McCormick
Northwestern Engineering

Northwestern University
School of Communication

IEMS 441-0-20 / COMM ST 525-022 / MTS 525-0-20
Social Network Analysis
Winter 2011

Wednesdays, 6:00pm - 9:00pm
Frances Searle Building, Room 2-370

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Introduction

Networks have come to play an increasingly important role in our understanding of a wide array of human behavior. In communication and the organizational sciences, extraordinary developments in computing and telecommunications have engendered new organizational forms based on fluid, dynamic networks. These new network forms of self-organizing are constantly evolving in dynamic communities as new network links are created, and dysfunctional ones dissolved. While many writers assert that the capability to nurture networks will differentiate dominant 21st century organizations, little is known about how this important new organizational form emerges and evolves.

This seminar is intended to review theoretical, conceptual, and analytic issues associated with network perspectives on communicating and organizing. The course will review scholarship on the science of networks in communication, computer science, economics, engineering, organizational science, life sciences, physical sciences, political science, psychology, and sociology, in order to take an in-depth look at theories, methods, and tools to examine the structure and dynamics of networks.

As with most graduate seminars, the majority of class time will be spent discussing the assigned readings. A series of laboratory exercises will provide experience with computer-based network analysis, modeling and visualization tools. Students will write a term paper advancing some theoretical, methodological or computational aspect of network science.

This course will be offered via videoconference by Northwestern University and is open to all students at CIC universities (Academic counterpart to the Big Ten) via CourseShare. All aspects of the class including lectures, discussions, and lab assignments will be coordinated across the schools.

Prerequisites

The course has no formal pre-requisites but will be most beneficial to students who have had an introductory statistics course covering descriptives for central tendencies and dispersion, correlation, sampling, and significance testing.

Software tools

The following software tools will be introduced throughout the course. They are freely available or will be made available to you for free. Unless noted, they will only run on a Windows machine. The software for the lab assignments (UCINET and NodeXL) will be installed in Tech C135 (Undergraduate PC Computing Laboratory). You can also download UCINET and NodeXL at:

- **NetLogo**: Wilensky, U. (2007). NetLogo. Center for Connected Learning and Computer-Based Modeling. Northwestern University, Evanston, IL. http://ccl.northwestern.edu/netlogo/
- **NodeXL**: Smith, M., Milic-Frayling, N., Shneiderman, B., Mendes Rodrigues, E., Leskovec, J., Dunne, C., (2010). NodeXL: a free and open network overview, discovery and exploration add-in for Excel 2007/2010. Social Media Research Foundation. http://nodexl.codeplex.com/
- **Pajek**: Batagelj, V. & Mrvar, A. (2010). Pajek – Program for Large Network Analysis. University of Ljubljana. http://vlado.fmf.uni-lj.si/pub/networks/pajek/
- **PNet:** Wang, P. Robins, G. & Pattison, P. (2007). Software that includes procedures for MCMCMLE for exponential random graph models. University of Melbourne, Australia. http://www.sna.unimelb.edu.au/pnet/pnet.html
- **SIENA:** Snijders, T.A.B., Steglich, C. E. G., Schweinberger, M. & Huisman, M. (2007). SIENA: Simulation Investigation for Empirical Network Analysis. University of Groningen: ICS / Department of Sociology; University of Oxford: Department of Statistics, http://stat.gamma.rug.nl/siena.html
- **StatNet:** Handcock, M. S., Hunter, D. R., Butts, C. T., Goodreau, S. M., and Morris, M. (2007) Statnet: An R package for the Statistical Modeling of Social Networks. Funding support from NIH grants R01DA012831 and R01HD041877. http://www.csde.washington.edu/statnet
- **UCINET:** Borgatti, S., Everett, M., & Freeman, L. (2005) UCINET 6 for Windows software for social network analysis. Harvard, MA: Analytic Technologies. http://www.analytictech.com

Course Readings

Most readings will be posted on the Blackboard website for downloading under "Course Documents. Some of the readings are password protected. Professor Contractor will share the password that unlocks all the readings during lecture. Recurring readings will be taken from Easley & Kleinberg (E&K), Hanneman & Riddle (H&R), Wasserman & Faust (W&F), and Monge & Contractor (M&C). Students are encouraged but not expected to understand the mathematical formulae and proofs when encountered in any of these chapters.

- Easley, D. & Kleinberg, J. (2010). *Networks, Crowds, and Markets: Reasoning About a Highly Connected World*. New York: Cambridge University Press. http://www.cs.cornell.edu/home/kleinber/networks-book/
- Hanneman, R. A. & Riddle, M. (2005). *Introduction to social network methods.* Riverside, CA: University of California, Riverside. http://www.faculty.ucr.edu/~hanneman/nettext/
- Wasserman, S. & Faust, K. (1994). *Social network analysis: Methods and applications*. New York: Cambridge University Press.
- Monge, P. R. & Contractor, N. S. (2003). *Theories of communication networks*. New York: Oxford University Press. http://nosh.northwestern.edu/vita.html

Please plan to purchase the Monge & Contractor, Easley & Kleinberg, and Wasserman & Faust texts from your preferred vendor. Any other readings that cannot be acquired electronically will be distributed in hard copy during lecture the week beforehand.

Expectations

This course will also make extensive use of the Blackboard site for posting announcements, readings, and submitting assignments. Students are expected to check their email and the class Blackboard site regularly and notify the instructors if they are having any trouble using Blackboard. This syllabus (and any deadlines on it) is preliminary and subject to change via announcements on Blackboard. If there are any discrepancies between announcements made on Blackboard and this syllabus, follow the most recent Blackboard instructions.

Participation and preparation are essential to success in this course. Barring illness, academic obligations, or emergencies, attendance is required at every lecture. Students will be expected to have completed all the assigned weekly readings before class and be prepared to discuss the readings in depth. We welcome and encourage students to share best practices and collaborate on the lab assignments. However, students are expected to complete and submit their own lab assignments. See the statement on academic integrity below.

Evaluation

There are three requirements for the course: four network labs, one term paper, and online participation.

- **Network labs:** The four network labs will require you to conduct computational analyses on network data. Equal emphasis will be given to conducting the analysis and interpreting (and reporting) the results. The lab assignments due dates are shown below. You are free to revise these reports as often as you wish before March 16 at 9pm for full credit. (40% of final grade, 10% per lab)
    - **Lab 1**: Density & Centrality – Due January 26
    - **Lab 2**: QAP, CSS, Structural Equivalence – Due February 2
    - **Lab 3**: p*/ERGM – Due February 9
    - **Lab 4**: SIENA – Due February 16

- **Term paper:** The term paper should develop or elaborate a theory, method or application of your choice, explicitly incorporating a network perspective. A 500 word abstract/proposal is due February 23 by 9pm. It should review the relevant research literature and include a research design that tests network hypotheses or makes novel methodological or computational contributions. Papers need to be prepared according to APA 5 or the guidelines for a specific journal of your choosing. You are free to use this as an opportunity to develop a research proposal, working/conference paper, review and synthesis, or to develop ideas you have worked on in other courses. The term paper is due on March 16 by 9pm. (33% of final grade)
- **Online participation:** The online participation is an opportunity for you to provide substantive reactions to the readings for the week. These reactions should be posted online no later than 24 hours prior to the start of class (that is, by Tuesdays at 6pm CST). The reactions could include key takeaways from, extensions of, challenges to, and/or disagreements with the ideas developed in the readings. Your contribution will be evaluated on the quality of the reactions and their coverage of the breadth of readings for each session. (27% of final grade, 3% per week)

Students with Disabilities

If you require appropriate academic accommodations as a result of any disability, please make any requests during before the second lecture of the quarter. You are urged to register with Services for Students with Disabilities (SSD) for disability verification and for determination of reasonable academic accommodations. For more information, visit http://www.northwestern.edu/disability/.

Academic Integrity

Students are expected to comply with University regulations regarding academic integrity. Academic dishonesty includes, but is not limited to, plagiarism on submitted assignments such as taking material from readings without citation or copying another student's paper.

Failure to maintain academic integrity on an assignment will result in loss of credit for that assignment – at a minimum. Other penalties and sanctions may also apply and will be referred to the administration of either SoC or McCormick as is necessary. If you are in any doubt about what constitutes academic dishonesty, speak with an instructor before an assignment is due, or examine the appropriate University websites. Guidelines for determining academic integrity and procedures followed in a suspected incident of academic dishonesty are detailed on the following websites:

http://www.communication.northwestern.edu/files/ProceduresAllegedAcademicDishonesty.pdf

http://www.mccormick.northwestern.edu/undergraduate/academic_integrity.php

Course Outline

Week 1, January 5: Introduction & Administrivia

E&K 1; W&F 1; M&C 1

Borgatti, S., Mehra, A., Brass, D., & Labianca, G. (2009). "Network Analysis in the Social Sciences." *Science*, Vol. 323: 892-895.

Wellman, Barry and S.D. Berkowitz (Eds.). 1988. "Structural Analysis: From Method and Metaphor to Theory and Substance." Chapter 2 (pp. 19-61) in *Social Structures: A Network Approach*. Cambridge: Cambridge University Press.

Optional:
Emirbayer, M. & Goodwin, J. (1994). "Network analysis, culture, and the problem of agency." *American Journal of Sociology*, 99(6): 1411-1454. – **Critique.**

Emirbayer, M. (1997). "Manifesto for a Relational Sociology." *American Journal of Sociology*, 103(2): 281-317. – **Critique.**

Powell, W. (1990). "Neither Market Nor Hierarchy: Network Forms of Organization." *Research in Organizational Behavior*, 12: 295-336. **– Influential in organizational/management literature.**

Vespignani, A. (2009). "Predicting the Behavior of Techno-Social Systems." *Science*, 325: 425-428.

Week 2, January 12: Network types and local properties

E&K 2; W&F 2-4; M&C 2 (pp. 29-44); H&R 1-3, 5

Butts, C. (2009). "Revisiting the Foundations of Network Analysis." *Science*, 325: 414-416.

Optional:
H&R 16-17 – Using UCINet for multiplex & bipartite data

W&F 8 – Bipartite data

Granovetter, M. (1977). "The Strength of Weak Ties." *American Journal of Sociology,* 78: 1360-1380. – ***The*** **classic.**

Breiger, R.L. (1974). "The Duality of Persons and Groups." *Social Forces,* 53: 181-190.

Borgatti, S.P. & Everett, M. (1997). "Network Analysis of 2-Mode Data." *Social Networks,* 19: 243-269.

Faust, K. (1997). "Centrality in Affiliation Networks." *Social Networks,* 19: 157-191.

Ibarra, H. (1993). “Network Centrality. Power, and Innovation Involvement: Determinants of Technical and Administrative Roles.” *Academy of Management Journal*, 36(3), 471-501.

Week 3, January 19: Network metrics

H&R 6-13; W&F 5-7; E&K 13, 14, 18, 20

Wellman, B. (2001). “Computer Networks as Social Networks.” *Science*, 293: 2031-2034.

Borgatti, S. & Everett, M. (1992). "Notions of Position in Social Network Analysis.” *Sociological Methodology*, pp. 1-35.

LAB 1 ASSIGNED

Optional:
Milgram, S. "The Small World Problem." *Psychology Today* 1: 62-67. – **A classic.**

Barabasi, A. & Albert, R. (1999). “Emergence of Scaling in Random Networks.” *Science*, 286: 509-512. – **Preferential attachment mechanism for generating scale free networks.**

Watts, D. & Strogatz, S. (1998). “Collective dynamics of ‘small-world’ networks.” *Nature*, 393: 440-442. – **Rewiring model for generating clustering & small world properties.**

W&F 9, 12 – **More detail on structural, regular, & automorphic equivalence**

Newman, M. E. J. & Girvan. M. (2004). “Finding and evaluating community structure in networks.” *Physical Review E*, 69(2): 26113.

Adamic, L. A. & Glance, N. (2005). “The Political Blogosphere and the 2004 U.S. Election: Divided They Blog.” *KDD*, Chicago, IL.

Week 4, January 26: Data collection

Marsden, P.V. (1990). "Network Data and Measurement." *Annual Review of Sociology*, 16: 435-463.

Killworth, P.D. & Bernard, H.R. (1976). "Informant Accuracy in Social Network Data." *Human Organization,* 35: 269-286.

Krackhardt, D. (1987). “Cognitive social structures.” *Social Networks*, 9: 109-134.

Krackhardt, D. (1987). "QAP Partialling as a Test of Spuriousness." *Social Networks,* 9: 171-86.

Eagle, N., Macy, M, & Claxton, R. (2010). “Network Diversity and Economic Development.” *Science*, 328: 1029-1031.

LAB 1 DUE; LAB 2 ASSIGNED

Optional:

Granovetter, M. (1976). "Network Sampling: Some First Steps." *American Journal of Sociology*, 83: 1287-1303.

Campbell, K. E. & Lee, B. A. (1991). "Name generators in surveys of personal networks." *Social Networks*, 13: 203-221.

Kumbasser, E., Romner, K. & Batchelder, W. (1994). "Systematic Biases in Social Perception." *American Journal of Sociology,* 100, 2: 477-505.

Eagle, N., Pentland, A.S., & Lazer, D. (2009). "Inferring friendship network structure by using mobile phone data." *PNAS*, 106(36): 15274-15278.

Pentland, A.S. (2007). "Automatic mapping and modeling of human networks." *Physica A*, 378: 59-67.

Lazer, D., Pentland, A., *et al*. (2009). "Computational Social Science." *Science*, 323: 721-723.

Week 5, February 2: Triadic census, p*/ERGM, and MTML

M&C 2 (pp. 45-77), 10; W&F 14

Milo, R, Itzkovitz, S., *et al.* (2004). "Superfamilies of Evolved and Designed Networks." *Science*, 303: 1538-1542.

Contractor, N., Wasserman, S., & Faust, K. (2006). "Testing multi-theoretical multilevel hypotheses about organizational networks: An analytic framework and empirical example." *Academy of Management Review*, 31: 681-703.

Robins, G., Pattison, P. & Woolcock, J. (2005). "Small and other worlds: Global network structures from local processes." *American Journal of Sociology, 110*(4): 894-936.

Robins, G., Pattison, P., Kalish, Y., & Lusher, D. (2007). "An introduction to exponential random graph (p*) models for social networks." *Social Networks*, 29(2): 173-191.

Optional reading:

Holland, P. & Leinhardt, S. (1970). "A Method for Detecting Structure in Sociometric Data." *American Journal of Sociology,* 76(3): 492-513.

Milo, R., Shen-Orr, S., Itzkovitz, S., Kashtan, N., Chklovskii, D., Alon, U. (2002) "Network Motifs: Simple Building Blocks of Complex Networks." *Science*, 298: 824-827.

Artzy-Randrup, Y. Fleishman, S., Ben-Tal, N., & Tone, L. (2004). "Comment on 'Network Motifs' and 'Superfamilies.'" *Science*, 305: 1107c.

Milo, R., Itzkovitz, S., Kashtan, N., Levitt, R., & Alon, U. (2004). "Response to Comment on 'Network Motifs'" *Science*, 305: 1007d.

Goodreau, S. M. (2007). "Advances in exponential random graph (*p**) models applied to a large social network." *Social Networks,* 28: 231-248.

Goodreau, S.M., Kitts, J.A., and Morris, M. (2009). "Birds of a Feather, Or Friend of a Friend?: Using Exponential Random Graph Models to Investigate Adolescent Social Networks." *Demography* 46(1):103-125.

Robins, G., Snijders, T., Wang, P., Handcock, M., & Pattison, P. (2007). Recent developments in exponential random graph (*p**) models for social networks. *Social Networks,* 29: 192-215.

Rank, O. N., Robins, G. L., & Pattison, P. E. (2009). Structural logic of intraorganizational networks. *Organization Science*, 21(3): 745-764.

Week 6, February 9: Computational models of network dynamics

M&C 4

Guimera, R., Uzzi, B., Spiro, J., Amaral, L.A.N. (2005). "Team Assembly Mechanisms Determine Collaboration Network Structure and Team Performance." *Science*, 308: 697-702.

Pearson, M., Steglich, C., & Snijders, T. (2006). "Homophily and assimilation among sport-active adolescent substance users." *Connections*, 27(1): 47-63.

Steglich, C., Snijders, T., West, P. (2006). "Applying SIENA: An illustrative analysis of the co-evolution of adolescents' friendship networks, taste in music, and alcohol consumption." *Methodology*, 2(1): 48-56.

Palazzolo, E. T., Serb, D., She, Y., Su, C., & Contractor, N. S. (2006). "Co-evolution of communication and knowledge networks as Transactive Memory systems: Using computational models for theoretical integration and extensions." *Communication Theory*, 16: 223-250.

Macy, M. W. & Willer, R. (2002). "From factors to actors: Computational sociology and agent-based modeling." *Annual Review of Sociology*, 28(1): 143-166.

LAB 2 DUE; LAB 3 ASSIGNED

Optional reading:

Cederman, L.-E. (2005). "Computational Models of Social Forms: Advancing Generative Process Theory." *American Journal of Sociology,* 110(4)*:* 864-893.

McPherson, J.M., Popielarz, P.A., & Drobnic, S. (1992). "Social Networks and Organizations Dynamics." *American Sociological Review,* 57: 153-170.

Burt, R.S. (1987). "Social Contagion and Innovation: Cohesion Versus Structural Equivalence." *American Journal of Sociology,* 92: 1287-1335.

Doreian, P. (2001). "Causality in Social Network Analysis." *Sociological Methods and Research*, 30(1), 81-114. – **Critique of causality.**

Week 7, February 16: Network Optimization Models

Hillier, F. & Lieberman, G. (2004). Network optimization models. In *Introduction to Operations Research (7th Ed.).* Boston: McGraw Hill.

Newman, M.E.J. (2010). "Chapter 14: Network Optimization Models." *Networks: An Introduction*: 541-551. Oxford University Press.

LAB 3 DUE; LAB 4 ASSIGNED; FINAL PAPER PROPOSAL DUE NEXT WEEK

Week 8, February 23: Contagion, Balance, Self-Interest, & Collective Interest

M&C 5,6; E&K 3, 5, 16, 17, 19

Burt, R. S. (2005). "The Social Capital of Structural Holes." Chapter 1 in *Brokerage and Closure: An Introduction to Social Capital*, pp. 10-57.

Macy, M. (1991). "Chains of Cooperation: Threshold Effects in Collective Action." *American Sociological Review* 56: 730-747.

Armbruster, B., Enns, E.A., Lucas, A.M. (2011). "Modeling Disease Spread and Interventions."

FINAL PAPER PROPOSAL DUE

Optional:

Uzzi, B. (1997). "Social structure and competition in interfirm networks: The paradox of embeddedness." *Administrative Science Quarterly*, 42: 35-67.

Bearman, P., Moody, J., & Stovel, K. (2004). "Chains of affection: The structure of adolescent romantic and sexual networks." *American Journal of Sociology*, 110(1): 44-91.

Feld, Scott L. (1981). "The Focused Organization of Social Ties." *American Journal of Sociology,* 86, 5: 1015-1035.

Diani, M. (2003). "Introduction: Social Movements, contentious actions, and social networks: From metaphor to substance?" In M. Diani & D. McAdam (Eds.), *Social Movement and Networks: Relational Approaches to Collective Action* (pp. 1-20). Oxford, UK: Oxford University Press.

Passy, F. (2003). “Social networks matter. But how?” In M. Diani & D. McAdam (Eds.), *Social Movement and Networks: Relational Approaches to Collective Action* (pp. 21-48). Oxford, UK: Oxford University Press.

Reagans, R. and B. McEvily (2003). “Network Structure and Knowledge Transfer: The Effects of Cohesion and Range.” *Administrative Science Quarterly,* 48(2): 240-267.

Leonardi, P. M. (2007). “Activating the Informational Capabilities of Information Technology for Organizational Change.” *Organization Science,* 18(5): 813-831.

Gould, R. (1989). "Power and Social Structure in Community Elites." *Social Forces,* 68: 531-552.

Marwell, G., P. E. Oliver, *et al*. (1988). “Social Networks and Collective Action: A Theory of the Critical Mass.” III. *American Journal of Sociology*, 94(3): 502-534.

Week 9, March 2: Homophily, Proximity, & Social Support

NICO/SONIC Conference on Complexity, March 6 & 7

M&C 8; E&K 4

Ruef, M., Aldrich, H. A., & Carter, N. M. (2003). “The structure of founding teams: Homophily, strong ties, and isolation among U.S. entrepreneurs.” *American Sociological Review*, *68*: 195-222.

Bell, G. G. & A. Zaheer, A. (2007). “Geography, Networks, and Knowledge Flow.” *Organization Science*, 18: 955-972.

Hampton, K.N., Livio, O., & Sessions, L. (2010). “The Social Life of Wireless Urban Spaces: Internet Use, Social Networks, and the Public Realm.” *Journal of Communication*, 60(4): 701-722.

Chua, R. Y. J., Ingram, P., & Morris, M. W. (2008). “From the head and the heart: Locating cognition- and affect-based trust in managers' professional networks.” *Academy of Management Journal*, 51: 436-452.

Optional reading:

Kandel, D. (1978). "Homophily, Selection, and Socialization in Adolescent Friendships." *American Journal of Sociology* 84, 2: 427-436.

McPherson, M., Smith-Lovin, L., Cook, J.M. (2001) “Birds of a Feather: Homophily in Social Networks.” *Annual Review of Sociology*, 27: 415-444.

McDonald, M. L., Khanna, P., & Westphal, J. D. (2008). “Getting them to think outside the circle: Corporate governance, CEO’s external advice networks, and firm performance.” *Academy of Management Journal,* 51: 453-475.

Feld, S. (1991). "Why Your Friends Have More Friends than You Do." *American Journal of Sociology,* 96:1464-1477.

Week 10, March 9: Exchange & Dependency

M&C 7

McGinn, K.L., & Keros, A.T. (2002). "Improvisation and the logic of exchange in socially embedded transactions." *Administrative Science Quarterly,* 47: 442-473.

Gulati, R., & Higgins, M.C. (2003). "Which ties matter when? The contingent effects of interorganizational partnerships on IPO success." *Strategic Management Journal*, 24(2): 127-144

Baker, W. & Faulkner, R. (1991). "Role as Resource in the Hollywood Film Industry."*American Journal of Sociology,* 97: 279-309.

Uzzi, B. & Spiro, J. (2005). "Collaboration and Creativity: The Small World Problem." *American Journal of Sociology*, 111: 447-504.

Optional reading:

Padgett, J.F. & Ansell, C. 1993. "Robust Action and the Rise of the Medici, 1400-1434." *American Journal of Sociology*, 93, 6: 1259-1319.

Week 11, March 16: NO CLASS

FINAL PAPER DUE

Other syllabai:

- Adamic, L. "SI508, SI708, CS608: Networks." University of Michigan. http://www-personal.umich.edu/~ladamic/courses/networks/si508si708cs608/index.html
- Brockmann, D. "ESAM 495: Dynamical Processes on Networks." Northwestern University. http://web.me.com/zwergen/S10-495/Home.html
- Hampton, K. "Comm 481: Social Networks." University of Pennsylvania. http://www.mysocialnetwork.net/classes/comm481.html
- Hampton, K. "Comm 555: Social Networks." University of Pennsylvania. http://faculty.maxwell.syr.edu/iamergel/files/SocialNetworks-grad-08.pdf
- Howard, P. "Network Organization, New Media, and Collective Action Problems." University of Washington. http://faculty.washington.edu/pnhoward/teaching/netorg/netorg.html
- Kearns, M. "CIS112: Networked Life." University of Pennsylvania. http://www.cis.upenn.edu/~mkearns/teaching/NetworkedLife/
- Leskovec, J. "CS224W: Social and Information Network Analysis." Stanford University. http://www.stanford.edu/class/cs224w/schedule.html
- Matei, S.A. "Comm 632: From Mass Media to Social Media Research: Theoretical and Methodological Trends." http://matei.org/ithink/2010/08/10/mass-to-social-media/
- McFarland, D. "Education 316/Sociology369: Network Analysis of Formal and Informal Organizations." Stanford University. http://www.stanford.edu/~dmcfarla/courses/net-anl-syl.htm
- Mizruchi, M. "Sociology 495-3: Social Networks." University of Michigan. http://www.hks.harvard.edu/netgov/files/snasyllabi/Mark_Mizruchi_Social_Networks.pdf
- Newman, M. "Complex Systems 535/Physics 508: Network Theory." University of Michigan. http://www-personal.umich.edu/~mejn/courses/2010/cscs535/index.html
- Raab, J. "Organization Studies 440804: Interorganizational Relationships." Tillburg University. http://www.hks.harvard.edu/netgov/files/snasyllabi/Interorganizational_Relationships.pdf
- Salganik, M. "Sociology 544: Social Network Analysis." Princeton University. http://www.princeton.edu/~mjs3/soc544_fa10.shtml
- Salganik, M. "Sociology 596: Web-based Social Research." Princeton University. http://www.princeton.edu/~mjs3/soc596_fa10.shtml
- Watts, D. "Sociology 3233: Network Analysis." Columbia University. http://www.columbia.edu/itc/sociology/watts/w3233/client_edit/course_syllabus2.html
- Wheat, C. "15.992: Networks & Organizations." Massachusetts Institute of Technology. http://cwheat.scripts.mit.edu/teaching/15.992/readings.php

Other resources:

- Academic organizations and conferences
  - Sunbelt Conference, International Network for Social Network Analysis (INSNA). http://www.insna.org/index.html
    - INSNA SOCNET listserv. http://www.insna.org/pubs/socnet.html
  - Web Science Trust. http://webscience.org/home.html
  - Communication and Technology Division, Organizational Communication Division. International Communication Association (ICA). http://www.icahdq.org
  - Organizational Behavior Division, Organizational Communication and Information Systems Division, Academy of Management (AoM). http://www.aom.pace.edu
  - Conference on Human-Computer Interaction (CHI), Conference on Computer-Supported Cooperative Work (CSCW), Conference on Supporting Group Work (GROUP), Association for Computing Machinery (ACM). http://www.acm.org
  - Conference on Social Computing (SocialComp), World Wide Web Conference (WWW), Hawaii Conference on System Sciences (HICSS), Conference on Advances in Social Networking and Mining (ASONAM), IEEE Computer Society. http://www.computer.org
  - Conference on Network Science (NetSci). http://netsci2011.net/
  - Conference on Weblogs and Social Media (ICWSM), Conference on Artificial Intelligence (AAAI), Knowledge Discovery and Data Mining (KDD), Association for Advancement of Artificial Intelligence (AAAI). http://www.aaai.org/
- Data sets
  - McFarland, D. "Social Network Analysis Labs in R and SoNIA." Stanford University. http://sna.stanford.edu/rlabs.php
  - Newman, M. "Network data." University of Michigan. http://www-personal.umich.edu/~mejn/netdata/
  - Leskovec, J. "Large Network Dataset Collection." Stanford University. http://snap.stanford.edu/data/
  - Batagelj, V. & Mrvar, A. "Pajek datasets." University of Ljubljana. http://vlado.fmf.uni-lj.si/pub/networks/data/
  - Börner, K., *et al.* "InfoVis Cyberinfrastructure Databases." Indiana University. http://iv.slis.indiana.edu/db/index.html
- People and Research groups
  - Northwestern
    - Science of Networks in Communities (SONIC). Noshir Contractor. http://sonic.northwestern.edu
    - Northwestern Institute on Complex Systems. Daniel Diermeier, Brian Uzzi, Kevin Lynch, William Kath, *et al.* http://www.northwestern.edu/nico/
    - Amaral Lab. Luis Amaral. http://amaral.northwestern.edu
    - Center for Connected Learning. Uri Wilensky. http://www.ccl.sesp.northwestern.edu
    - Research on Complex Systems. Dirk Brockmann. http://rocs.northwestern.edu
  - Elsewhere
    - Annenberg Networks Network. Peter Monge, University of Southern California. http://ann.uscannenberg.org/
    - Program for Network Governance. David Lazer, Harvard University. http://www.hks.harvard.edu/netgov/html/index.htm
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