Social Dynamics and Network Analysis

MORS 457: Section 31 and 32

Fall 2019*

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* This syllabus is subject to change
Description

Social Dynamics and Network Analytics (Social-DNA) covers cutting edge research on social media, network analytics, big data, and crowdsourcing, and equips you with conceptual tools to practically apply this research in your own career and future business. By the end of the course you will know how to: measure volume and location of Internet search data to understand and forecast trends; collect network data and create meaningful network visualizations; and use the wisdom of crowds to create better forecasts.

The course counts towards a major in Entrepreneurship and Management and Organizations.

Course Requirements and Assignments

Your final grade is composed of:

1. Course Contribution 5%+10%
2. 8-week long network analysis engagement 25%
3. Course assignments 40%
4. Mid-term Exam 20%

Course Contribution (5%+10%):

Individual Attendance (5%): Regular attendance is expected. There will be random attendance checks throughout the quarter, which together account for 5% of your total grade. If you must miss a class, notify the instructor at least 24 hours in advance via email to make sure the one-time absence will not affect your overall attendance grades. This is also essential for the teaching team to make arrangements for any in-class exercises and so that you can be certain to get the materials that will be distributed during the class.

Note that there are classes where your presence is not only important to yourself but to your fellow classmates. In particular, the two classes on week 7 (Midterm, May 14th) and week 10 (Final presentation, June 4th) require you to be present. If you will have to miss either of these two classes, you must email the professor by May 7th. Otherwise I will assume you will be in class.

Individual Participation (10%): Most class sessions involve active discussions, with an emphasis both on theoretical questions and practical implications. You should be prepared to share your ideas and to listen to and interpret the issues presented by others. Most participation will be voluntary; however, in order to ensure that everyone has the opportunity to be involved, individuals will often be called upon “cold.”

Quality discussion comments possess one or more of the following attributes:

- Offer a relevant perspective on the issue.
- Provide careful analysis.
- Apply the theory and concepts offered in the readings and lectures.
- Move the discussion forward by building on previous contributions with new insights; do not repeat points already made by others.
Eight-week long network analysis engagement (25%):

The key value of this course lies in its practical nature. This eight-week network analysis engagement offers you an immersive experience of applying everything you have learned in this class, from advanced network analysis tools to principles of social dynamics, to solving a practical problem that fascinates you the most.

A key feature of this engagement project is the concept of “Genius bar” - a unique opportunity for you to work directly with experienced data scientists. You will team up with fellow Kellogg students (~4 members each team). Teams are assembled by a random algorithm that takes into account the diversity in backgrounds and expertise within the team.

Course Assignments (40%)

A series of individual and group assignments will equip you with practical experience applying the tools from class. The per assignment weighting is indicated in the assignment summary table below.

All assignments are due by 11:59 pm on the day indicated.
Late assignments will be penalized 10% for the first 24 hours, and 20% for the first 48 hours
Assignments more than 48 hours late will not be accepted.
This policy will be strictly enforced. No exceptions will be granted.

Midterm Exam (20%)

A midterm exam will test your cumulative understanding of the course material. The exam is an in-class exam that takes place on Week 7.

Honor Code

As with all Kellogg courses, by enrolling in this course you agree to abide by the Kellogg Honor Code (http://www.kellogg.northwestern.edu/stu_aff/policies/honorcode.htm). In this course you may (and are encouraged to) discuss both the individual assignments and group assignment with your fellow students; however, the finished product that you submit must be entirely your own work. If you have any questions regarding how the honor code applies to this course, please see the instructor.
Readings
All readings are available on Canvas. There is no textbook for the course. Readings marked as (Reference) are optional unless noted otherwise – they are intended for you to refer to if you need to revisit a concept. Readings marked as (Advanced) are more difficult and are provided only for those interested in exploring a specific topic in more depth.

Summary of Assignments
(subject to change)
All assignments are due by 11:59pm on the day indicated.

<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Distributed</th>
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<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Individual Superstars</td>
<td>09/26</td>
<td>10/03</td>
<td>8%</td>
</tr>
<tr>
<td>2</td>
<td>Individual Everything is a network</td>
<td>10/03</td>
<td>10/10</td>
<td>8%</td>
</tr>
<tr>
<td>3</td>
<td>Individual Visualizing influence</td>
<td>10/07</td>
<td>10/14</td>
<td>8%</td>
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<tr>
<td>4</td>
<td>Individual Mini network homework (b)</td>
<td>10/24</td>
<td>10/31</td>
<td>8%</td>
</tr>
<tr>
<td>5</td>
<td>Individual Predicting the present with Google</td>
<td>10/31</td>
<td>11/07</td>
<td>8%</td>
</tr>
</tbody>
</table>
Schedule

Warning: This schedule is subject to change

Week 1 — Social Dynamics

Session 1. Rethink Success.

What is social dynamics? In this lecture we will look at several familiar examples that span across diverse domains, from ace pilots in the WWI to la la land to Usian Bolt. Through these vivid yet apparently disparate examples, we will uncover the first two principles governing social dynamics. Yet the true value of the examples covered in this session is to show us how different the world as we know it may seem, when viewed through the lens of analytical, data-driven frameworks.


Session 2. Superstars.

Power law distributions. Network effects and winner-take-all markets. Information cascades.


Assignment 1 out
Week 2 —From Social Dynamics to Networks

Session 1. Unpredictability and Inequality in a Connected World.

Matthew Salganik, Peter Sheridan Dodds and Duncan Watts, “Experimental Study of Inequality and Unpredictability in an Artificial Cultural Market,” Salganik, Science, 311(5762), 854–856. (Advanced)


Install Gephi on your computer (Need it for week 3; contact TA for help)

Session 2. Introduction to Networks.

✻ In Class Activity. Mapping the Social Network of the Class.

Barabasi. Network Science. Chapter 1

Assignment 2 out

Week 3 — Networks, A first look

Session 1. Mapping Networks – A First Look
What is network data? What data should you collect? How do you collect it?
An introduction to Gephi and mapping networks.

✻ In Class Activity. Gephi (computers necessary)

Assignment 3 out

Session 2. Viral Network - It’s a Small World
Which networks are the best for facilitating contagion? How do you measure networks? What is random network model? aka cocktail party model? Six Degrees of Separation. What does Kevin Bacon have to do with all these?

Nicholas A. Christakis and James H. Fowler. “Changing What We Do, or Changing What We Think?” Connected, 2011.
Week 4 — Network Influentials

Session 1. Guest speaker – Network analytics in action
Pioneering the design and use of network analytics to transform organizations
Taemie Kim, Chief Scientist and Co-founder, Humanyze

Session 2. From Small World to Global Hub.
Six degrees revisited. The Small World model. Identifying the most important people in a network. Power law networks. Scale free network
Barabasi, Network Science, Chapter 3 (Cambridge University Press)
Barabasi, Network Science, Chapter 4 (Cambridge University Press)

Week 5 — Network Entrepreneurs

Session 1. The Influentials.
Late comers; Network Robustness; Navigating a network; Friendship paradox.

Session 2. THINK Lab
A mysterious group exercise on networks.
Assignment 4 out

Extra Session. Movie (Optional)
Prize-winning network documentary (Friday 12:15-1:15).
Week 6 — Decisions and predictions in a connected world

**Session 1. Social Segmentation.**
Community structure is a key architecture of networks. How to detect communities? What are the implications of communities? How to identifying target markets?

✻ *In Class Activity. Mid quarter feedback*

**Session 2. Predicting the Present.**
The Billion Prices Project. The “Measure and React” strategy at Zara. Predicting box office success, the DJIA, and election outcomes with Twitter. Sentiment analysis with Amazon Mechanical Turk. Twitterbombs, Astroturfing, and Truthy.


Assignment 5 out

Week 7 — Midterm & Crowd Intelligence

**Session 1. Midterm Exam**
An in-class midterm exam that tests your cumulative understand of course materials.

**Session 2. The Wisdom of Crowds.**

✻ *In Class Activity. The Wisdom of the Class.*

Week 8 — Crowd Intelligence

Session 1. Crowdsourcing and Open Innovation

How to engage crowds for solving complex problems and discovering innovations? The NetFlix Prize, Fold-It, Top Coder. When and why diverse groups outperform high ability groups.


* In Class Activity. The “much anticipated” one-on-one math contest with the prof!

Session 2. Hackathon

Group project sprint with the geniuses from the Genius Bar
Week 9 — Persuasion through connections and crowd intelligence

**Session 1. Contagion and persuasion Part 1: Go Viral.**
Why do some things take-off while others don’t? Tipping point. How do we create contagions? Passive and active viral features.


**Session 2. Contagions and persuasion through connections.**
Case study: A close look at Facebook early strategy that is key for its success. Big seed viral campaigns for subcritical contagions. Threshold contagion, critical mass, and the cascade window.

*In Class Activity. The Quarterly Professor Wang “Winner Takes All” Tournament of Network Seeding.*


Week 10 — Season Finale

**Session 1. SHOWTIME.**
Groups will deliver the final presentation for group project. Each group will have 7 minutes (strictly enforced) to present their work, your slide decks will be ready for you and you may use any additional props that you bring.

*Must be present in this class*

**Session 2. Finale**
The last surprise. Where to from here?