

Economics 291

Spring 2017

Social and Economic Networks

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Text:

The recommended text for the course is:

Matthew O. Jackson (2008) *Social and Economic Networks*, Princeton University Press.

This will be supplemented by research articles as we proceed, which will be posted on Canvas. We will have in-depth discussions of recent research and techniques.

Prerequisites:

The emphasis of the course is on the analytic modeling of networks, but some empirical work will also be discussed. As such, the course will require some basic prerequisites in mathematics and statistics. For example, it will be assumed that students are very comfortable with standard concepts from linear algebra, probability theory, regression analysis, hypothesis testing, and Markov chains. Beyond those concepts, the course will be self-contained.

Motivation:

The motivation for the course can be described as follows. Social networks pervade our social and economic lives. They play a central role in the transmission of information about job opportunities and are critical to the trade of many goods and services. They are important in determining how diseases spread, which products we buy, which languages we speak, how we vote, as well as whether or not we decide to become criminals, how much education we obtain, and our likelihood of succeeding professionally. The countless ways in which network structures affect our well-being make it critical to understand how social network structures impact behavior, which network structures are likely to emerge in a society, and why we organize ourselves as we do. This course provides an overview and synthesis of research on social and economic networks, drawing on studies by sociologists, economists, computer scientists, physicists, and mathematicians.

Content:

The course will begin with an overview of social and economic networks, and the embeddedness of economic activity. We then will examine how to describe and measure networks as well as empirical observations about network structure. Next, we will examine models of how networks form, including random network models and strategic formation models. We will take a long look at models of how networks impact behavior, including infection, diffusion, learning, peer influences, games played on network, and networked markets. The course will conclude with an examination of areas for further research.

Problem Sets and Final Project “Proposal”:

The course will involve problem sets, and a final project proposal. The problem sets will be available via a Coursera site that will also have some videos that cover some of the materials.

The final project involves preparing a detailed research proposal concerning either the analysis of a social or economic network, or a theoretical contribution. Given the ten week horizon, you will not be expected to produce a completed paper, but rather a proposal regarding the work that you would conduct: basic motivation, approach, methods, and some preliminary analysis, and an outline of what steps would be taken to complete the analysis. Thus, it should be well enough along to present the ideas and approach, but not a finished piece of research. The project will be due at the end of finals week and *should be no longer than 15 pages* (double spaced with 1 inch margins and 12 point type including appendices, figures, and references). For a guide to writing a proposal, see: <http://www.stanford.edu/~jacksonm/nsfpost.pdf> You may work in groups on the final project, but with no more than three people on a project. Grades will be based on an equal weighting of the problem sets and final project.

Syllabus

Background on Network Analysis

- Introduction and Overview (1 lecture)
Examples of Social Networks and their Impact, Why Model Networks?
Chapter 1
- Describing and Measuring Networks and Empirical Background (3 lectures)
Definitions: Centrality, Clustering, Degrees, Diameters, Small Worlds, Homophily, Weak and Strong Ties, Opinion Leaders...
Chapters 2 and 3

Network Formation

- Random Networks (2 lectures)
Poisson Random Networks, Thresholds and Phase Transitions, Exponential Random Graph Models
Chapter 4.

- Growing Random Networks (1+ lectures)
Preferential Attachment and Power Laws, Hybrid models of Network Formation
Chapter 5.
- Strategic Network Formation (2 lectures)
Game Theoretic Modeling of Network Formation, Conflict between Incentives and Efficiency, Transfers, Dynamics, Farsightedness, Directed Networks, Hybrid Models and Data
Chapters 6 and 11.
- Fitting Network Formation Models to Data (2 lectures)
Some econometrics of network formation models
Chapters 4,5, and other posted readings.

Behavior and Networks

- Diffusion on Networks. (2 lectures)
Components, Cohesiveness and Contagion, Infection
Chapter 7.
- Learning on Networks. (2 lectures)
Bayesian Learning on Networks, Boundedly Rational Learning, Convergence of Beliefs, Influence
Chapter 8.
- Games Played on Networks. (2 lectures)
Markov Models of Behavior, Graphical Games, Network Games, Complements and Substitutes
Chapter 9.
- Networks and Markets. (2 lecture)
Empirical Studies of Bargaining and Trading on Networks, Financial Networks, Experiments on Network Transactions, Price Dispersion, Labor Markets
Chapter 10.