Social Network Analysis

DACSS 697E (3 Credits)
University of Massachusetts Amherst
Spring 2023

Instructional Team

Dr. Meredith Rolfe
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Course Times and Location

Monday 5:30-6:45pm	Multimodal	Machmer W-13 or Zoom
Wednesday 5:30-6:45pm	Multimodal	Machmer W-13 or Zoom

Support and Office Hours

All general and technical questions should be posted first to Slack in a public forum or asked in class. Professor Rolfe answers all asynchronous questions posed in the classroom or #r-help slack but does not respond to individual student questions about grades, classwork, or other course-related matters.If you have an issue that cannot be resolved asynchronously, please contact the corresponding instructor Dr. Vallès Codina. Office hours with Dr. Vallès Codina can be booked online and he is reachable for appointment by email and slack.

Course Description

This course introduces theories and methods used to analyze social and political networks of people, organizations, and language. The study of networks is a growing interdisciplinary area with broad applications, and the sociological theory of network analysis provides a useful theoretical perspective on many machine learning algorithms.In this course, we will cover social scientific perspectives on network structure, network data collection and management, network visualization and description; and methods for the statistical analysis of networks. The course will make extensive use of real-world applications and students will gain a thorough background in the use of network analytic software. Examples used in the course are drawn from multiple disciplines, and the course will be relevant to anyone interested in network analytic research. Students without extensive prior experience with R should take DACSS 601 or the equivalent prior to enrolling.

Course Objectives

- Identify and define key terms used in network analysis.
- Use network software to create, explore and describe networks
- Interpret software output, including descriptive network statistics and explanatory

modeling

- Gain practical experience in collecting and cleaning network data
- Practice and improve advanced data cleaning and management techniques
- Analyze network data using the theoretical concepts that have proven most useful in the study of networks.
- Present network based research to an audience.

Textbook

Students are not required to purchase any books for this course. All required readings are available via Google Drive. However, the following books make excellent references for network analysts, so students are encouraged to purchase them if possible.

> Wasserman, S., and Faust, K. (1994). Social network analysis: Methods and applications Cambridge University Press.
>
> Jackson, Matthew O. (2008). Social and economic networks. Princeton: Princeton University Press.
>
> Hanneman, Robert A. and Mark Riddle. 2005. Introduction to Social Network Methods. Riverside, CA: University of California, Riverside. (Published online.)

Note: Recommended readings are identified as methods and/or measurement [M] if they provide technical background or extensions and applied [APP] if they provide examples of published substantive research related to that week's concepts and methods.

Course LMS and GitHub Website

All classroom material will be posted in Google Classroom. You will be submitting assignments via Github as part of a course blog (to be updated to a correct link soon), which will be introduced during the first week.

Prerequisites

This course will be most useful for students with some prior training in research design and quantitative research methods. Students who do not yet have experience using the R statistical package would benefit from prior training available through ISSR or DACSS 601. Contact an instructor for access to a UMass-only asynchronous resource for learning R.

Grading

Grades are calculated as follows:

- Quizzes (15%, optional)
- Tutorials (15%, optional)
- Challenges (30%, optional)
- Final Research Project or Poster (30%)
- Synchronous and Asynchronous Participation (10%)

	Full participation & all assignments	Challenges & Final Project	Quizzes & Final	Final Project only
Quizzes	15%		10%	
Challenges	50%	50%		
Final Project	25%	50%	90%	100%
Participation	10%			

Quizzes Quizzes serve to ensure that basic course material is mastered, and will be available each week on Moodle. Each quiz may be taken only once, and are “open book” (i.e., lecture notes and readings may be used.) Formative grading, lowest score dropped.

Tutorials Students are expected to complete seven online R tutorials that introduce network analysis in R, along with an accompanying “quiz” to ensure comprehension. These tutorials are FORMATIVE work - they are not intended to negatively affect your grade but to support your learning. Therefore, students who submit every assignment will receive an A for that portion of their grade, and no grades will be kept on the “quiz” - it only serves as proof of submission.

Challenges Weekly challenges, similar to those in 601, will help you build skills in R working with network data and build to the final student project. These are formative assignments, and submitting

Final Project involving a publication length research paper involving network analysis and/or research poster of the project. The research topic and direction of the project will be approved by the corresponding instructor.

Participation We have found that students who actively participate in class discussion - whether synchronously (when possible) or asynchronously - get a lot more out of the course and learn new skills at an accelerated rate. Students who participate regularly - including posting questions in Slack or volunteering to have your weekly submission reviewed live - will receive a “boost” to their grade. Participation does not need to reflect expertise; rather, students should seek to both ask and answer questions regularly and in equal proportion.

Final letter grades are assigned using the University’s Plus-Minus Grading Scale according to following rubric:

A (94-100%)

A- (90-93%)

B+ (86-89%)

B (81-85%)

B- (77-80%)

C+ (74-76%)

C (70-73%)

F (Below 70%)

Please note that due to privacy concerns related to FERPA, no instructor can discuss grades over email. To discuss your grade, you must make an appointment to speak with the corresponding instructor.

Software

Students in this class will use R and RStudio, and assumes prior experience with both. We will also make use of Google Classroom, GitHub and Slack. All of these are freely available, and basic instruction will be provided.

The instructional team cannot provide support for installation or other general computing issues, and can provide only limited support for hands-on debugging (e.g., during class, during drop-in office hours, via slack.) We recommend that students work in small groups and support each other as much as possible during class. Additionally, DACSS maintains a list of tutors who can provide more specialized and intensive support for an hourly fee.

Academic Honesty

Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst.

Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. The procedures outlined below are intended to provide an efficient and orderly process by which action may be taken if it appears that academic dishonesty has occurred and by which students may appeal such actions.

Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent.

For more information about what constitutes academic dishonesty, please see the Dean of Students' website: http://umass.edu/dean_students/codeofconduct/acadhonesty/

Statement on Disabilities

The University of Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier free campus.

If you are in need of accommodation for a documented disability, register with Disability Services to have an accommodation letter sent to your faculty. It is your responsibility to initiate these services and to communicate with faculty ahead of time to manage accommodations in a timely manner. For more information, consult the Disability Services website.

Course Schedule

Detailed schedule information with all asynchronous materials, assignment instructions and due dates is provided on Google Classroom. The following is not finalized and is subject to changes that will be announced in class.

Week Of...					
02/06/2023		Introduction	Tutorial 1	R and Github, Network Data	Week 1 Quiz, GH Setup, Challenge 1
02/13/2023	Lecture 2, Week 2 Quiz	Network Ties	Tutorial 2		Challenge 1 catch up
02/20/2023	Lecture 3, Week 3 Quiz	NO CLASS		Challenge 1	Challenge 2
02/27/2023		Degree Centrality	Tutorial 3, Assign 3: Degree Cent.	Challenge 2	Work on HW 5
03/06/2023	Lecture 4, Week 4 Quiz	Eigenvector Centrality	Tutorial 4, Assign 4: Status	Challenge 3	Work on HW 6
03/13/2023	Lecture 5, Week 5 Quiz	NO CLASS	Tutorial 5, Assign 5: Power	NO CLASS	
03/20/2023	Lecture 6, Week 6 Quiz	Roles & Blockmodels	Tutorial 6, Assign 6: Roles	HW6	Work on HW 7
03/27/2023	Lecture 7, Week 7 Quiz	Community Structure	Tutorial 7, Assign 7: Community	HW7	
04/03/2023	Lecture 8, Week 8 Quiz	Network Formation		Ind Projects	Work on HW 9
04/10/2023	Lecture 9, Week 9 Quiz	Network Inference 1	Tutorial 9, Assign 9	HW 9	Work HW 11
04/17/2023	Lecture 10, Week 10 Quiz	Network Diffusion		Ind Projects	Work HW 11
04/24/2023	Lecture 11, Week 11 Quiz	Network Inference 2	Tutorial 11, Assign 11	HW 11	Work on Poster
05/01/2023		Selection vs Influence		Ind Projects	Work (cont)
05/08/2023		Presentations		Presentations	Work (cont)
05/15/2023	*Poster printing*	Presentations	*Poster printing*	**Poster Session**	
05/22/2023					Final paper or Exam due