CAS 892 • Network Science

Spring 2024 | Section 001 | T • 5-7:50pm

Instructor: Jacob T. Fisher, Ph.D. **E-mail:** jtf@msu.edu	**Office Hours** Tue. 2-4 pm - CAS 445 or Zoom

Course Description:

In this graduate course, students will learn about network science across a number of communication related contexts. The course covers basic theoretical concepts in the science of networks, as well as methodologies for generating networks from multivariate data, analyzing networks, and interpreting results. Designed for students in communication, psychology, and related social/behavioral sciences, the course provides a multi-disciplinary approach to understanding complex systems from a network perspective.

Objectives

Upon completion of this course, students should be able to accomplish the following objectives:

1. Demonstrate an understanding of key concepts in network science and graph theory, and how they can be applied within the context of communication research.
2. Build and analyze real world networks of relevance to communication scholarship, including interpersonal networks, online social networks, and brain networks.
3. Utilize a variety of network analysis and visualization tools to develop insights regarding how network structure and function relate to research questions of interest.

This class will be a mix of lectures, discussions, and various other activities. It is important that you attend class and that you complete all of the readings ahead of time. Your readings will be the launching pad for the discussion and activities you will complete in this course

Digital Tools:

D2L - We will be using D2L to manage all assignments, reading materials, and quizzes. If you have not yet logged into D2L, you can do so at d2l.msu.edu. Note that this is one of the first semesters that I will be using D2L, so it's possible that there may be some bumps along the way. I appreciate your patience. Please reach out if you have questions or if something is confusing.

GitHub - We will be using GitHub Classroom to manage the homework assignments (discussed later), and we will extensively use GitHub for code management and sharing, as well as other odds and ends.

Python - You can expect to do quite a bit of coding in this course. The vast majority of network analysis software is written in Python, although there are a few exceptions. If you are not familiar with Python, I

would recommend taking advantage of resources that the library offers such as Linkedin Learning to brush up on some basic concepts.

Personal Digital Technology

Personal technologies such as smartphones, laptops, and tablets can be immensely useful tools for learning and for staying connected with one another. They can also be distracting and disruptive to you, your peers, and your instructors. Academic research conclusively shows that: 1) the mere presence of a smartphone can increase distraction and decrease the academic performance of you and your classmates, 2) multitasking with digital devices while learning leads to reduced knowledge retention and greater difficulty understanding course material. With this in mind, I *strongly* encourage you to minimize your use of personal devices in the classroom, and I reserve the right to ask you to put away your device, remove your earbuds, or otherwise alter your use of digital technology to facilitate more effective learning and communication within the classroom.

Readings

There will be one textbook required for this course:

- Menczer, F., Fortunato, S., & Davis, C. A. (2020). *A first course in network science.* Cambridge University Press.

We will also have a collection of additional readings and supplemental videos consisting of chapters/selections from journals, books, tutorials, and other online resources. I will post these resources on D2L as they are assigned.

COVID-19 and our class

COVID-19 is still a rapidly evolving situation, and it is difficult to predict how it will affect our class this semester. Although vaccination requirements will undeniably be helpful in mitigating the spread of COVID-19, it is critical that each of us does all that we can to keep ourselves and the campus community safe. All students are expected to comply with the guidance provided by the university with regard to vaccination, mask-wearing, and other health-related behaviors.

Please note that although this class is scheduled as an in-person lecture, there is always the possibility that we will have to transition to online learning for at least part of the semester if the prevalence of COVID increases and university policies change. If this is necessary, I will communicate any changes to the course structure as quickly and thoroughly as possible.

Course Requirements Overview

Requirement	**Worth?**
Homeworks [x 4]	200
Topic Briefs [x 2]	100
Research Proposal	400

Discussion Leadership [x 2]	200
Attendance & Participation	100
Total	**1000 points**

Assignments & Grading

Homeworks

A central aim of this class is not only that you know about networks, but that you are able to actually apply your knowledge to analyze real-world problems. For this reason, we will have four homework assignments distributed throughout the semester in which you will be asked to demonstrate your knowledge. These will be submitted via GitHub Classroom.

Topic Briefs

During the course of the semester, you will be asked to create two "Topic Briefs" that cover a specific concept, method, or tool within network science. Your brief should be designed to provide a clear and accessible overview of the topic, suitable for an audience with a basic understanding of communication or related social scientific disciplines, but limited exposure to network science. At the beginning of the semester, each student will select two different weeks in which you will be responsible for a topic brief. On the week that you submit a topic brief, you will also present your brief to the class.

Discussion Leadership

Most weeks, 2-3 student(s) in the class will be assigned as a discussion leader. The discussion leader will select an academic article or coding tutorial that relates to the course, and will guide the class through the article or tutorial. Discussion leaders will be responsible for sending the article or tutorial to the class at least one week before their scheduled date, and for generating a discussion outline that will be used to guide the discussion. Discussion leadership will be assigned at the beginning of the semester based on a ranked choice voting system.

Research Proposal

The final output from the class will be a pre-proposal for a study or other research endeavor. The focus of this proposal will be to demonstrate the progress that you have made from beginning with a topic that piques your interest to a coherent explication of a research problem, buttressed by a relevant literature review and leading to a set of concrete arguments/ research questions. The proposal will progress in three parts:

1. An initial document in which you will summarize your problem, why it is significant, what questions, if answered, might begin to address the problem, the purpose of the proposed research, and a statement of initial hypotheses or arguments. You will present these initial ideas to the class, and receive feedback.
2. An outline of the full proposal, in which you will expand the initial document to provide more in depth explication of your problem, situate the work within a theoretical and methodological

framework, distill and begin to synthesize relevant literature, and begin to articulate a logic for your specific hypotheses or arguments. This will again be presented to the class for feedback.

3. The final proposal, containing an in-depth analysis of your chosen problem, detailed justification for the proposed research, and a thorough description of the aims of the proposed work. This proposal should be presentable as the front-end of an academic manuscript or book proposal. Submission of the final proposal will be accompanied by a final presentation.

Attendance and Participation

Attendance in this course is strongly encouraged. Being "present" mentally and physically in this class will position you for success. That being said, I understand that sometimes it is not possible to attend due to sickness, personal emergencies, and other reasons. For this reason, you will be granted one no-questions-asked absence. If you have extenuating circumstances that prevent you from coming to class after you already have one absence, please reach out so that we can try to work something out in advance. Every non-documented absence (beyond one) that you have not discussed with me in advance will result in a 25 point deduction from your participation grade.

Grading Scale

Below is the grading scale for this course. Please note that I reserve the right to change the final grading scale based on the distribution of class scores at the end of the term.

< 650	650-699	700-749	750-799	800-849	850-899	900-949	> 950
0.0	1.0	1.5	2.0	2.5	3.0	3.5	4.0

A Few Notes on Grading

If you have a question or concern about a grade, please contact me. If you have questions about your grade or believe that it should be changed, you must contact me no more than 7 days after the grades are announced or posted. When I re-grade your assignment, your score may go up OR down, and the grade is final. I will not discuss grades after this seven-day period.

There will be no rounding up of points. For example, if you get 899 points in the course, it will translate into a 3.0 and will not be rounded up to a 3.5.

When I grade your work, you will earn points based on the quality of the work. You do not start with full points and then lose them based on the mistakes you might make. Your final grade represents the total points earned for that assignment, not the number of points "taken away" for errors or omissions.

Late Work

I understand that extenuating circumstances sometimes prevent turning in work on time. Because of this, I have a relatively generous policy on late submissions. This policy is as follows:

So long as the assignment is turned in within 12 hours of the deadline, it will be graded for up to full credit. After this, there will be a 10% automatic deduction from the maximum possible score for every day after the deadline has passed until the grade reaches zero.

You will be granted one "partial credit pass" per semester. This pass may only be applied to an assignment that is worth 5% of the final course grade or more. The pass can be used to either:

- Submit one assignment that is less than 10 days overdue for up to 90% credit.
- Submit one assignment that is more than 10 days overdue for up to 75% credit.

The partial credit pass cannot be used for assignments that are more than 30 days past due, and cannot be used within two weeks of the last day of the semester.

No other exceptions will be granted for late work in the absence of an officially documented excuse.

Email

The main ways to communicate with me is either through D2L or via email. Please follow professional standards in your email communications. This entails including a subject line that indicates the nature of the message - not "Hi" or (no subject) – and a greeting at the beginning of the email (e.g., "Dear Prof. Fisher"). Subsequent communication in the same conversation may be less formal, but please remember to be respectful.

I will do my best to respond to emails within 24 hours during the week and 48 hours on the weekend, although my typical response time is usually quicker. Please note that I will not respond to email questions about an assignment or project within 12 hours of its due date, or about a grade more than 7 days after it is posted. If you have a pressing last-minute question during this timeframe, please look over course materials (often the answer is in the syllabus or assignment directives) or seek help from your peers.

Academic Integrity

Michigan State University affirms the principle that all individuals associated with the academic community have a responsibility for establishing, maintaining, and fostering an understanding and appreciation for academic integrity. Academic integrity is the foundation for university success. Learning how to express original ideas, cite works, work independently, and report results accurately and honestly are skills that carry students beyond their academic career.

The Spartan Code of Honor Academic Pledge embodies the principles of academic integrity through a personal commitment to ethical behavior in a student's studies and research. All undergraduate students are expected to uphold the academic pledge throughout their enrollment at MSU. Student conduct that is inconsistent with the academic pledge is addressed through existing policies, regulations, and ordinances governing academic honesty and integrity. Those policies include:

- Integrity of Scholarships and Grades Policy
- Student Rights and Responsibilities
- General Student Regulations (includes Protection of Scholarship and Grades)
- Ordinance 17.00 Examinations

Students are encouraged to review the following websites to learn more about academic integrity, student rights and responsibilities, and the Spartan Code of Honor:

- Spartan Life Handbook (Student Affairs)
- University Ombudsperson
- ASMSU

The Spartan Code of Honor was adopted by ASMSU on March 3, 2016, endorsed by Academic Governance on March 22, 2016, and recognized by the Provost, President, and Board of Trustees on April 15, 2016.

Use of AI Tools (ChatGPT, etc)

The use of AI tools can confer a powerful advantage in many contexts. However, transparency, honesty, and understanding of the strengths and weaknesses of these tools is expected from all students who choose to use them. Non-disclosure or misrepresentation of the use (or the extent of use) of AI tools in your work constitutes academic misconduct and will be handled accordingly.

For the purpose of this policy, 'AI tools' refers to any software or digital instrument powered by artificial intelligence designed to assist users in creating, editing, or generating content. This includes, but isn't limited to ChatGPT, Google Bard, Claude, and Bing Chat.

- **Usage:** Unless specifically noted otherwise, students are permitted to use AI tools to aid their research, generate ideas, proofread assignments, or operate other tasks essential to their work in this course.
- **Disclosure:** Any use of AI tools must be explicitly declared by the student in an *AI Disclosure Statement* attached to the submitted assignment. The disclosure should include the following details:
    - The name of the tool
    - The tasks for which the tool was used (i.e., idea generation, proofreading, paraphrasing)
    - The components of the assignment that you contributed without AI assistance.
    - A brief reflection on the effectiveness (or non-effectiveness) of the tool.
- **Responsibility:** Students are responsible for any work produced with the help of such tools. Using AI tools to assist in assignments does not absolve students of the need to understand and be capable of explaining their work in its entirety. I reserve the right to ask you specific questions about assignment submissions if I suspect that an AI tool was used but not disclosed.
- **Consequences:** Failure to disclose the full extent of the use of AI tools for completing an assignment will result in a zero on the assignment, as well as an academic misconduct report that will become a part of your academic file.

Bottom Line: If you think it might be wrong, don't do it. If you're unsure, ask Jacob and he will help guide you in the right direction.

Turnitin

Consistent with MSU's efforts to enhance student learning, foster honesty, and maintain integrity in our academic processes, instructors may use a tool called Turnitin to compare a student's work with multiple sources and detect the use of AI content generators. The tool compares each student's work with an

extensive database of prior publications and papers, providing links to possible matches and a "similarity score." The tool does not determine whether plagiarism has occurred or not. Instead, the instructor must make a complete assessment and judge the originality of the student's work. All submissions to this course may be checked using this tool.

Students should submit papers to Turnitin Assignments without identifying information included in the paper (e.g., name or student number), the system will automatically show this information to faculty in your course when viewing the submission, but the information will not be retained by Turnitin.

Student Accommodations

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at rcpd.msu.edu.

Once your eligibility for an accommodation has been determined, you will be issued a verified individual services accommodation ("Accommodation Letter") form. Please present this form to me at the start of the term and/or two weeks prior to the accommodation date (test, project, etc). Requests received after this date will be honored whenever possible, but will not be applied retroactively.

Mental Health and Wellness

College students often experience issues that may interfere with academic success such as academic stress, sleep problems, juggling responsibilities, life events, relationship concerns, or feelings of anxiety, hopelessness, or depression. If you or a friend is struggling, we strongly encourage you to seek support. Helpful, effective resources are available on campus, and most are free of charge.

- If you are struggling with this class, please check-in during office hours or contact me by email (jtf@msu.edu).
- Check-in with your academic advisor if you are struggling in multiple classes, unsure whether you are making the most of your time at MSU, or unsure what academic resources are available at MSU.
- Access CAPS Services for new counseling and psychiatric services by scheduling a consultation.
- **CAPS is providing remote crisis services 24/7/365. Students can call us at 517-355-8270 and press "1" at the prompt to speak with a crisis counselor.** Other prompt options are available for those not in crisis.
- Visit caps.msu.edu for additional information and resources.

Change Statement

Please note that I reserve the right to change course policies, scheduling, assignments, or other content in this syllabus at any time.

Key Dates

Week	Dates	Lecture Topics	Due
1	8/28 - 9/1	M: Media & Messages W: The Changing Media Landscape	
2	9/4 - 9/8	**M: NO CLASS (Labor Day Holiday)** W: The Digital Economy	
3	9/11 - 9/15	M: Cooperative vs. Adversarial Technologies **W: Discussion 1**	**9/12 - Discussion 1 Memo** **9/15 - Discussion 1 Reflection**
4	9/18 - 9/22	M: Data is the New Oil W: Privacy and Persuasion	**9/22 - Assignment 1**
5	9/25 - 9/29	M: From Finding to Filtering W: Hi, I'm an API	
6	10/2 - 10/6	**M: Discussion 2** W: The Rise (and Fall?) of Social Media	**10/1 - Discussion 2 Memo** **10/6 - Discussion 2 Reflection**
7	10/9 - 10/13	M: Online Communication & Communities W: Under the Influence(rs)	**10/13 - Assignment 2**
8	10/16 - 10/20	M: Bot? Or Not? W: Bad Information	
9	10/23 - 10/27	**M: NO CLASS (Fall Break)** **W: Discussion 3**	**10/24 - Discussion 3 Memo** **10/27 - Discussion 3 Reflection**
10	10/30 - 11/3	M: Going Mobile W: Everything is Online	**11/3 - Assignment 3**
11	11/6 - 11/10	M: VR, AR, and Video Games W: Blockchain and the Metaverse	
12	11/13 - 11/17	**M: Discussion 4** W: Algorithms & Ethics	**11/12 - Discussion 4 Memo** **11/15 - Discussion 4 Reflection**
13	11/20 - 11/24	M: Attention Merchants **W: NO CLASS (Thanksgiving Holiday)**	
14	11/27 - 12/1	M: Digital Divide(s) W: Imagining the Future	
15	12/4 - 12/8	M: Discussion 5 (Pt. 1) W: Discussion 5 (Pt. 2)	**12/3 - Discussion 5 Memo** **12/8 - Discussion 5 Reflection**
16	12/11 - 12/15		**12/13 - Assignment 4**