

Introduction to Social Network Analysis

CS 176

Fall 2025 Section 01 In Person 3 Unit(s) 08/20/2025 to 12/08/2025 Modified 08/19/2025

Contact Information

Instructor(s):	Aikaterini (Katerina) Potika
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Office Hours:	Tuesday-Thursday 9:30-10 am, 12-1 pm or by appointment
Class Days/Time:	Tuesday-Thursday 10:30-11:45 am
Classroom:	MacQuarrie Hall 422
Prerequisites:	CS 146 (with a grade of "C-" or better in each); or instructor consent.

Course Description and Requisites

The Web and social networks are complex networks. We study them by unifying tools from different disciplines: computer science, economics, and social sciences. Topics include graph theory, information networks, search, advertisement, auctions.

Prerequisite(s): CS 146 (with a grade of C-). Computer Science or Software Engineering majors only, or instructor consent.

Letter Graded

* Classroom Protocols

Attendance is highly recommended. Please avoid disturbing the class: turn off cell phones (or put them on vibrate mode), no text messaging in the class or the exams, no taking pictures and videos, and avoid coming late. You may not publicly share or upload material for this course without my consent, such as exam questions, lecture notes, or solutions.

☰ Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

📊 Course Learning Outcomes (CLOs)

Upon successful completion of this course, students will be able to:

- CLO1. Discuss graph theory used to predict and determine network behavior
- CLO2. Reflect on the basic topics of behavior analysis
- CLO3. Carry out the basics of web search, sponsored, and matching markets
- CLO4. Determine network properties and features in real-world settings
- CLO5. Integrate different approaches from computer science, economics, and social studies to design complex networks
- CLO6. Carry out network analysis using various software and visualizations
- CLO7. Summarize the main tools to analyze complex networks

☰ Course Materials

Textbook

[Networks, Crowds, and Markets: Reasoning About a Highly Connected World](#), by David Easley and Jon Kleinberg, Cambridge University Press, ISBN-13 978-0521195331

Other Readings

- Social and Economic Networks, by Matthew O. Jackson, ISBN: 9780691148205
- Social Media Mining An Introduction, by Reza Zafarani, Mohammad Ali Abbasi, Huan Liu, ISBN: 9781107018853
- [Network Science](#) (1st Edition) by Albert-László Barabási (Author), Márton Pósfai, ISBN: 978-1107076266
- [Mining of Massive Datasets](#), by Jure Leskovec, Anand Rajaraman, Jeff Ullman
- [Speech and Language Processing](#) (3rd ed. draft), by Dan Jurafsky and James H. Martin
- Online resources.

Other technology requirements/equipment/material

Software

- <https://networkx.github.io>
- <https://gephi.github.io/>
- <http://ccl.northwestern.edu/netlogo/index.shtml>

☰ Course Requirements and Assignments

Homework assignments: individual, regularly assigned, written problem assignments, and perhaps some online exercises. Solutions are not posted. The homework is a tool for you to learn the material and prepare for the exams.

Reading and Video assignments: Reading assignments and posted videos are regular and for the next class (see schedule).

Quizzes: regular quizzes are online (total 6, only 5 top count). Cover topics from the reading and video assignment and/or the homework.

Participation & Discussions (one for each module): Contribution during meetings, polls, and in the discussion forum of Canvas.

Mini Tutorial: In-class note-taking of a topic (one pair of students per lecture), create a small tutorial that goes in-depth on the topic, and hands-on examples of the problems and methods we cover using various datasets. From 600-800 words and code.

Group Project: A programming project of your choice related to the course's topics in groups of two students to cover CLO 6 and CLO 7. Never use any code you find on the web unless it is given by me. The penalty for late submission is 5% for every 3 days up to 9 days; after that, no submission will be accepted. The final presentation at the end of the semester is mandatory.

Activities: In-class hands-on examples of social network analysis on various datasets.

Midterm exam: One Midterm exam during the semester.

Final Examination or Evaluation: One final, written, and cumulative exam is split into two parts. The exams contain multiple-choice questions, short-answer questions, and questions that require pseudocode and/or computations.

✓ Grading Information

No extra point options (only the final exam might offer an extra points option). The final exam is comprehensive.

Grading Information

Determination of Grades

No make-up exams except in case of verifiable emergency circumstances. *Penalty for late submission, 5% for every 3 days up to 9 days, after that, no submission is accepted (without counting weekends).* Never email your assignments; always upload them to Canvas. Rubrics and examples will be given.

Final Grade:

25% Project

10% Homework

10% Participation & Discussions

5% Activities

5% Mini Tutorial

15% Quizzes

15% Midterm

15% Final

<i>Grade</i>	<i>Percentage</i>
A plus	96 to 100%
A	93 to 95%
A minus	90 to 92%
B plus	86 to 89 %
B	82 to 85%
B minus	78 to 82%
C plus	74 to 77%

<i>Grade</i>	<i>Percentage</i>
C	70 to 73%
C minus	65 to 69%
D plus	62 to 64%
D	58 to 61%
D minus	55 to 57%
F	<54%

University Policies

Per [University Policy S16-9 \(PDF\)](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the [Syllabus Information](https://www.sjsu.edu/curriculum/courses/syllabus-info.php) (<https://www.sjsu.edu/curriculum/courses/syllabus-info.php>) web page. Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

The schedule is subject to change with fair notice, and the notice will be made available

Lesson	Date	Topic	Reading/Project (part of the chapters covered)
1	8/21	Introduction	Chapter 1
2	8/26	Graphs	Chapter 2

3	8/28	Datasets, the Web, Visualization	Chapter 2
4	9/2	Centrality measures I	Other resources
5	9/4	Centrality measures II	Other resources
6	9/9	Strong/Weak Ties	Ch 3
7	9/11	Graph Partitioning, Community Detection	Ch 4
8	9/16	Homophily/Segregation, Influence Maximization	Ch 4, Ch 21
9	9/18	Positive and Negative Relationships, Structural Balance	Ch 5
10	9/23	Natural Language Processing, GenAI, LLMs (transformers)	Other resources, project proposal
11	9/25	Machine Learning on graphs, Node/edge/graph embeddings	Other resources
12	9/30	Graph Neural Networks intro	Other resources
13	10/2	Behavior Analysis, Game Theory I	Ch 6, 8
14	10/7	Behavior Analysis, Game Theory II	Ch 6, 8
15	10/9	Auctions and Markets I	Ch 9, 10
16	10/14	Auctions and Markets II	Ch 9, 10
	10/16	Midterm	
17	10/21	Matching Markets	Ch 10
18	10/23	Sponsored Search Markets I	Ch 15

19	10/28	Sponsored Search Markets II	Ch 15
20	10/30	Structure of the Web	Ch 13, Project demo
21	11/4	Link Analysis, Web Search	Ch 14
22	11/6	Link Analysis	Ch 14
23	11/13	Recommender Systems	other resources, Project presentation due
24	11/18	Information cascades, Properties of graphs	Ch 16
25	11/20	Random graphs, Project presentations	Ch 18,20,
26	11/25	GenAI GraphRAG, GANs, Project presentations	other resources, Project report due
27	12/2	Project presentations	
28	12/4	Project presentations	
		Final exam Thu, December 11 10:45 AM-12:45 PM	