measures

---

SCHEDULE

<i>Date</i>	<i>Topic</i>
Jan 4	<b>Lecture:</b> Introduction and notation: motivating examples and some graph theory <b>Lab:</b> Introduction to R
5	<b>Lecture:</b> Types of networks, network data structures <b>Lab:</b> Creating and managing network objects
6	<b>Lecture:</b> Network/node attributes: descriptive statistics, centrality, prestige and more <b>Lab:</b> Network summary statistics and characteristics
7	<b>Lecture:</b> Stochastic models for networks, part 1: Renyi-Erdos, Bernoulli and other dyad-independent models <b>Lab:</b> Plotting networks
8	<b>Lecture:</b> Stochastic models for networks, part 2: ERGM <b>Lab:</b> Building ergm models

- 11 **Lecture:** Network structures for ERG modeling  
**Lab:** ergm diagnostics
- 12 **Lecture:** Network sampling methods  
**Lab:** ergm goodness-of-fit
- 13 **Lecture:** Modeling partially observed network data, with an emphasis on ego-centric data.  
**Lab:** Wrap up ergm models
- 14 **Lecture:** Advanced topics: Latent space models, dynamic network simulation  
**Lab:** Simulating networks
- 15 **Lecture:** Project presentations  
**Lab:** Project presentations