

SOCIAL NETWORKS
PSY 493-003 – FALL 2024
TUESDAYS 9:10 – NOON @ ~~BERKEY 107~~ → [GILTNER 346](#) OR [ZOOM](#)

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Office: [Psychology 236](#) **Office Hours:** [By appointment](#)

COURSE DESCRIPTION

Social science research often treats each person as a completely independent “subject” or “participant.” Really?!? We all know that people have relationships with each other: they fall in love, they fight, they talk, etc. To understand how the social world works, we need to consider these relationships. A social network is the pattern of social relationships that a person has, or that exist among a set of people. This course will introduce what social networks are, how we can observe them, and how we can use them to understand the social world.

COURSE FORMAT

We will meet for three hours each week, split into two parts, with a break:

- **Lecture** – We will explore using networks to answer a question about the social world, and will look at an example. This material will be on the exams and is important for the final paper.
- **Break**
- **Lab** – We will explore using the R software to perform the analyses we discussed in the lecture. This material will not be on the exams and is not required for the final paper, but it is important for the honors option.

COURSE OBJECTIVES

By the end of this course, you should be able to:

- Define a social network
- Measure a social network
- Identify key features of a social network
- Understand how features of a social network are related to the social world
- If participating in lab sessions: Analyze and visualize a network using R

There are also some things we will not be covering:

- Networking – We will explore how social networks form and dissolve, but will not be considering how to grow or enhance your own network. If you don’t have friends now, taking this class probably won’t help.
- Actor Network Theory (ANT) – This has the word “network” in it, but I don’t really know what it is. It’s somehow related to French Post-Structuralism.
- Psychometric Networks – Networks of the statistical relationships among variables generally yield invalid results (see [Neal et al., 2022](#) and [Neal & Neal 2023](#))

EXPECTATIONS

- Come to class (in-person or on zoom) on time to prevent disruptions
- Complete readings before class to ask questions and participate in discussion
- Be (or pretend to be) excited about social networks

PREREQUISITES

- PSY101 (Introductory Psychology) & PSY295 (Data Analysis in *Psychological Research*) & Tier I Writing Requirement, OR
- Instructor approval via an override

REQUIRED MATERIALS

- All required readings are available on D2L
- **If you plan to participate in lab sessions and/or complete the honors option:** Before September 3, follow [Steps 1 and 2 on this page](#) to install R and R Studio on your computer.

COURSE POLICIES

- *Academic Integrity:* A student found in violation of the [All-University Policy on the Integrity of Scholarship and Grades](#) (i.e., a student who cheats) will receive a penalty grade of 0.0 for the course.
- *Students with disabilities:* Accommodations for persons with disabilities, with documentation from the [MSU Resource Center for Persons with Disabilities](#), may be requested by contacting me at the start of the term and/or two weeks prior to the accommodation date.
- *Attendance:* Attending class provides an opportunity to ask questions and participate in discussion, which can help you understand the material better. However, I will not be taking attendance, and attendance is not part of your grade.
- *Illness:* This semester we'll learn how networks help spread illnesses. Therefore, if you are sick, please do not attend class in person. Instead, please join class [by zoom](#). If you are unable to participate in class, [email me](#) with any questions you have about that week's material.
- *Questions or concerns:* I want to see each of you succeed in this course. If you have any questions or concerns, please contact me and we can set up a time to talk. Please let me know as soon as possible if you experience any problems in the course. By letting me know early, we can work out a plan to make sure you do not fall behind.

EXAMS

There are two exams:

- **A 50-point midterm exam on October 8**
- **A cumulative 50-point final exam on December 10**

Here are some important details about the exams:

- **Format:** Both exams are multiple-choice open-book exams administered via D2L.
- **Content:** The exams will not include questions about material from lab sessions (i.e., about using software).
- **Grading:** If your final exam score is higher than your midterm exam score, I will replace your midterm exam score with your final exam score. For example, if you got 30/50 on the midterm and a 45/50 on the final, then I will replace your midterm grade with 45/50.

FINAL PAPER

In a final paper, you will discuss an example of a network that you find. The **final paper is worth 50 points, and is due on December 3 via D2L**. Late papers will not be accepted.

First, find a network to write about. This should be a network that you think is interesting because you'll be thinking about it carefully and writing about it. Your network can come from a research article in your field, a newspaper story, a blog, etc. Be sure that the source has enough information about the network that you'll be able to write a paper about it. Start looking early, and let me know if you aren't sure or have trouble finding one.

Second, write about your network. Your final paper should be about 10 double-spaced pages, excluding the title page and any references. In your paper, you should cover the following topics:

- What does the network represent?
- How was the network data collected?
- What is interesting about this network?
- How does this network illustrate a concept from class?
- What concerns do you have about how the source describes the network?

Here are some important things to keep in mind:

- **References:** Except for clearly identifying the source of your network, your paper does not need to contain references or citations. However, if you borrow ideas or use quotations from another source, they must be cited using APA style.

- **Grading:** The attached grading rubric provides details on what the paper should contain and how points will be awarded. Be sure to look at the rubric while you are writing to make sure your paper contains all the required elements.
- **Feedback:** If you would like feedback on a draft, [email me](#) a copy by November 19.
- Late papers will not be accepted

EXTRA CREDIT

For five points extra credit:

- Find an example of a network from the news, a blog, social media, etc.
- In an MS Word document, include (1) a hyperlink to your example and (2) a 1/2 page description of the network and why it is interesting.
- Be ready to share your example network with the class in the next session after you submit it.

These extra credit opportunities are like mini versions of the final paper. You can use the same network for an extra credit assignment and for your final paper. This can be a good strategy to start thinking about your final paper, and get some extra points.

You can submit one extra credit assignment per week, and up to five extra credit assignments during the semester (up to 25 points total). All extra credit assignments must be submitted by November 19.

HONORS OPTION

The honors option involves analyzing and visualizing a network in R, then briefly writing up the results. The attached Honors Option document provides details about the requirements. If you want to complete the Honors Option, please [email me](#) by September 24.

GRADING

All grades will be posted on D2L. Your final grade will be assigned based on your midterm exam (October 8; up to 50 points), your final exam (December 10; up to 50 points), your final paper (December 3; up to 50 points), and any extra credit (up to 25 points) according to the following scale:

135 – 150 points → 4.0	105 – 111 points → 2.0
127 – 134 points → 3.5	97 – 104 points → 1.5
120 – 126 points → 3.0	90 – 96 points → 1.0
112 – 119 points → 2.5	0 – 89 points → 0.0

Any concerns about your grade or progress in class should be brought to my attention as early as possible.

COURSE SCHEDULE

A note about the readings: The “application” readings are published research articles from various disciplines. You may not understand everything in them...I know I don’t! That’s ok. Focus on trying to understand two things: (1) What is the network in this research, (2) How does this week’s topic play a role in the analysis and findings.

AUGUST 27 – INTRODUCTION

- Review the syllabus

SEPTEMBER 3 – WHAT’S A NETWORK? (DEFINITIONS)

- **INTRO:** Borgatti, S. P., Everett, M. G., Johnson, J. C., and Agneessens, F. (2022). Introduction. Pp. 1-13 in *Analyzing Social Networks in R*. Sage.
- **APPLICATION (sports):** Fewell, J. H., Armbruster, D., Ingraham, J., Petersen, A., and Waters, J. S. (2012). Basketball Teams as Strategic Networks. *PLOS One*, 7, e47445. <https://doi.org/10.1371/journal.pone.0047445> [if you like basketball] **OR** Goncalves, B., Coutinho, D., Santos, S., Lago-Penas, C., Jimenez, S., and Sampaio, J. (2017) Exploring Team Passing Networks and Player Movement Dynamics in Youth Association Football. *PLOS One*, 12, e0171156. <https://doi.org/10.1371/journal.pone.0171156> [if you like football]

- **LAB:** Review `intro.R` code

SEPTEMBER 10 – WHO ARE YOUR FRIENDS? (DATA)

- **INTRO:** Prell, C. (2012). How to study social networks, from theory to design. Pp. 59-91 in *Social Network Analysis: History, Theory, & Methodology*. Thousand Oaks, CA: Sage.
- **APPLICATION (education):** Neal, J. W., & Neal, Z. P. (2022). Collecting, modeling, and visualizing network data from educators: A tutorial. *School Psychology, 37*(6), 434-444. <https://doi.org/10.1037/spq0000479>
- **LAB:** Review `data.R` code (you'll also need the files `nodes.csv` and `relational.csv`)

SEPTEMBER 17 – WHAT'S THE NETWORK LOOK LIKE? (VISUALIZATION)

- **INTRO:** Pfeffer, J. (2018). Visualization of Political Networks. Pp. 277-300 in *The Oxford Handbook of Political Networks*, edited by Victor, J. N., Montgomery, A. H., and Lubell, M. Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780190228217.013.13>
- **APPLICATION (food):** Ahn, Y.-Y., Ahnert, S. E., Bagrow, J. P., and Barabasi, A.-L. (2011). Flavor network and the principles of food pairing. *Scientific Reports, 1*, 196. <https://doi.org/10.1038/srep00196>
- **LAB:** Review `visualization.R` code

SEPTEMBER 24 – WHO'S IMPORTANT? (CENTRALITY)

- **INTRO:** Prell, C. (2012). Actor level in complete networks. Pp. 95-117 in *Social Network Analysis: History, Theory, & Methodology*. Thousand Oaks, CA: Sage.
- **APPLICATION (crime):** Bright, D. A., Hughes, C. E., and Chalmers, J. (2012). Illuminating dark networks: a social network analysis of an Australian drug trafficking syndicate. *Crime, Law, and Social Change, 57*, 151-176. <https://doi.org/10.1007/s10611-011-9336-z>
- **LAB:** Review `centrality.R` code
- **REMINDER:** This is the last day to let me know you want to do an Honors Option.

OCTOBER 1 – WHERE ARE YOU FROM? (COMMUNITIES)

- **INTRO:** Borgatti, S. P., Everett, M. G., Johnson, J. C., and Agneessens, F. (2022). Subgroups and community detection. Pp. 213-230 in *Analyzing Social Networks in R*. Sage.
- **APPLICATION (geography):** Nelson, G. D. and Rae, A. (2016). An Economic Geography of the United States: From Commutes to Megaregions. *PLOS One, 11*, e0166083. <https://doi.org/10.1371/journal.pone.0166083>
- **LAB:** Review `communities.R` code

OCTOBER 8 – MIDTERM EXAM ON D2L

- Exam will be available from October 8 @ 9am until October 11 @ 5pm
- No class, but you can take the exam in G346 @ 9:10am (I will be available for questions)
- **REMINDER:** Next Monday 10/14 is the last day to drop without a grade reported

OCTOBER 15 – DO OPPOSITES ATTRACT? (HOMOPHILY)

- **INTRO:** McPherson, J. M., Smith-Lovin, L., and Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology, 27*, 415-444. <https://doi.org/10.1146/annurev.soc.27.1.415>
- **APPLICATION (social media):** Pignolet, Y.-A., Schmid, S., and Seelisch, A. (2024). Gender-specific homophily on Instagram and implications on information spread. *Scientific Reports, 14*, 451. <https://doi.org/10.1038/s41598-023-51117-w>
- **LAB:** Review `homophily.R` code

OCTOBER 22 – NO CLASS: FALL BREAK

- **REMINDER:** Be working on your final paper (and honors option)

OCTOBER 29 – WHO CAN GET STUFF DONE? (SOCIAL CAPITAL)

- **INTRO:** Watts, D. J. & Strogatz, S. H. (1998). Collective dynamics of 'small-world' networks. *Nature, 393*, 440-442. <https://doi.org/10.1038/30918> [short & technical] **OR** Watts, D. J. (2003). Small worlds. Pp. 69-100 in *Six Degrees: The Science of a Connected Age*. New York: W. W. Norton. [long & non-technical]

- **APPLICATION (business):** Burt, R.S. (2001). Structural Holes Versus Network Closure as Social Capital. Pp. 31-56 in *Social Capital: Theory and Research. Sociology and Economics*, edited by Lin N., Cook K., and Burt R.S. New York: Aldine de Gruyter.
- **LAB:** Review `social_capital.R` code

NOVEMBER 5 – WHO DOES STUFF TOGETHER? (PROJECTIONS)

- **INTRO:** Neal, Z. P. (n.d.) Two-mode Networks and Projections. *Lecture Notes*.
- **APPLICATION (politics):** Andris, C., Lee, D., Hamilton, M. J., Martino, M., Gunning, C. E., and Selden, J. A. (2015). The Rise of Partisanship and Super-Cooperators in the U.S. House of Representatives. *PLOS One*, 10, e0123507. <https://doi.org/10.1371/journal.pone.0123507>
- **LAB:** Review `projections.R` code

NOVEMBER 12 – WHAT NEXT? (DYNAMICS)

- **INTRO:** Neal, Z. P. (n.d.) Network Dynamics. *Lecture Notes*.
- **APPLICATION (developmental psychology):** Neal, J. W., Durbin, C. E., and Lo, S. L. (2017). Codevelopment of preschoolers' temperament traits and social play networks over an entire school year. *Journal of Personality and Social Psychology*, 113, 627–640. <https://doi.org/10.1037/pspp0000135>
- **LAB:** Review `balance.R` code

NOVEMBER 19 – DO THE RICH GET RICHER? (DEGREE DISTRIBUTIONS)

- **INTRO:** Barabási, A.-L. & Albert, R. (1999). Emergence of scaling in random networks. *Science*, 286, 509-512. <https://doi.org/10.1126/science.286.5439.509> [short & technical] **OR** Barabási, A.-L. & Bonabeau, E. (2003). Scale free networks. *Scientific American*, May, 50-59. [long & non-technical]
- **APPLICATION (social psychology):** Zuckerman, E. W. and Jost, J. T. (2001). What Makes You Think You're so Popular? Self-Evaluation Maintenance and the Subjective Side of the "Friendship Paradox". *Social Psychology Quarterly*, 64, 207-223. <https://doi.org/10.2307/3090112>
- **LAB:** Review `degree.R` code
- **REMINDER:** This is the last day to submit a draft of your final paper for feedback.

NOVEMBER 26 – NO CLASS: THANKSGIVING

- **REMINDER:** Finish up your final paper (and honors option)

DECEMBER 3 – FINAL PAPER & HONORS OPTION DUE ON D2L

- Review & Honors Option Presentations

DECEMBER 10 – FINAL EXAM ON D2L

- Exam will be available from December 9 @ 9am until December 12 @ 5pm
- Official final exam time is December 10 @ 10am. You can take the exam in G346 then (I will be available for questions)
- Final exam score replaces your midterm score if it is higher

Final Paper Grading Rubric

DUE DECEMBER 3

This rubric describes how your final paper will be graded. Please make sure your paper contains all the elements listed below. If you would like feedback on a draft of your final paper, [email me](#) a copy by November 19.

Description (50 points possible)	Score / Comments
Network (5 points): The paper clearly identifies the source of the network being described, using an APA-format citation or a working hyperlink.	
Description (8 points): The paper contains a labeled subsection that clearly describes what the network represents. The description should explain: <ul style="list-style-type: none">• How many nodes there are, and what the nodes represent• How many edges there are (or the network's density), and what the edges represent If these details cannot be determined from the source, this should be noted and discussed as a concern (see below).	
Data Collection (8 points): The paper contains a labeled subsection that clearly describes how the network data was collected. The description should explain: <ul style="list-style-type: none">• How nodes were selected for inclusion in the network• How information was obtained about the nodes and edges• Whether (how many) any nodes are missing from the network• If the nodes represent people, did they consent to provide their information? How was their privacy protected? If these details cannot be determined from the source, this should be noted and discussed as a concern (see below).	
Analysis (8 points): The paper contains a labeled subsection that clearly describes how the source analyzed or examined the network, and describes the main findings or key messages derived from the network. If the source does not analyze the network, or offer any main findings or key messages, then the paper should clearly describe what <u>you</u> think is interesting about the network and what can be learned from the network.	
Key concept (8 points): The paper contains a labeled subsection that clearly explains how one of the following concepts is illustrated in the network: centrality, communities or subgroups, homophily, social capital, projections or co-occurrence, dynamics, degree distribution/hubs.	
Concerns (8 points): The paper contains a labeled subsection that clearly discusses any concerns about how the source collected, described, or analyzed the network. For example, if the source does not describe how the data was collected, the paper discusses why this is a concern.	
Spelling & Grammar (5 points): The paper does not contain spelling or grammar errors detected in the MS Word spelling/grammar check.	

Honors Option

DUE DECEMBER 3

The honors option involves analyzing and visualizing a network in R, then briefly writing up the results.

If you want to complete the honors option:

- Let me know [by email](#) no later than September 24.
- Complete an “Honors Option Agreement Form” on the [Registrar’s website](#) (under student-instructor forms). The form has space to describe the honors option. Paste this text: “The student will choose an existing network dataset, visualize the network using R, perform a network analysis using R, describe the visualization and analysis in a research paper, submit the paper and associated R code to Dr. Neal for feedback, and share the findings in a brief in-class presentation.”
- Begin working on the requirements below. I encourage you to work on your honors option project throughout the semester. Do not wait until the end of the semester to get started.

Honors Option Requirements

- Choose a network from the [R networkdata package](#). This package contains over 2000 network datasets from a wide variety of settings including classic network datasets, movies, animals, crimes, plays, and sports. Some networks have better documentation than others. Be sure to pick one that has enough documentation to understand what it contains. Let me know if you want help finding or choosing a network.
- In up to 10 double-spaced pages:
 - Describe what the network represents and how it was collected. This may require doing some digging for additional information about the network.
 - Use R to create a visualization of the network, and describe the visualization, noting any important patterns that it is intended to illustrate
 - Use R to examine at least one of the key network features discussed in class, and interpret your findings
- Submit your paper and R code [by email](#) by December 3
- Share your network in a brief presentation on December 3