Social Dynamics and Network Analytics
(Social DNA)

MORS 457

Winter 2020*

Professor Hyejin Youn
Phone: 847.491.4071
E-mail: hyejin.youn@kellogg.northwestern.edu
Office: KGH 5171 By appointment

Teaching Assistant
Wei Wang (Primary) wei.wang@kellogg.northwestern.edu

Class Liaison
TBD

* This syllabus is in constant progress and is likely to change
Description

Social Dynamics and Network Analytics (Social-DNA) covers cutting edge research on social media, network analytics, big data, and crowdsourcing. You will be equipped with both conceptual and analytical tools to practically apply the scientific research outcomes 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. Class Contribution (individual) 5%+10%
2. 7-week long network analysis engagement (group, peer evaluation) 25%
3. Course assignments (individual) 40%
4. Midterm Exam (individual) 20%

Course Contribution (5%+10%):

Individual Attendance (5%): Regular attendance is expected. There will be random attendance checks throughout the quarter, which together accounts 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 get you 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, Feb 19th) and week 10 (Final presentation, March 12th) require you to be present. If you will have to miss either of these two classes, you must email the professor by Jan 18th. 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.” Please bring your name card. In order to create the best possible learning environment, use of laptops or tablets is prohibited except for in-class activities.

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.

**Seven-week long network analysis engagement (25%):**

The key value of this course lies in its practical nature (learning by doing). This 7-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. You will team up with fellow Kellogg students (~5 members each team). Teams are assembled by a random algorithm that takes into account the diversity in backgrounds and expertise within the team. Members’ contribution will be evaluated as follows.

**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](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 course packet or 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 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>
<th>Due</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Individual Superstars</td>
<td>Jan 6</td>
<td>Jan 13</td>
<td>10%</td>
</tr>
<tr>
<td>2</td>
<td>Individual Everything is a network</td>
<td>Jan 13</td>
<td>Jan 20</td>
<td>10%</td>
</tr>
<tr>
<td>3</td>
<td>Individual Visualizing Social DNA</td>
<td>Jan 22</td>
<td>Jan 27</td>
<td>10%</td>
</tr>
<tr>
<td>4</td>
<td>Group Idea pitch (final group project)</td>
<td>Jan 22</td>
<td>Feb 3</td>
<td>5%</td>
</tr>
<tr>
<td>5</td>
<td>Optional Genius Bar ticket</td>
<td>Jan 22</td>
<td>Feb 21</td>
<td>0%</td>
</tr>
<tr>
<td>6</td>
<td>Individual Predicting the present with Google</td>
<td>Feb 10</td>
<td>Feb 24</td>
<td>10%</td>
</tr>
<tr>
<td>7</td>
<td>Group Showtime</td>
<td>Jan 22</td>
<td>Mar 9</td>
<td>10%</td>
</tr>
<tr>
<td>8</td>
<td>Group Final Project report</td>
<td>Jan 22</td>
<td>Mar 16</td>
<td>10%</td>
</tr>
</tbody>
</table>
Schedule

Warning: This schedule is subject to change

**Week 1 — Social Dynamics**

**Session 1. Rethink Success:** understand Success as social dynamics.

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 Usain Bolt. Through these vivid yet apparently disparate examples, we will uncover the first two principles governing social dynamics that makes success. The true value of the examples covered in this session is to uncover underlying dynamics through the lens of analytical, data-driven frameworks.


(Reference) Markman, Jon "Netflix Knows What You Want... Before You Do," Forbes, 2017


(Reference) Anderson, Eric; Zettelmeyer, Florian "How Amazon Will use Analytics to Shake Up the Supermarket Industry," Forbes, 2017

**Session 2. Superstars.**

What is the phenomenon of superstars? Can we describe and explain this superstar phenomenon in a more scientific and rigorous way? We will learn two kinds of distributions—normal distribution, and power-law distribution—and how the distribution reveals network effects, winner-take-all markets, and information cascades.


*Assignment 1 out*
Week 2 — From Social Dynamics to Networks

Session 1. Unpredictability and Inequality in a Connected World.


✻ In Class Activity: Wine tasting.

Session 2. Mapping Networks – A First Look
Modeling social interactions using networks. What is a network? How do we model networks? In this Class, we will learn mathematical framework for network representation, and vocabulary to speak the network science: Nodes, links, homophily, bipartite network, degree, degree distribution.

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

A. Barabasi. Network Science. Chapter 1

Week 3 — We are Networked.

Session 1. All You Need is Network
How to tell your idea using the network? What data should you collect? How do you collect it? How to visualize the network? How to make a persuasive network visualization? The Class will provide hands-on experience and tools for presenting data-based evidence as a form of network representation. This skill will be required for Assignment 3.

* preparation: install Gephi program, familiarize the program (a link to a video tutorial will be available on Canvas before the course) and bring your laptop.

* In Class Activity: Hands-on experience with Gephi.

Session 2. It’s a Small World after all.
Which networks are the best for facilitating rumor spread? How do you measure networks distance? What is random network model (cocktail party model)? We will discuss, and mathematically prove a phenomenon called 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.


P. Dodds, R. Muhamad, D. Watts, An Experimental Study of Search in Global Social Networks, 2003 (reference)

* In Class Activity: Rumor spread in Cocktail party.
Week 4 — Play with Networks

**Session 1. From Small World to Global Hub.**

Six degrees revisited. We will learn a mathematical model, called The Small World model. From there, we will learn how to identify the most important people in a network, so called, a hub. We will learn network structures called Power law networks (or Scale free network).


**Session 2. The Influentials.**

Let’s apply the network concept to explain phenomena in the business world. Network Robustness; Navigating a network; Friendship paradox.
Warning: This schedule is subject to change

**Week 5 — Network Entrepreneurs**

**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? Summary movie for late comers! Bring your Sodas and popcorns!

* In Class Activity: Mid quarter feedback

**Session 2. THINK Lab**

A mysterious group exercise on networks. From explanation to application. Let’s use our theories to real business applications. Capitalize what we have learnt, and unleash your creativity!

* In Class Activity: Breakout room discussion.
Week 6 — Decisions and predictions in a connected world

Session 1. Decision-making with uncertainty.

The relative performance of experts and models. Forecaster behavior and trend extrapolation. Big Data and its uses in modelling. How about predicting the present?


Session 1. 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.

We will learn how to use Google Flu Trends. Using Google Correlate and Google Trends to identify trends and target markets.

Week 7 — Midterm

Session 1. Midterm Exam

An in-class midterm exam that tests your cumulative understanding of course materials.

Session 1. The Wisdom of Crowds.

* In Class Activity: Jelly bean!

**Week 8 — If it takes a village, Build a Village**

**Session 1. Crowdsourcing and Open Innovation**

How to engage crowds for solving complex problems and discovering innovations? The NetFlix Prize, Fold-It, Top Coder, and Upwork. 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. Let’s Go Viral.**

Why do some things take-off while others don’t? Tipping point. How do we create contagions? Passive and active viral features.


Week 9 — Persuasion through connections and crowd intelligence

Session 1. Complex Contagions.

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.


Session 2. Hackathon

Group project sprint with the geniuses from the Genius Bar. We will learn how to interact with data scientists, efficiently, effectively, and intelligently. This is time to use all the network jargons that we have learnt during the Class.

* In Class Activity: Breakout room discussion.
Week 10 — Season Finale

Session 1. SHOWTIME.
Groups will deliver the final presentation for group project. Each group will have 7 minutes (6min + 1min, 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.