

Course Information and Syllabus

MATH-517-30: Social Network Analysis

Summer 2022

Time & Location: Mondays & Wednesdays 6:00pm-8:45pm
St. Marys 111

Instructor: Dr. Alla Webb

Office: TBD

Email: TBD

Office Hours: Virtual; By appointment only.
Mondays and Wednesdays TBD

Appointments should be requested at least 24 hours in advance

Email Policy: -Emails received *after 5pm or on holidays and weekends* will be responded on the next school day, at the earliest.
-You are expected to notify the instructor through email in case you will be missing class

Course Overview

This course will cover the mathematical concepts used in Social Network Analysis (SNA), in particular those drawn from graph theory and linear algebra. The primary focus of the applications of these methods is the analysis of relational data measured on groups of social agents or graph nodes. Topics to be discussed include graph theory, link analysis, centrality measures, estimation, sampling, large-scale analysis, functional granulation, visualization of network data including issues of validity and representation, and diffusions on networks. After identifying an area of interest, students will prepare a Research Paper and Final Project that uses tools from network theory to quantify the structure of their system and provide a meaningful interpretation of their findings.

Credits: 3

Course Objectives

By the end of the course, students are expected to:

- demonstrate conceptual understanding of experimental studies of social networks
- demonstrate working with computer methods for studying networks
- demonstrate understanding of graph theory, link analysis, centrality measures, functional granulation for networking
- perform estimation, sampling, large-scale analysis for networking

- select and apply methods and computer algorithms for the analysis and interpretation of network data
- perform visualization of network data including issues of validity and representation

Textbook

There will be required textbooks for this course:

- Newman, Mark. Networks: an introduction. Oxford University Press, 2018. ISBN-10: 0199206651, ISBN-13: 978-0199206650.
- Stephen P. Borgatti, Martin G. Everett. Analyzing Social Networks 2nd Edition, Sage Publications Ltd, ISBN 978-1526404091, ISBN: 526404107

Recommended Textbooks and References

The following textbooks are recommended (optional) texts for further

- Christina Prell, Social Network Analysis: Sage Publications Ltd, 2012. ISBN:978-1412947145, ISBN:978-1412947145-2
- Charles Kadushin, Understanding Social Networks, Oxford University Press, 2012, ISBN:978-0195379464, ISBN:978-019537947

Course Website

We will use the Canvas site for the course for all the lecture notes, assignments, and communications. Announcements will usually only appear on the web page.

Calculator

Calculators are optional. You will need a calculator for exams/assignments. The instructor will not provide support and instructions on using calculators.

Prerequisites

MATH-503 Mathematical Statistics or equivalent.

- Comfortable with the Linux command line
- Familiarity with SQL, R, and/or Python: students must be able to write a script to read in, write, and manipulate data
- Familiarity with data mining techniques
- Math skills: probability, statistics, matrices, linear algebra, Graphs

Homework Assignments

There will be weekly homework assignments. **Late homework submissions will receive a score of zero!**

Computer Software Package R/R Studio

R is a freeware and can be downloaded from the <https://www.r-project.org/> Website

Alternatively, R Studio may be used. R Studio is also free and may be obtained from RStudio.com. It is available for both Windows and Mac platforms. UCINET can be used.

Open source software options include using the igraph package in R (<http://igraph.org/>), Gephi (<https://gephi.org/>), Cytoscape (<http://www.cytoscape.org/>), and some of the APOC functions available for Neo4J (neo4j.com), which are all available cross-platform. Python users have networkx and there is a port of igraph for python; however, for the purposes of this class, you may ultimately find it easier to use R/RStudio.

Evaluations

There will be homework assignments, Midterm Research paper, and a final project (Presentation & Report). Exam will be “take-home” and online.

Details regarding the projects will be provided later in the semester.

Exam Schedule and Projects Due Dates

Exact dates will be announced ahead of time for each activity.

Grading

Homework Assignments	40%
Midterm Research Paper	25%
<u>Final Project (Presentation & Report)</u>	<u>35%</u>
Total	100%

Honor Code

Remember that your work **MUST BE YOUR OWN**. Plagiarism and cheating will be swiftly dealt with to the full extent allowed under Georgetown policies (see details [here](#)).

Title IX/Sexual Misconduct

Georgetown University and its faculty are committed to supporting survivors and those impacted by sexual misconduct, which includes sexual assault, sexual harassment, relationship violence, and stalking. Georgetown requires faculty members, unless otherwise designated as confidential, to report all disclosures of sexual misconduct to the University Title IX Coordinator or a Deputy Title IX Coordinator. If you disclose an incident of sexual misconduct to a professor in or outside of the classroom (with the exception of disclosures in papers), that faculty member must report the incident to the Title IX Coordinator, or Deputy Title IX Coordinator. The coordinator will, in turn, reach out to the student to provide support, resources, and the option to meet. [Please note that the student is not required to meet with the Title IX coordinator.]. More information about reporting

options and resources can be found on the Sexual Misconduct Website: <https://sexualassault.georgetown.edu/resourcecenter>.

If you would prefer to speak to someone confidentially, Georgetown has a number of fully confidential professional resources that can provide support and assistance. These resources include:

Health Education Services for Sexual Assault Response and Prevention:
confidential email sarp@georgetown.edu

Counseling and Psychiatric Services (CAPS): 202.687.6985 or after hours, call (833) 960-3006 to reach Fonemed, a telehealth service; individuals may ask for the on-call CAPS clinician

More information about reporting options and resources can be found on the [Sexual Misconduct Website](https://sexualassault.georgetown.edu).