

# SI 301 - Models of Social Information Processing

## Fall 2020

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### **Instructor:**

Daniel M Romero ([drom@umich.edu](mailto:drom@umich.edu))

Associate Professor

School of Information, Complex Systems, Computer Science

### **GSI:**

Agrima Seth, Ph.D. Student, School of Information ([agrima@umich.edu](mailto:agrima@umich.edu))

Lucy Jiang, Master's Student, School of Information ([lqjiang@umich.edu](mailto:lqjiang@umich.edu))

### **Instructional Aides:**

Alana Woloshin, Undergraduate Student, School of Information ([awoloshi@umich.edu](mailto:awoloshi@umich.edu))

Harrison McCabe, Undergraduate Student, School of Information ([hjmccabe@umich.edu](mailto:hjmccabe@umich.edu))

Instructional Team email: [SI301-Fall2020@umich.edu](mailto:SI301-Fall2020@umich.edu)

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### **A note about this semester**

As we are sure you are aware, we are about to have a very unusual semester. We will be holding lectures, discussions, office hours, exams, etc. fully online. We have had to re-imagine the way we teach this class and we are both excited and nervous about the challenges ahead. We promise that we will work very hard to offer you a high-quality educational experience. At the same time, we ask you to be patient with us if things seem a bit chaotic at times. More than ever, we welcome your feedback and want to hear from you if you are facing any problems with the class. We are here for you!

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### **Textbook**

Title: "Networks, Crowds and Markets: Reasoning about a Highly Connected World"

Authors: David Easley and Jon Kleinberg

Access: You can freely download a pre-publication version of the book at the authors' site: <http://www.cs.cornell.edu/home/kleinber/networks-book/>

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### **Course Description**

This course focuses on how social groups form, interact, and change. We look at the technical structures of social networks and explore how individual actions are combined to produce collective effects. This course introduces two conceptual models for how information flows is used in multi-person settings -- networks and games. Networks describe the structure of connections among people or documents. They permit mathematical analysis and meaningful visualizations that highlight different roles played by different people or documents, as well as features of the collection as a whole. Games describe the actions available to different people and how each person's outcomes are contingent on the choices of others. They permit analysis of stable sets of choices by all players (equilibrium) and provide a framework for the analysis of the theoretical effects

of alternative designs for markets and information elicitation mechanisms. The techniques learned in this course can provide a high level understanding of systems like Facebook, recommender systems used in sites such as Netflix, auction systems such as Ebay, and information networks used by search engines such as Google.

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### Learning Objectives

- Identify different types of networks and describe a network using appropriate terminology such as node, edge, and connected component.
  - Describe several theories of social and information network formation such as triadic closure, structural balance, and social influence.
  - Given a small network, explain how much power each node has using terminology such as node centrality, outside option, and Nash bargaining solution.
  - Describe the assumptions made by the HITS and Page Rank algorithms.
  - Given a small network, find and interpret the PageRank, authority score, and hub score of each node.
  - Describe a few different models of information cascades on social networks and analyze how a cascade will diffuse on small networks.
  - Describe the Preferential Attachment and Small-World models.
  - Analyze large networks using Python's library NetworkX by applying concepts covered in the class.
  - Identify the basic components of a game such as players, strategies, and payoffs.
  - Analyze a game by finding and interpreting dominant strategies and pure and mixed strategy Nash equilibria.
  - Identify several well-known games and real world situations that can be modeled by these games.
  - Identify different types of auctions and explain how each type will incentivize bidders to behave.
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### Tentative weekly topics

Week of	Topics
Aug 31	Why study networks, Network connectivity, Distance, Breadth-first search, Small world experiment, Triadic closure, Clustering coefficient.
Sept 7	Bridges, Strong and weak ties, Strength of weak ties, Structural holes, Homophily, Selection and social influence.
Sept 14	Affiliation networks, Signed networks, Structural balance, Game theory intro
Sept 21	Prisoners dilemma, Best response, Dominant strategy, Nash equilibrium definition
Sep 28	Finding mixed and pure strategy Nash equilibria, Coordination games.
Oct 5	Network traffic, Braess' paradox, Auctions, Bipartite graphs, Bipartite Matching Problem
Oct 12	Markets, Market clearing prices.

Oct 19 <b>Midterm Week</b>	Network exchange experiments, Ultimatum game, Stability and balance.
Oct 26	Link analysis and web search, Hubs and authorities, HITS algorithm.
Nov 2	PageRank.
Nov 9	Search ads, Auctions with multiple items, Herding and information cascades.
Nov 16	Popularity on the web, Degree distributions, Rich-Get-Richer model, Behavior cascades in networks
Nov 23 <b>Thanksgiving Break</b>	
Nov 30	Collective action, Decentralized search, Small World networks
Dec 7	Branching Processes, SI, SIS, SIR Models

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### **Student Mental Health and Wellbeing**

The University of Michigan is committed to advancing the mental health and wellbeing of its students, while acknowledging that a variety of issues, such as strained relationships, increased anxiety, alcohol/drug problems, and depression, directly impacts students' academic performance. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact Counseling and Psychological Services (CAPS) at (734) 764-8312 and <https://caps.umich.edu/> during and after hours, on weekends and holidays. You may also consult University Health Service (UHS) at (732) 764-8320 and <https://www.uhs.umich.edu/mentalhealthsvcs>, or for alcohol or drug concerns, see [www.uhs.umich.edu/aodresources](http://www.uhs.umich.edu/aodresources). Since many students are remote during fall 2020, CAPS COVID-19 Support features SilverCloud, an online, self-guided, interactive mental health resource that provides cognitive behavioral interventions. For a more comprehensive listing of the broad range of mental health services available on campus, please visit: <http://umich.edu/~mhealth/>

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### **Accommodations for students with disabilities**

If you think you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way we teach may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities (SSD) to help us determine appropriate accommodations. SSD (734-763-3000; <http://www.umich.edu/sswd/>) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. I will treat any information that you provide in as confidential a manner as possible.

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### **Lectures**

Lectures will be delivered via pre-recorded videos. There will be no synchronous meeting during the scheduled lecture time. Please see Media Gallery on canvas to find the videos for each week. You should watch all the videos for the week before you attend your discussion on Thursday or Friday.

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## Discussions

Discussions will be offered synchronously through Zoom. They will consist of a combination of practice problems and programming exercises related to the material from lectures. Attendance to discussion is not mandatory. However, it is to your benefit to attend in order to work with your peers and GSI on practice exercises. A completed worksheet or programming exercise, most of which you will have time to finish during discussion, will be due on Friday of the following week. Discussion exercises will be submitted through Canvas.

Discussion	GSI	Day/Time	Zoom Link
SI301-002-DIS	Agrima Seth	Th 4pm – 5pm	<a href="https://umich.zoom.us/my/agrima">https://umich.zoom.us/my/agrima</a>
SI301-003-DIS	Agrima Seth	Th 5pm – 6pm	<a href="https://umich.zoom.us/my/agrima">https://umich.zoom.us/my/agrima</a>
SI301-004-DIS	Lucy Jiang	Fr 1pm – 2pm	<a href="https://umich.zoom.us/my/lucyjiang">https://umich.zoom.us/my/lucyjiang</a>
SI301-005-DIS	Lucy Jiang	Fr 2pm – 3pm	<a href="https://umich.zoom.us/my/lucyjiang">https://umich.zoom.us/my/lucyjiang</a>

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## Office hours

We offer two types of office hours through Zoom:

- **Individual office hours:** you can meet one-on-one with the instructor or the GSIs. This requires an appointment (details below). We offer 15-minute slots, but you are free to schedule more than one if you think you need additional time. At the time of your appointment, simply join the Zoom link for the instructor you made the appointment and they will let you when it's your turn. It is possible that their previous meeting is running a bit long. If you are not allowed in immediately, please wait. The instructor knows you are there.
- **Group office hours:** no appointment necessary. Simply join the Zoom meeting any at time during the block and we will be there.

	Morning	Early Afternoon	Late Afternoon
<b>Monday</b>	8-9am (Seth)		
<b>Tuesday</b>	9-10am (Jiang)	11am-1pm (McCabe/Woloshin)	3-4pm (Seth)* 4-5pm (Seth)
<b>Wednesday</b>	8-9am (Seth) 9-10am (Jiang)* 10-11am (Jiang)		
<b>Thursday</b>		2-3pm (Romero)* 3-4pm (Romero)	
<b>Friday</b>	9-10 (Jiang)		

\* Indicates individual office hours. Appointment required.

Use the following links to book one-on-one office hours:

[Thursdays 2-3pm \(Romero\)](#)

[Wednesdays 9-10am \(Jiang\)](#)

[Fridays 3-4pm \(Seth\)](#)

Zoom links for all office hours – group and individual:

Daniel Romero: <https://umich.zoom.us/my/danielmromero>

Agrima Seth: <https://umich.zoom.us/my/agrima>

Lucy Jiang: <https://umich.zoom.us/my/lucyjiang>

Harrison McCabe/Alana Woloshin: <https://umich.zoom.us/my/hjmccabe>

Be sure to connect to the right meeting room!

If you need to meet with the instructor or a GSI and you cannot attend any of the office hours, please contact us to make an appointment.

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## **Slack**

We will use a Slack workspace for the class. Everyone enrolled in the course should have received an invitation to join the workspace. If you have not received it, please contact us. Participating on Slack is completely optional. We will be monitoring the #assignments and #general channels and trying to answer your questions as promptly as possible. We also encourage you to answer each other's questions and use this platform for discussion related to the class. While we will try to read your posts and clarify or remove wrong or misleading responses, we cannot guarantee that all statements made by students are correct. Please remember to be civil and treat everyone with kindness and respect.

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## **Email**

You should feel free to email anyone in the instructional team at any time for any reason. If you would like to email the entire instructional team (instructor, GSIs, IAs) you should send your email to [SI301-Fall2020@umich.edu](mailto:SI301-Fall2020@umich.edu). Emailing the entire team will increase your chances of getting a quick response (compared to emailing a single one of us) since more people will see your email.

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## **Assignments**

We will have weekly assignments due almost every Wednesday (with some exceptions such as breaks, the first week of class, and possibly exams). Assignments are probably the most important part of the course. They give you an opportunity to engage deeply with the material through a variety of problems of different levels of difficulty. We encourage you to start assignments early after watching all lectures and doing the assigned reading. You should attend office hours, ask questions during discussions, or reach out to us on Slack if you are stuck or confused.

You will be given the opportunity to work on your assignment with an **assigned** partner. Partner assignments will change every week and they will be announced when the assignment is posted on Canvas. Working with your assigned partner is optional. If you decide to work with a partner, simply form a group on Canvas and submit a **single assignment** as a group. We will provide more detailed instructions on how to submit assignments in the first video lecture.

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### Quizzes

We will have weekly quizzes on Canvas. Quizzes consist of multiple choice or short answer questions that assess whether you understood key concepts from the video lectures. The questions are not meant to be very difficult. However, if you are having trouble with quizzes, it could be a sign that you need to review the lectures again or attend office hours for clarifications on the material.

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### Grading

- Weekly assignments: 30%
- Midterm (Wednesday Oct 21<sup>st</sup> 11:30am-12:50pm): 25%
- Final (Wednesday Dec 16<sup>th</sup> 1:30-3:30pm): 25%
- Discussion worksheets: 10%
- Quizzes: 10%

Letter grade assignment:

[98,100] = A+	[87, 90) = B+	[77, 80) = C+	[67, 70) = D+
[93, 98) = A	[83, 87) = B	[73, 77) = C	[63, 67) = D
[90, 93) = A-	[80, 83) = B-	[70, 73) = C-	[60, 63) = D-
			[0, 60) = E

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### Free Insurance Policy:

We understand that unexpected events out of your control such as illness, job interviews, and family emergencies happen. That's why we will: (i) drop two assignments with the lowest grade and (ii) allow two missed discussion worksheets without penalty. No explanations are required to use these "freebies".

At the same time, late assignments will not be accepted and no additional make-up opportunities will be granted. Please do not ask for extensions or exceptions.

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### Extra Credit

From time to time, we may offer the class extra credit opportunities. Extra credit points will be applied to the current week's assignment and scores are capped at 100%. Extra credit points are not meant to increase your grade significantly and only a small number of them will be offered. Please do not ask for additional extra credit points.

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### **Collaborating on Assignments**

We strongly encourage collaboration while working on some assignments and interpreting readings as a general practice. Active learning is effective. Collaboration with other students in the course will be especially valuable in summarizing the reading materials and picking out the key concepts. You must, however, ***write your assignment submission on your own, in your own words, except when you are working with your assigned partner.*** If you discussed your assignment with someone before writing it, you must list their names on your written submission.

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### **Plagiarism**

Unless otherwise specified in an assignment all submitted work must be your own, original work. Any excerpts from the work of others must be clearly identified as a quotation, and a proper citation provided. When collaborating on assignments you are allowed to discuss how to solve problems and explain concepts to each other. However, you are not allowed to copy someone else's solution. Always write solutions independently. Always turn in original work. Always indicate the names of students you collaborate with. All cases of plagiarism will be officially reported.

Any violation of the School's policy on Academic and Professional Integrity will result in serious penalties, which might range from failing an assignment, to failing a course, to being expelled from the program. Violations of academic and professional integrity will be reported to UMSI Student Affairs. Consequences impacting assignment or course grades are determined by the faculty instructor; additional sanctions may be imposed by the Senior Associate Dean for Academic Affairs.

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