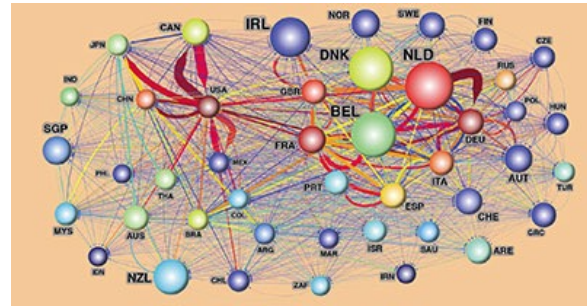
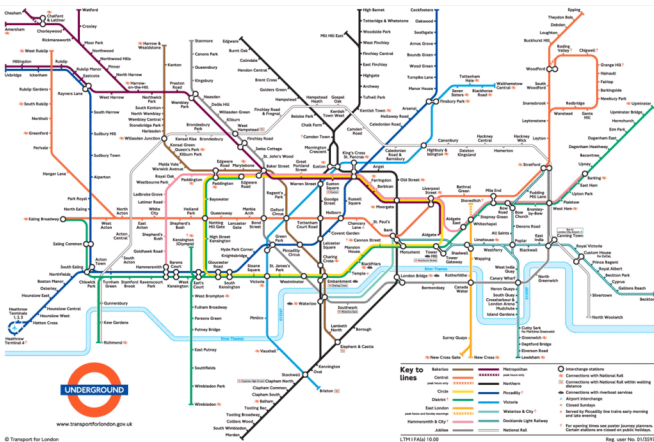


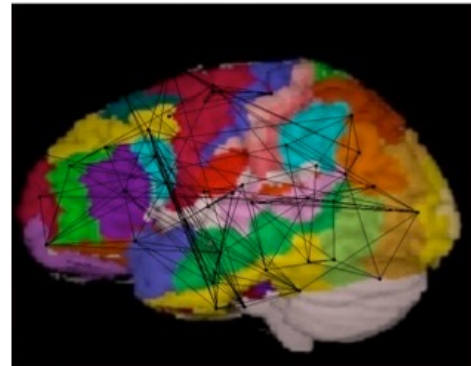
Facebook Friends Network



Food Contamination Spread Network between Countries



London Underground Network



Sample Network of Brain Regions

EECS 498: An Introduction to Social, Economic and Technological Networks

Time: MW 10:30am-12:00noon

Location: Room 3427 EECS

School: EECS Dept, University of Michigan, Ann Arbor

Course description:

Networks are everywhere. We encounter a variety of networks of different sizes and forms on a daily basis: societal networks such as the network of retweets of a certain hashtag on Twitter or the friends network on Facebook; technological networks such as the Internet with the telecommunication network of computers, the links between webpages, the groupings of users generated by recommendation systems for predictions or the network of users on BitTorrent downloading a specific file; and economic networks such as trade networks or supply-chain networks. Some of these networks emerge naturally such as many societal networks, while others are planned such as the public transportation or road network. We depend on the efficient functioning of these networks to transact many of our activities.

This course serves as an introduction to the broad class of networks described above: how these networks are connected, how they form, how processes and transactions take place on them, and how they are being transformed and interconnected in the modern world. Students will learn how to develop and apply mathematical models and tools from graph theory, linear algebra, probability and game theory in order to analyze network processes such as how opinions and fads spread on networks, how sponsored advertisements are developed, how web content is displayed, how recommendation systems work, etc.

Syllabus:

Graph Theory and Social Networks, Game Theory (sponsored ad auctions), Markets and Strategic Interaction on Networks (graphical games), Information Networks and the World-Wide Web (centrality, PageRank, HITS, matching markets), Network Dynamics: Population Models (information cascades), Network Dynamics: Structural Models (epidemics, cascades), Institutions and Aggregate Behavior (markets, voting theory).

Prerequisites:

There are no pre-requisites for the course as most necessary mathematical tools will be developed as a part of the course. However, students are assumed to have some mathematical sophistication (some familiarity with proofs, basic understanding of probability, some exposure to linear algebra and graph theory, etc.). EECS 203 and/or EECS 301 (or equivalent courses) are recommended. Open to students with junior standing or above, and graduate students are welcome.

Grading Information:

An important part of the course will be a project that will explore one of the topics in greater detail with one aspect being implementing some of the algorithms described in class. Additionally, there will be regular homework, mid-terms, and a final. You will also be graded for class participation. The contribution of the scores will be weighted as follows:

- Class Participation 5%
- Homework 10%
- Mid-term 1 15%
- Mid-term 2 15%
- Project 20%
- Finals 30%

Textbook:

The textbook for the course will be the following:

Networks, Crowds, and Markets, Jon Kleinberg and David Easley
Cambridge University Press, 2010

The textbook is freely available online on the author Jon Kleinberg's [website](#).

We may also use material from the following books:

- *Networks: An Introduction*, M. E. J. Newman, Oxford University Press, 2010
- *Social and Economic Networks*, Matthew O. Jackson, Princeton University Press, 2010

Additionally, we may use research articles and papers as further reading material. These will be posted on the course website and/or distributed in class.

Instructor: Vijay G. Subramanian

School: EECS Dept, University of Michigan, Ann Arbor

Contact: <vgsubram@umich.edu>