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## Description

*Social Dynamics and Network Analytics (Social-DNA)* covers cutting edge research on social media, network analytics, big data, and crowdsourcing, and provides you with the tools to practically apply this research in your own career. By the end of the course you will know how to: measure volume and location of Internet search data to understand and forecast trends; measure volume and sentiment of Twitter conversations; collect network data and create meaningful network visualizations; use the wisdom of crowds, including setting up a prediction market, to create better forecasts; and use Amazon Mechanical Turk for crowdsourcing. *The course counts towards a major in Entrepreneurship and Management and Organizations.*

## Grading

*Assignments* (50%) A series of individual and group assignments will give you experience applying the tools from class. The per assignment weighting is indicated in the assignment summary table at the end of the syllabus. *All assignments are due by Midnight on the day indicated. Late assignments will be penalized 20%. Assignments more than 24 hours late will not be accepted. This policy will be strictly enforced, and absolutely no exceptions will be granted.*

*Attendance and Participation* (10%) Sharing insights and participating in class discussions is integral to success in the course. **If you miss class or are late more than twice, it will lower your class participation grade** (Kellogg provides exceptions for religious holidays, funeral attendance, and student/dependent hospitalization). If you must miss class, you should do the readings, turn in the assignments on time, and arrange to get notes from a friend about what you missed in class.

*Final exam* (40%) A final exam will test your cumulative understanding of the course material. The exam will be available to take from Friday, March 11 to Tuesday, March 15.

## Readings

All readings are available on Canvas. There is no course packet or textbook for the course. Readings marked as (Reference) are optional and repeat material that will be covered in class. They are provided for your reference if you need to go over something again. Readings marked as (Advanced) are more difficult and are provided for those interested in exploring topics in more depth. They are strictly optional.

## 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 should be entirely your own work. If you have any questions regarding how the honor code applies to this course, please ask.

Schedule

Warning: This schedule is subject to change

**Week 1 — Social Dynamics**

*Session 1. Unpredictability and Inequality in a Connected World.*

How social influence creates unpredictable successes, catastrophic failures, and radical transformations. How did Susan Boyle have the sixth bestselling album of 2010? The Music Lab experiment. Market inequality and unpredictability.

Samuel J. Palmisano, “A Note to Fellow CEOs,” *Capitalizing on Complexity: Insights from the Global Chief Executive Officer Study*, IBM, 2010.

Robert M. May, Simon A. Levin, and George Sugihara (2008) “Complex systems: Ecology for bankers,” *Nature* 451, 893-895.

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)

☞ Assignment 1. #socialDNA. Due March 11 at Midnight.

*Session 2. Superstars.*

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

W. B. Arthur, “Increasing Returns and the New World of Business,” *Harvard Business Review*, 1996.

Sushil Bikhchandani, David Hirshleifer, and Ivo Welch, “Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades,” *Journal of Economic Perspectives*, 12(3): 151—170, 1998. (Advanced)

## Week 2 — Predicting the Present

### **Session 1. Predicting the Present and the Measure and React Strategy.**

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.

Kurt Kleiner, “Bogus Grass-roots Politics on Twitter,” *Technology Review*, November 2, 2010.

Duncan J. Watts, “A Twenty-first Century Science,” *Nature*, 445: 489, February, 2007.

### **Session 2. Googling.**

Google Flu Trends. Using Google Correlate and Google Trends to identify trends and target markets.

Hal Varian, “Predicting the Present,” *Google Think Quarterly: The People Issue*.

↪ Assignment 2. *Predicting the Present with Google. January 21 at Midnight.*

## Week 3 — Going Viral

### **Session 1. Going Viral.**

Why do some things take-off while others don't? Modeling contagion and the viral tipping point.

Jill Lepore, “It’s Spreading,” *The New Yorker*, June 1, 2009.

PJ Lamberson, “What it takes to ‘Go Viral’”

<http://social-dynamics.org/what-it-takes-to-go-viral/> (Reference)

M. E. J. Newman. *Networks: An Introduction*. Sections 17.1-17.5. (Advanced)

### **Session 2. Creating Contagions.**

Passive and active viral features. Big seed viral campaigns for subcritical contagions.

Sinan Aral and Dylan Walker, “Creating Social Contagion Through Viral Product Design: A Randomized Trial of Peer Influence in Networks,” *Management Science*, 2011, 57(9): 1623—1639. (Advanced)

## Week 4 — Networks

### **Session 1. Networks.**

Modeling social interactions using networks. What is a network? How do we model networks? How can we visualize networks? Network vocabulary: Nodes, links, homophily, bipartite network, degree, degree distribution.

M. E. J. Newman. *Networks: An Introduction*. Chapter 1 and Sections 6.1 and 6.2. (Reference)

### **Session 2. Viral Networks.**

Which networks are the best for facilitating contagion? How do you measure networks? Network metrics: path length, clustering, and degree distributions. Watts and Strogatz Small-world networks. The viral tipping point for a general degree distribution. Random networks, giant components, and percolation. Video: Six Degrees of Separation.

\* *In Class Activity. The Degree Distribution of the Class.*

## Week 5 — Network Analytics: Mapping Networks

### **Session 1. Mapping Networks.**

An introduction to Gephi and mapping networks.

\* *In Class Activity. Mapping Your Own LinkedIn Network.*

PJ Lamberson, “Visualizing Your Own Facebook Network with Gephi,”  
<http://social-dynamics.org/gephi-facebook/> (Reference)

PJ Lamberson, “Gephi FAQs (and answers!),”  
<http://social-dynamics.org/gephi-faq/> (Reference)

☞ Assignment 3. *Visualizing your LinkedIn network. Due February 4 at Midnight.*

### **Session 2. Network Data.**

What is network data? What data should you collect? How do you collect it?

\* *In Class Activity. Mapping the Social Network of the Class.*

☞ Assignment 4. *Collecting and mapping network data. Part 1 (small data — individual) due February 15 at Midnight. Part 2 (big data — group) due February 23 at Midnight.*

## Week 6 — Network Analytics: Influentials

### **Session 1. Identifying Influentials.**

Six degrees revisited. The influentials hypothesis. Identifying the most important people in a network. Degree centrality and eigenvector centrality.

Malcolm Gladwell, “Six Degrees of Lois Weisberg,” *The New Yorker*, January 11, 1999.

David Easley and Jon Kleinberg. *Networks, Crowds, and Markets*, Chapter 14: “Link Analysis and Web Search.” (Advanced/Reference)

### **Session 2. The Myth of the Influential.**

Tracking cascades on Twitter. Influencer ROI. The Fundamental Attribution Error. Referral incentives versus seeding strategies.

Clive Thompson, “Is the Tipping Point Toast?” *Fast Company*, January 28, 2008.

Eytan Bakshy, Jake Hofman, Winter Mason, and Duncan Watts, “Everyone’s an Influencer” Quantifying Influence on Twitter,” *Proceedings of the fourth ACM international conference on Web search and data mining*. ACM, 2011. (Advanced)

Sinan Aral, Lev Muchnik, Arun Sundararajan, “Engineering Social Contagions: Optimal Network Seeding and Incentive Strategies,” <http://ssrn.com/abstract=1770982>.

## Week 7 — Complex Contagions and Communities

### **Session 1. Complex Contagions.**

Threshold contagion, critical mass, and the cascade window.

Damon Centola and Michael Macy, “Complex contagions and the weakness of long ties,” *American Journal of Sociology*, 113(3): 702–34, 2007. (Advanced)

### **Session 2. Network Communities and Social Segmentation.**

Modularity and community detection. Identifying target markets and tracking cascades with Twitter and NodeXL.

PJ Lamberson, “Identifying Network Communities.” (Reference)

✎ Assignment 5. *Identifying influentials and influenceables with Twitter. Due March 3 at Midnight.*

## Week 8 — Crowdsourcing

### **Session 1. Crowdsourcing**

How to tell if a model was photoshopped. Training computers with crowds. Processing unstructured data with Amazon Mechanical Turk.

Jeff Howe, “The Rise of Crowdsourcing,” *Wired*, June, 2006.

### **Session 2. Network Presentations.**

A selection of groups will present the networks that they collected in Assignment 4.

## Week 9 — Crowd Forecasting

### **Session 1. Forecasting with Big Data, Simple Models, and Crowds.**

The relative performance of experts and models. Forecaster behavior and trend extrapolation. The averaging principle and the wisdom of crowds. The relative benefits of accuracy and diversity in forecasting (The Diversity Prediction Theorem).

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

Robyn M. Dawes, David Faust, and Paul E. Meehl, “Clinical Versus Actuarial Judgment,” *Science*, 1989, 243(4899): 1668—1674. (Advanced)

David Easley and Jon Kleinberg. *Networks, Crowds, and Markets*. Chapter 22. (Reference)

### **Session 2. Prediction Markets.**

Prediction markets and how markets reveal and aggregate information. Prediction markets in theory and practice. The Iowa Elections Market, prediction markets at Google and HP. When to use experts, models, or crowds.

Sharad Goel, Daniel M. Reeves, Duncan J. Watts, and David M. Pennock, “Prediction Without Markets,” 2010, *Proceedings of the 11th ACM Conference on Electronic Commerce*, 357—366. (Advanced)

## Week 10 — Open Innovation

### **Session 1. Problem Solving with Crowds.**

Using crowds for solving complex problems and discovering innovations. The Netflix Prize, Fold-It, Top Coder.

Eliot Van Buskirk, “How the Netflix Prize Was Won,” *Wired*, September 22, 2009.

Eric Siegel “Casual Rocket Scientists: An Interview with a Layman Leading the Netflix Prize, Martin Chabbert,” *Predictive Analytics*, September, 2009.

### **Session 2. Open Innovation.**

When and why diverse groups outperform high ability groups.

Scott E. Page, “Making the Difference: Applying a Logic of Diversity,” *The Academy of Management Perspectives*, 21(4): 6-20, 2007.

K.R. Lakhani and J.A. Panetta, “The Principles of Distributed Innovation,” *Innovations: Technology, Governance, Globalization* 2, no. 3 (2007): 97-112.

Eric Bonabeau, “Decisions 2.0: The Power of Collective Intelligence,” *MIT Sloan Management Review*, Winter 2009, 50(2): 45—52.

## Summary of Assignments

*All assignments are due by Midnight on the day indicated.*

		Title	Distributed	Due	Percentage
1	<i>Individual</i>	<i>#socialDNA</i>	January 5	March 11	2%
2	<i>Individual</i>	<i>Predicting the present with Google</i>	January 15	January 21	8%
3	<i>Individual</i>	<i>Visualizing your LinkedIn network</i>	February 2	February 4	8%
4.1	<i>Individual</i>	<i>Collecting and mapping network data</i>	February 5	February 15	8%
4.2	<i>Group</i>	<i>Collecting and mapping network data</i>	February 5	February 23	12%
5	<i>Group</i>	<i>Identifying target markets and influentials with Twitter</i>	February 19	March 3	12%