

NETS 7341 – Network Economics

Doctoral Student Seminar

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Fall 2021

Mon & Wed 5pm-7:10pm, 177 Huntington Ave #02.07

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by appointment.

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Course Description

Information technology has had profound effects on the digitization of the Economy: businesses increasingly rely on platform business models to leverage network effects, finance has been transformed by algorithmic trading and Bitcoin, the sharing economy is changing the nature of public transportation (e.g., Uber, Lyft) and hospitality (e.g., AirBnB), online labor markets and crowdsourcing are changing the future of work. A key force underlying these digital economies are externalities—the effect that one person’s behavior has on the welfare and utilities of others.

This class discusses fundamentals of the economics of information and social network analysis from the perspective of economics. We will cover seminal works in the economics of information including the Nobel Prize winning ideas of Akerlof, Arrow, Spence, Stiglitz, and von Hayek as well as seminal work in network analysis by Burt, Granovetter, Jackson, Duflo, and Aral. The course will proceed through (i) concepts of information, its value and measurement (ii) search and choice under uncertainty (iii) signaling, screening, and how rational actors use information for private advantage (iv) strategy given network effects (v) two-sided (or multi-sided) network effects, organizational information processing (including sharing economy business models used by Uber, AirBnB, Crowdfunding, and Blockchain), learning and social networks (vi) other micro and macroeconomic effects such as matching markets (eBay, Craigslist). This course should be of interest to any student applying information economics and network economics in academic, commercial, or government policy contexts. Prerequisites are a course in microeconomics and mathematics at the level of introductory calculus and statistics. Students are expected to produce a major paper suitable for publication or inclusion in a thesis.

All readings and additional material are online at the [course website](#).

Course Objectives

After completion of *Network Economics*, students will be able to apply principles of information economics and network thinking in the contexts of markets, organizational behavior, and public policy. In particular, students will be able to demonstrate the following competencies:

- To familiarize students with information economics and network economic theories involving efficiency, rationality, and choice under uncertainty.
- Apply information economic methods to analyze efficiency, rationality, and choice under uncertainty.
- To design incentive compatible information disclosure mechanisms to uncover (signal or screen) information.
- To provide an economic perspective on network effects.
- To understand the contributions of information economics to contracting and intellectual property policy.

Learning Assessments

During the course, the following will be used to assess student learning.

- Written and discussion-based analysis of case studies that demonstrate student's ability to understand and explain business models, economic and social policy using network economic theories.
- A semester-long project in which students select appropriate data sources and apply appropriate analysis techniques to solve a data analytics problem (e.g., in areas such as targeted marketing in banking and telecommunications, credit scoring, and attrition management).

Learning Strategies

In order to achieve the course objectives, the student will:

- Read and discuss seminal works of economics of information and network theory.
- Perform analyses of network economic business and policy questions.
- Develop theory about network economic business and policy questions.

Grading

- 20% Class Participation

When reading a paper consider these four questions to prepare for class:

- What is the problem being addressed?
 - What are the fundamental/conceptual ideas of the papers?
 - What are the main theoretical contributions?
 - What are some of the promising research questions and how could they be pursued?
- 5% Contributed Ideas
 - Get credit for bringing new materials to class attention. Be creative; these can be interesting articles, issues, software, teaching examples, web resources or other.
 - 75% Final Project. Final projects consist of:
 - A draft proposal (due before class following spring break; 2-5 pages). The project proposal should include answers to the following questions:
 - What is the problem?
 - Why is it interesting and important?

- Why is it hard? Why have previous approaches failed?
- What are the key components of your approach?
- What approach will be used to validate the approach?

The draft proposal will be assigned to two other students in the class who will provide feedback and comments (.5 to 1 full page of written comments; due one week later).

- Class presentation – 25 minutes presentation (15-20min presentation + 5min Q&A) during (Class 15).
- Final report – due before final presentations (Class 15).

Final Project Details.

There will be one final paper based on original research of the students' choosing.

This paper may take one of four forms:

- (1) The paper can represent an application of network economic theory to an original business problem. As illustration, it might therefore develop a formal, game theory, or agent-based model of competition among platform firms such as Lyft and Uber, econometric analysis of developer contributions in gaming networks, or experiments in information diffusion on Facebook or Volunteer Science.
- (2) The paper may apply network economics to a policy question of social significance. Possibilities might include information asymmetry in healthcare, welfare effects of different information distribution patterns, regulatory questions, intellectual property, innovation questions, and others.
- (3) The paper may attempt to advance the state of research in network economics by developing novel aspects of network economic theory. Examples might include network effects, productivity measurement, information boundaries of organizations, economics of memetic processes, diffusion, crowdsourcing, social media, platforms, and others.
- (4) The paper may begin with the replication of a published article. Producing a publishable paper—the goal of this course project—is one that by definition advances knowledge. If you start by replicating an existing work, then you are right at the cutting edge of the field. If you can then improve any one aspect of the research that makes a substantive difference and is defensible, you have a publishable paper (King (2006) contains many helpful ideas and guidelines, but please note that it was written for a different course and hence some differences apply).
- (5) The paper may be a business plan for a new business venture or government initiative (e.g., Blockchain use in city planning). Such a paper will be judged by the same standards that an investor would apply. A top grade corresponds to something I would be willing to make a seed investment of \$20-30 thousand dollars in if I were an angel investor and would plan to encourage the students to pursue seriously.

However, I will be open to any plan that seems feasible and sufficiently valuable. Note that the output of this course will help Ph.D. students prepare a final research paper of *publishable quality* that is ready for submission to a conference or journal and is satisfactory for inclusion in a dissertation. Given the interdisciplinary nature of the course and the students, the project and the written report should be commensurate to the student's discipline. That is, the length, style, depth, and formatting of the report should be appropriate for your field and your target outlet (e.g., if you are targeting a top computer science conference, then follow some established IEEE/ACM conference format; if you are targeting a social science outlet, then a longer paper with double-spaced text will be most appropriate). "A" roughly corresponds to a

top field journal in economics or top computer science conference for a graduate student and a widely read international journal for an undergraduate.

Readings. Readings in the class will be drawn from a variety of sources but most will consist of research papers published in leading economics journals. For the most part, the articles will be available digitally through the university library or downloadable consistent with fair University access and fair use from the course website. I tried to pick Open Access versions of material (SSRN, arXiv, working paper series) wherever possible. However, there are a few books that we will read larger pieces from and which you should therefore either check out from the library or purchase in fairness to the authors' intellectual property. Most notably, this will be Arun's book *The Sharing Economy* and Matt Jackson's book *Social and Economic Networks*. Readings listed under *If you want to learn more* are intended as starting points for students who want to focus their project or dissertation work on a topic.

Special Accommodations

If you have specific physical, psychiatric or learning disabilities that may require accommodations for this course, please contact Northeastern's Disabilities Resource Center (DRC) at (617) 373-2675. The DRC can provide you with information and assistance to help manage any challenges that could affect your performance in the course. The University requires that you provide documentation of your disabilities to the DRC so that they may identify what accommodations are required, and arrange with the instructor to provide those on your behalf, as needed.

Honor Code

All students must adhere to the Northeastern University honor code available on the Northeastern web site (see <http://www.northeastern.edu/osccr/academicintegrity/index.html>) and the graduate student handbook.

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