All programmes
Academic year 2023–2024

Social Networks Theories and Methods
MINT311 – Fall – 6 ECTS

Course Description
Networks represent the structure of how entities are related. Researchers of politics, sociology, economics, history, and law employ networks to analyse and model social and political structures and the agency of actors to construct and change them. This course aims to enable students to be discriminating consumers of network literature and intermediate users of network techniques. We will learn core theories, measures, and models used in social and political networks, and discuss how networks are structured, change, and affect the entities they connect. Sessions match theory with practical exercises using R. Though some introductory exercises are provided, familiarity with R and introductory statistics is highly recommended. If in doubt, please contact the course instructor.

PROFESSOR

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Syllabus

Course Aims

By the end of the course, you will be a discriminating consumer of network literature from across the social sciences, have a strong overview of the theories, measures and models used, and be a reasonably advanced user of network techniques to ask and answer key questions.

Course Structure

This survey course consists of two main sections. The first half of the course describes and analyses social networks, or what is called "network analysis". The second half builds on this by exploring how we can explain network structures or other aspects of socio-political life and investigate relational mechanisms using networks, or what is called "network modelling". The main lecture programme covers central concepts in the network literature and discusses how these concepts are theoretically motivated, methodologically operationalized, and applied. Various in-class exercises encourage familiarity and reflection on these concepts. Practical tutorials in R will offer hands-on opportunities to use the various concepts and measures taught (so do bring your laptops).

Course Materials

There is no required textbook for this course, however many of the books and journals contained in the remainder of the syllabus also hold additional or alternative readings that may be useful for deepening your understanding of network theory and/or methods in preparation for your presentations, the exam, and/or your own research. Please approach me during my office hours if there is a particular theme or topic you would like to learn more about. For a fairly comprehensive overview of current topics, see:

- Scott, John, and Peter Carrington. 2011. *The SAGE Handbook of Social Network Analysis*. London: SAGE Publications.
- McLevey, John, John Scott, and Peter Carrington. 2023. *The SAGE Handbook of Social Network Analysis*. 2nd Edition. London: SAGE Publications.

For more recent applications, especially of multimodal network analysis, to a range of political networks, please see:

- Knoke, David, Mario Diani, James Hollway, and Dimitrios Christopoulos. 2021. *Multimodal Political Networks*. Cambridge: Cambridge University Press.

In terms of software, we will be using the free statistical software R. If you haven't used R before, we will start from the basics, however you should plan to be taking some additional class in R simultaneously if not before the start of class. We will begin in the first lesson with getting acquainted with the software, so please make sure you bring your laptop with you, ideally with R and RStudio already installed. For general support with the practical component of the course, see:

- Kolaczyk, Eric, and Gábor Csárdi. 2014. *Statistical Analysis of Network Data with R*. New York: Springer.

The main packages used in this course are {manynet} and {migraph}. Downloading {migraph} from CRAN using `install.packages(``migraph'')` will install both packages and all dependencies.

Course Evaluation

Evaluation for the course consists of four parts:

Tutorials and Participation (20%) Students will complete the supplied tutorials and exercises and share their questions, issues, and solutions on Slack. Since this is about learning, the grade will not follow performance in the tutorials, but engagement on Slack in terms of both questions and answers. Note that a nonlinear grading scheme encourages all contributions.

Report (30%) At the end of the network analysis section, an assignment will be given that requires students to practice applying the theory and methods learned to new datasets. Datasets and further instructions will be provided when the report assignment is issued.

Post(er)s (50%) At the end of the course, students submit an executable Rmarkdown document or URL to a blog that summarises the results of analysing and modelling a relational dataset of the student's choice. You are encouraged to begin identifying a relevant dataset/research question early. We will provide consultancy sessions to support your projects.

Course Policies

Auditing is not possible in this course at this time.

Plagiarism means presenting another's thoughts, ideas, or expressions as one's own, and is a breach of academic integrity that is not tolerated at the Graduate Institute. Students who present others' work as their own may receive a 0. Please cite appropriately and contact the TA if you have any doubts.

Course Schedule

Week 1   (20 Sep): Networks, or How to talk networks

- Lazer, David (2011). "Networks in political science: Back to the future". *PS: Political Science and Politics*, 44(01), 61–68.
- Prell, Christina (2012). "A brief history of social network analysis". In *Social network analysis: History, theory and methodology* (19–52). SAGE.
- Brandes, Ulrik, Robins, Garry, McCranie, Ann, & Wasserman, Stanley (2013). "What is network science?". *Network Science*, 1(1), 1–15.

Week 2   (27 Sep): Relations, or How to find networks

- Mische, Ann (2011). "Relational sociology, culture, and agency". In P. Carrington & J. Scott (Eds.), *The sage handbook of social network analysis* (80–97). SAGE.
- Robins, Garry (2015). "Thinking about networks: Research questions and study design". In *Doing social network research* (39–62). SAGE.
- Marsden, Peter (2005). "Recent developments in network measurement". In P. Carrington, J. Scott, & S. Wasserman (Eds.), *Models and methods in social network analysis* (8–30). CUP.

Week 3   (4 Oct): Centrality, or How to stand out

- Smith, Jason, Halgin, Dan, Kidwell-Lopez, Virginie, Labianca, Giuseppe, Brass, Dan, & Borgatti, Stephen (2014). "Power in politically charged networks". *Social Networks*, 36, 162–176.
- Fowler, James (2006). "Connecting the congress: A study of cosponsorship networks". *Political Analysis*, 14(4), 456–487.
- Brandes, Ulrik, Kenis, Patrick, Raab, Jörg, Schneider, Volker, & Wagner, Dorothea (1999). "Explorations into the visualization of policy networks". *Journal of Theoretical Politics*, 11(1), 75–106.

Week 4   (11 Oct): Community, or How to stand together

- Newman, M. E. J. (2012). "Communities, modules and large-scale structure in networks". *Nature Physics*, 8(1), 25–31.
- Maoz, Zeev (2006). "Network Polarization, Network Interdependence, and International Conflict, 1816–2002". *Journal of Peace Research*, 43(4), 391–411.
- Kadushin, Charles (2012). "The psychological foundations of social networks". In *Understanding social networks: Theories, concepts, and findings* (56–73). Oxford University Press.

Week 5   (18 Oct): Actors, or How to describe roles

- Burt, Ronald (2004). "Structural holes and good ideas". *American Journal of Sociology*, 110(2), 349–399.
- Padgett, John, & Ansell, Christopher (1993). "Robust action and the rise of the medici, 1400-1434". *American Journal of Sociology*, 98, 1259–1319.
- Knoke, David, Diani, Mario, Hollway, James, & Christopoulos, Dimitrios (2021). "Multimodal Graphs and Matrices". In *Multimodal Political Networks* (20–52). Cambridge University Press.

Week 6   (25 Oct): Structures, or How to describe topologies

- Merton, Robert K. (1968). "The matthew effect in science". *Science*, 159(3810), 56–63.
- Borgatti, Stephen, & Everett, Martin (1999). "Models of core/periphery structures". *Social Networks*, 21, 375–395.
- Watts, Duncan (2004). "New science of networks". *Annual Review of Sociology*, 30, 243–270.

Week 7   (1 Nov): Reports due

Week 8   (8 Nov): Network Diffusion, or How to model contagion

- Andrews, Kenneth T., & Biggs, Michael (2006). "The dynamics of protest diffusion: Movement organizations, social networks, and news media in the 1960 sit-ins". *American Sociological Review*, 71(5), 752–777.
- Gonzalez-Bailon, Sandra, Borge-Holthoefer, Javier, Rivero, Alejandro, & Moreno, Yamir (2011). "The dynamics of protest recruitment through an online network". *Nature Publishing Group*, 1.
- Graham, Erin, Shipan, Charles, & Volden, Craig (2012). "The diffusion of policy diffusion research in political science". *British Journal of Political Science*, 43(3), 1–29.

Week 9   (15 Nov): Network Regression, or How to model homophily

- McPherson, Miller, Smith-Lovin, Lynn, & Cook, James (2001). "Birds of a feather: Homophily in social networks". *Annual Review of Sociology*, 27, 415–444.
- Robins, Garry, Lewis, Jenny, & Wang, Peng (2012). "Statistical network analysis for analyzing policy networks". *Policy Studies Journal*, 40(3), 375–401.
- Lee, In Won, Feiock, Richard, & Lee, Youngmi (2012). "Competitors and cooperators: A micro-level analysis of regional economic development collaboration networks". *Public Administration Review*, 72(2), 253–262.

Week 10   (22 Nov): Network Modelling, or How to model network formation

- Amati, Viviana, Lomi, Alessandro, & Mira, Antonietta (2018). "Social network modeling". *Annual Review of Statistics and Its Application*, 5(1), 343–369.
- Koskinen, Johan, & Daraganova, Galina (2013). "Exponential random graph model fundamentals". In D. Lusher, J. Koskinen, & G. Robins (Eds.), *Exponential random graph models for social networks* (16–28). Cambridge University Press.
- Lubell, Mark, Robins, Garry, & Wang, Peng (2014). "Network structure and institutional complexity in an ecology of water management games". *Ecology and Society*, 19(4), art23.

Week 11   (29 Nov): Network Dynamics, or How to model network change

- Snijders, Tom, Van de Bunt, Gerhard, & Steglich, Christian (2010). "Introduction to stochastic actor-based models for network dynamics". *Social Networks*, 32(1), 44–60.
- Manger, Mark, & Pickup, Mark (2016). "The coevolution of trade agreement networks and democracy". *Journal of Conflict Resolution*, 60(1), 164–191.
- Stadtfeld, Christoph, Hollway, James, & Block, Per (2017). "Dynamic network actor models: Investigating coordination ties through time". *Sociological Methodology*, 47(1), 1–40.

Week 12   (6 Dec): Review

Week 13   (13 Dec): Consultations

Week 14   (20 Dec): Post(er)s due

– This syllabus is subject to change –