

**San José State University  
Science/Computer Science  
CS176, Introduction to Social Network Analysis, Section 1, Spring, 2023**

**Course and Contact Information**

Instructor(s):	Aikaterini Potika
Office Location:	MacQuarrie Hall 215
Telephone:	408-9245134
Email:	katerina.potika@sjsu.edu
Office Hours:	Mondays-Wednesdays 9:30-10:00 am and Mondays 1:30-2:30 pm or by appointment
Class Days/Time:	Mondays-Wednesdays 10:30-11:45 am
Classroom:	Duncan Hall 450
Prerequisites:	CS 146 (with a grade of "C-" or better in each); or instructor consent.

**Course Description**

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

**Course Format**

**Technology Intensive, Hybrid, and Online Courses**

The course will be in person, and only online synchronous zoom meetings plus recording lectures until 2/14/2022, thus allowing students to listen to recorded lecturers asynchronously.

**Course Learning Outcomes (CLO)**

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 main tools to analyze complex networks

## Required Texts/Readings

### 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
- Online resources

### Other technology requirements / equipment / material

Software

<https://networkx.github.io>

<https://www.r-project.org/>

<https://igraph.org/>

<https://gephi.github.io/>

<http://ccl.northwestern.edu/netlogo/index.shtml>

Network Data Repositories

<https://snap.stanford.edu/data/>

<http://konect.uni-koblenz.de>

### Course Requirements and Assignments

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.”

**Homework assignments (3 total):** individual, regularly assigned, include 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:** Contribution during zoom meetings, polls and activities, and in the discussion forum of Canvas.

**Group Project:** A programming project of your choice related to the course's topics in groups of two students and to cover CLO 6 and CLO 7. Never use any code you find on the web, unless given by me. Penalty for late submission 5% for every 3 days up to 9 days, after that no submission will be accepted. 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, split in 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 offers extra points option). Final exam is comprehensive.

### **Grading Information**

### **Determination of Grades**

No make-ups 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 to Canvas. Rubrics and examples will be given.

### **Final Grade:**

- 25% Project
- 15% Activities
- 10% Quizzes
- 10% Homework
- 10% Participation & Discussions
- 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%

<i>Grade</i>	<i>Percentage</i>
C plus	74 to 77%
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%

### **Classroom Protocol**

During zoom meetings: camera on, mute yourself (unless you have a question or want to contribute), and dress appropriately. Private interactions with other students are prohibited unless you are in a breakroom. 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 video, avoid coming late, no talking or whispering with other students during the instructor's presentation. You may not publicly share or upload material of this course such as exam questions, lecture notes, or solutions without my consent.

### **CoS COVID-19 Safety**

All students registered for a College of Science (CoS) class with an in-person component must view the [CoS COVID-19 Training slides](#) and the [SJSU Phased Adapt Plan](#) website and acknowledge reading them according to their instructor's directions. By working together to follow these county and SJSU safety practices, we can keep our college safer. Students who do not follow COVID-19 Safety practice(s) outlined in the training, the SJSU Phased Adapt Plan, or instructions from their instructors, TAs or CoS Safety Staff may be dismissed from CoS buildings, facilities or field sites. Please review this training as needed throughout the semester, as updates will be implemented as changes occur (and posted to the same links).

### **University Policies**

Per [University Policy S16-9](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 [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo) (<http://www.sjsu.edu/gup/syllabusinfo>), which is hosted by the Office of Undergraduate Education. Make sure to visit this page to review and be aware of these university policies and resources.

The instructor reserves the right to drop students that do not show up during the first two lectures.

## **CS 176 Section 1 / Introduction to Social Network Analysis, Spring 2023, Course Schedule**

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

<b>Lesson</b>	<b>Date</b>	<b>Topic</b>	<b>Reading/Projects</b>
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			<b>(part of chapters covered)</b>
<b>1</b>	1/25	Introduction	Chapters 1
<b>2</b>	1/30	Graphs	Chapter 2
<b>3</b>	2/1	Datasets, the Web	Chapter 2
<b>4</b>	2/6	Graphs, Visualizations	Chapter 2
<b>5</b>	2/8	Centrality measures	Other resources
<b>6</b>	2/13	Centrality measures	Other resources
<b>7</b>	2/15	Strong/Weak Ties	Ch 3
<b>8</b>	2/20	Graph Partitioning	Ch 4
<b>9</b>	2/22	Graph Partitioning	Ch 4
<b>10</b>	2/27	Graph and node embeddings	other
<b>11</b>	3/1	Graph classification, link prediction, higher order structures	other
<b>12</b>	3/6	Homophily/Segregation	Ch 4
<b>13</b>	3/8	Positive and Negative Relationships, Structural Balance	Ch 5, Project Proposal
<b>14</b>	3/13	Positive and Negative Relationships, Structural Balance	Ch 5
<b>15</b>	3/15	Behavior Analysis, Game Theory	Ch 6, 8, Homework 1 due
<b>16</b>	3/20	Behavior Analysis, Game Theory	Ch 6, 8
	3/22	Midterm	
	3/27-4/2	<b>Break</b>	
<b>17</b>	4/3	Auctions and Markets	Ch 9, 10

<b>18</b>	4/5	Auctions and Markets	Ch 9, 10
<b>19</b>	4/10	Matching Markets	Ch 10, Project demo
<b>20</b>	4/12	Sponsored Search Markets	Ch 15
<b>21</b>	4/17	Sponsored Search Markets	Ch 15, Homework 2 due
<b>22</b>	4/19	Structure of the Web	Ch 13
<b>23</b>	4/24	Link Analysis, Web Search	Ch 14
<b>24</b>	4/26	Link Analysis, Web Search	Ch 14
<b>25</b>	5/1	Information cascades	Ch 16, Project presentation due
<b>26</b>	5/3	Epidemics, Influence maximization	Ch 21
<b>27</b>	5/8	Properties of graphs and random graphs	Ch 18,20, Project report due
<b>28</b>	5/10	Project presentations	Homework 3 due
<b>29</b>	5/15	Project presentations	
		<b>Final exam</b> Monday, May 22      9:45 AM-12:00 PM	