SOSC3720 / SOSC6030K: Introduction to Social Network Analysis

Spring 2021

Important: this is a preliminary syllabus. I have not taught this course online before and will likely make adjustments when I discover that some things don't work as well online as they do in offline classes. I am also open to suggestions regarding topics and more advanced methods to cover in this class.

Note that this class is offered to undergraduate students (as SOSC3720) and to graduate, postgraduate, MPhil, and PhD students (as SOSC 6030K). Those two groups will be graded separately, and the assessment requirements vary as detailed below.

Fridays, 12:00-13:20 and 13:30-14:50

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Office: Academic Building, Room 3356 (Ext. 7820)
Office Hours: Tuesdays 11:00-12:00 or by appointment

Course Description:

Social Network Analysis (SNA) studies social relations – usually between individuals or groups of people, but sometimes also between institutions, locations, countries, or even texts or concepts. But instead of just examining the individual connection, it focuses on the whole network of relationships. Using SNA, you might discover that even though you don't know Li Ka-shing personally, you are still only separated from him by "three degrees", because your friend's aunt is his business partner. Or you might find that when trying to find a job, it is less important how many people you know, but who those people know. And of course, with Covid-19, we have all learned how quickly a disease can spread along a network of contacts.

There are no pre-requisites for this course, but knowledge of basic statistics (such as how to calculate the mean) and how to use excel or similar programs would be useful. We will use R for most of the semester

Intended Learning Outcomes / Course Objectives:

After taking this course, you should be able to do the following:

- Talk more clearly about connections and networks using appropriate terminology
- Understand the most common concepts used in SNA and explain how they apply to specific circumstances (e.g. the group of people that you are interested in)
- Use network visualization programs to illustrate the network in a way that helps you and your audience better understand it
- Calculate basic summary statistics describing the network, the node-dyad (the pairs of individuals) and the nodes (individuals)
- Explain different positions individuals hold in a network (network centrality, structural equivalency) and how those positions matter

- Understand how different tie-formation processes on the individual level lead to different network shapes (preferential attachment, homophily)
- Able to use visone and R to analyze (and maybe collect) network data.

Teaching and Learning Activities:

Lectures, in-class discussions, homework, research project, (poster/paper) presentation

Organization:

We meet twice weekly. The regular lecture class introduces the theory and applications of different network concepts. We will also discuss any questions you might have from the readings. The lecture will be followed by a lab session. This means that you will follow along on your computer while I explain how to create network visualizations or calculate certain statistics. We will usually start by discussing the homework assigned in the previous session.

There will be homework assignments during most of the weeks for the two thirds of the semester, in which you have the opportunity to apply what you've learned during the lab session, and demonstrate that you've understood the lecture sessions by interpreting the results correctly.

In addition to the final exam, there will also be a project (see below) on which you will work in groups throughout the semester. You will have time to work on this project during your lab session, and some of the questions in the homework assignment will be on the dataset that you've chosen for your project.

You are allowed to discuss your homework assignments with other students, but the write-up has to be your own. Do not copy answers from others – what you turn in must reflect that you've understood and conducted the analysis on your own.

Software and Textbook:

The main textbook will be: Song Yang, Franziska Keller, and Lu Zheng (2017): Social Network Analysis: Methods and Examples, SAGE Publications. (I will post the relevant chapters as .pdfs on CANVAS)

We will use open-source software (visone, and R with the packages such as statnet and igraph) which you can download onto your own laptop. These programs are also installed on the computers in our computer lab. But as most of you are unlikely to attend in-person classes this semester, we will spend the first two lab sessions installing the necessary programs and trouble-shooting to get you up to speed.

The research project:

The goal of the project is to do a simple network analysis on your own on a "real case", present some of the results in class at the end of the semester and, if you are a undergraduate student, produce a poster together with 1-3 other undergraduate students, or write an individual research paper if you are a graduate student.
I will present a handful of different network dataset in the first few lessons available on CANVAS. If you want, you can also choose a network dataset from another source, but please discuss this with me first to make sure it is suitable. If you are a graduate student, I would

recommend that you try to find such data that matches with your thesis project or another project you're currently working on.
Over the duration of the semester, you or your group will become the experts on this particular dataset, and will do part of each week's homework on that data.

Assessment:

Attendance and participation in class (UG: 10%, PG: 0%): you are expected to be either able to answer questions about the assigned readings or ask questions about the parts you did not understand. If you are uncomfortable speaking up in class, ask questions before or after class, post them on our course web site, come to my office hours, or send your questions via e-mail.
Homework assignments (UG/PG: 30%): For undergraduate students, there will be 5-6 homework assignments, for postgraduate students there will be 7-8 homework assignments.
Presentation (UG/PG: 10%): You will present a preliminary version of your poster/paper to the class, where you can receive feedback on how to improve it before you submit it at the end of the course.
***Poster/paper (UG: 20% / PG: 30%)*:** Undergraduate students will prepare a poster of their (group) research project. Postgraduate students will submit an individual 15-20 page research paper instead.
Final exam (UG/PG: 30%): Note that the university will announce the date of the final exam by mid-semester, but has already announced the exam period. So please check the Academic calendar and make sure that you are available for the whole period.

Course Schedule (subject to modification):

Week 1:
Lecture: What is Social Network Analysis? What it is good for?
Lab: Getting started. Installing visone, and R. Introducing the project datasets
Tasks: fill out the online survey

Week 2: no class, Spring Festival

Week 3:
Lecture: types of networks (directed, undirected, binary, weighted, bipartite). The parts that make up networks: nodes, ties, dyads (Chapter 1: 1.1-1.3)
Lab: opening different network files, matrices, edgelists. The class network,
Tasks: homework assignments, skim articles associated with project datasets of interest to you

Week 4:
Lecture: Data collection. Surveys and observational data (Chapter 2)
Lab: How to use filters, how to deal with large networks, more on visualizations in gephi.
Task: homework assignment

Week 5:
Introduction to R. If you are already proficient in R, you are free to attend only part or none of these sessions.

Week 6:
Lecture: levels of analysis: node, dyads, triads, cliques, communities. (1.4-1.7 of Chapter 1, and section 3.1 and 3.3 of Chapter 3)
Lab: Filters (continued), centrality measures

Week 7:
Lecture: node level analysis (network positions): centrality, (Chapter 3)
Lab: centrality

Week 8:
Lecture: dyads, structural equivalence, geodesic distance, homophily
Lab: centrality, structural equivalence, geodesic distance

Week 9: no class, Good Friday

Week 10:
Lecture: triads, clustering, cliques and communities, types of networks: behavior on networks / along network ties, discuss requirements poster, paper and presentation
Lab: and clustering discuss and decide on rough outline of project idea

Week 11:
Lecture: network models: Erdös-Renyi, preferential attachment, homophily, small world – descriptive statistics (Chapter 4)
Lab: Netlogo: network formation models, contagion models

Week 12:
Lecture: network models: Erdös-Renyi, preferential attachment, homophily, small world – inferential statistics (Chapter 4)
Lab: statnet (R): ERGM

Week 13:
Lecture: supervised work on project
Lab: project presentations

Week 14:
Lecture: project presentations
Lab: project presentations

Final exam: TBA