# SOCS-SHU 213
# Applied Social Network Analysis

## Subject to Change Statement

The syllabus and course schedule may be subject to change. Changes will be communicated via email and in NYU LMS (Brightspace). It is your responsibility to check email messages and course announcements to stay current in the course.

## Instructor Information*


- Instructor: Zixi Chen, Ph.D.
- Office: N717
- Office hours: 3:45 pm – 4:45 pm Wed.
    - You can make appointments at here
    - For additional contact hours, please schedule an appointment by email
- Email: zc3154@nyu.edu


## Course Information*

- **Course Description:**
  Our society is interconnected, spanning physical and digital spaces, making network science a substantive approach to comprehending social relationships. This course introduces social network analysis (SNA) as a research method and its real-world applications. This course is designed with four main modules: we start with an overview of SNA history and related social theory, followed by an introduction to SNA data collection, key measures, and visualization, using the R programming language. Next, we focus on network structures and explore network formation and effects by learning the selection and influence (and diffusion) empirical models. Finally, we introduce meaning-oriented network representations, including an introduction to Epistemic Network Analysis (ENA) and semantic network analysis using text data. The course materials are designed to engage students from diverse disciplinary backgrounds in social science.

- **Prerequisite: SOCS-SHU 190 Introduction to Computational Social Science OR CSCI-SHU 101 Introduction to Computer and Data Science OR MATH-SHU 235**

**Probability and Statistics OR BUSF-SHU 101 Statistics for Business and Economics**

For this course, we assume that students are

a) familiar with key concepts in statistical modeling and inference making, including a basic understanding of sampling design, descriptive statistics and multiple linear regressions; and
b) basic skills in R programming (such as data collection, cleaning, and wrangling), along with knowledge of data types and structures.

While knowledge of generalized linear regression (or multivariate regression) is not a prerequisite, it would certainly be helpful.

- **Class meeting days and times**: 3:45 PM - 5:00 PM Tu Th
- **Class room number**: NB104

# Course Overview and Learning Outcomes*

In this entry-level SNA as methods course, we introduce four modules: 1) SNA background (one week), 2) SNA data collections and visualization (three weeks), 3) network structures (two weeks), and modeling network formation and effects (two weeks), and 4) meaning networks, covering ENA (two weeks) and semantic network analysis (two weeks). We end with project-focused methods clinics and student presentations.

Each module has three main parts:

a) An introduction of the weekly topics led by the instructor.
b) In-class discussions and activities are designed to introduce one to two theory and application reading articles. These materials are labeled as background readings.
c) R lab sessions: the instructor will demonstrate how to conduct SNA in R and provide R instructions and exercises in Quarto (.qmd files).

The instructor will preview the next module at the end of each module.

## Upon Completion of this Course, students will be able to:

- gain a robust understanding of the fundamental statistical concepts and popular social theories of network analysis.
- apply SNA to solve real-world questions, demonstrating the practical implications of network science.
- utilize R programming for SNA projects, exhibiting data collection, analysis, and visualization skills.

# Course Requirements*

## Class Participation

Active engagement and participation are essential components of this course. You will get one point deducted for each class missed without any legitimate reason. Legitimate reasons for absence may include medical, family illness or death, religious holidays, academic events (such as presenting at a conference), and unforeseen circumstances such as a car accident.

## Getting-to-know-you survey

The information will help the instructor know the students better and accommodate the learning materials to meet the students' needs. It is due in Week 2. Click the survey link here.

a) Describe your SNA interests in five sentences. They can be your general idea of applying SNA methods in your work or any learning objectives you have for this class.
b) Answer survey items about your academic background, such as research interest and research methods you have learned in other courses.
c) Describe your class project idea in five sentences. Your final project can be developed through these ideas!

## R assignments

Each R assignment will have 3-5 exercises due on Mondays (see the due dates in the Course Schedule below). The exercises will be assigned one week ahead of the due date. Students can work on them in groups (no more than three people per group) or individually.

## Class project

The class project aims to allow students to apply social network methods to solve their interested research or real-life questions. The project idea can be developed from their previous assignments and work.

a) Project proposal
   i. Structure:
      - Topic-specific questions (no more than three questions) you are interested in exploring;
      - The background of the questions (i.e., why they are important to answer); and
      - SNA approaches you plan to employ.
   ii. Format: no more than three pages (excluding figures, tables, and references), double-spaced, 12-point font of Times New Roman, Chicago or APA 7 style

b) Final paper
   i. Structure:
      - Develop the three components in the proposal based on the instructor's feedback.

- Describe the analytical process and results. Notice that a formal and complete project is not required. Using a sample or toy data set for preliminary analysis and results is sufficient. Students can also provide hypotheses or expected results if no data is available, or analyses are incomplete.

ii. Format: no more than eight pages (excluding figures, tables, and references), double-spaced, 12-point font of Times New Roman, Chicago or APA 7 style

c) In-class presentation (In Week 14)

## Assigned Readings

As outlined in the Course Schedule and Course Materials, students should complete the required readings before each week's instruction. While the background readings are optional, they will be utilized for in-class discussions and activities. These readings show the SNA theories and applications. Students are encouraged to skim to know the basic ideas and be able to discuss them in class.

## Grading of Assignments

The grade for this course will be determined according to the following formula:

| Assignments/Activities | % of Final Grade |
|---|---|
| Getting-to-know-you survey | 1% |
| In-class discussion and activities | 15% |
| R assignments | 40%<br>(10% for each exercise) |
| Class project proposal | 12% |
| Class project presentation | 12% |
| Class project write-up | 20% |

# Letter Grades

Letter grades for the entire course will be assigned as follows:

| Letter Grade | Points | Percent |
|---|---|---|
| **A** | 4.00 | 92.5% and higher |
| **A-** | 3.67 | 90.0 – 92.49% |
| **B+** | 3.33 | 87.5 – 89.99% |

| | | |
|---|---|---|
| **B** | 3.00 | 82.5 – 87.49% |
| **B-** | 2.67 | 80.0 – 82.49% |
| **C+** | 2.33 | 77.5 – 79.99% |
| **C** | 2.00 | 72.5 – 77.49% |
| **C-** | 1.67 | 70.0 – 72.49% |
| **D+** | 1.33 | 67.5 – 69.99% |
| **D** | 1.00 | 60 – 67.49% |
| **F** | .00 | 59.99 and lower |

# Course Schedule

## Topics and Assignments

| Week/ Date | Module | Topic | Reading | Assignment Due |
|---|---|---|---|---|
| Week 1, Jan. 20 & 22 | Background | Intro. to SNA and course overview | Required readings:<br>● TedTalk: Nicholas Christakis: How social networks predict epidemics.<br><br>Background readings:<br>● ASN, Ch. 1<br>● Lazer, D., et al., (2009). Computational social science. *Science*, *323*(5915 ), 721-723. | |
| Week 2, Jan. 27 & 29 | Data Collection & Visualization | Preview of network data and research ethics<br><br>R session overview | Required reading:<br>● Borgatti, S. P., & Molina, J. L. (2003). Ethical and strategic issues in organizational social network analysis. *The Journal of Applied Behavioral Science*, 39(3), 337-349.<br><br>Background readings:<br>● ASN, Ch. 2 (one-mode), 3 & 4 | Getting-to-know-you survey due on Jan.26 |
| Week 3, Feb. 3 & 5 | Data Collection & Visualization | R session 1: Preparing network data | | |

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|---|---|---|---|---|
| Week 4, Feb. 10 & 12 | Network Structures | Node-level metrics as descriptives and covariates | Required readings:<br>● Granovetter, M. S. (1973). The strength of weak ties. *American journal of sociology*, *78*(6), 1360-1380<br><br>Background readings:<br>● ASN, Ch. 10 | R Ex. 1 due on Feb. 9 |
| No class | Spring Festival Holiday (Monday, February 16 - Friday, February 20) | | | |
| Week 5, Feb. 24 & 26 | Network Structures | Network-level characterization<br><br>Intro. to egocentric network analysis | Required readings:<br>• ASN, Ch. 9 & 12 | Class project proposal due on Feb.27 |
| Week 6, Mar. 3 & 5 | Data Collection & Visualization | R session 2: Network measures and sociograms | No readings | |
| Week 7, Mar. 10 & 12 | Modeling Network Formation | Understanding network selection and influence | Required readings:<br>● McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual review of sociology*, *27*(1), 415-444.<br><br>● Frank, K. A., Muller, C., & Mueller, A. S. (2013). The embeddedness of adolescent friendship nominations: The formation of social capital in emergent network structures. *American Journal of Sociology*, 119(1), 216-253. | R Ex. 2 due on Mar. 9 |
| Week 8, Mar. 17 & 19 | Modeling Network Formation & Effects | R session 3: Selection (QAP) & Influence models | | |
| Week 9, Mar. 24 & 26 | Meaning networks I | Epistemic Network Analysis: from social ties to epistemic ties | Required readings:<br>• Shaffer, D. W., Collier, W., & Ruis, A. R. (2016). A Tutorial on Epistemic Network Analysis: Analyzing the Structure of Connections in Cognitive, Social, and Interaction Data. *Journal of Learning Analytics*, 3(3), 9–45. | R Ex. 3 due on Mar. 23 |
| Week 10, Mar. 31 | Meaning networks I | ENA in webtool | | |

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|---|---|---|---|---|
| & Apr. 2 | | | https://doi.org/10.18608/jla.2016.33.3 | |
| No class | Qingming Festival Holiday/ Spring Break (Monday, April 6 - Friday, April 10) | | | |
| Week 11, Apr. 14 & 16 | Meaning networks II | Semantic Network Analysis | Background readings:<br>● Basov, N. (2020). The ambivalence of cultural homophily: Field positions, semantic similarities, and social network ties in creative collectives. *Poetics*, *78*, 101353. | |
| Week 12, Apr. 21 & 23 | Meaning networks II | R session 4: Word co-occurrence network in R | | |
| Week 13, Apr. 28 & 30 | Project studio / Invited talk | In-class project work (Draw your networks) + methods clinics<br><br>Invited speaker TBD | No readings | R Ex. 4 due on Apr. 27 |
| Week 14, May. 5 & 7 | Pitch Days | Students present and work on their class projects. | No readings | |
| Final Week | | | No readings | Class project paper due on May. 14 (No late penalty) |

# Course Materials

## Supplemental Materials

- You will find the following book to be a great introduction to social network analysis. We selected a few chapters from it as background readings.
    - Borgatti, S. P., Everett, M. G., & Johnson, J. C. (2018). *Analyzing social networks*. Sage.
    - It is referred to as “ASN” in the course schedule. The authors also offer an R book. Check it out if you want to read more: Borgatti, S. P., Everett, M. G.,

Johnson, J. C., & Agneessens, F. (2022). Analyzing social networks using R. Sage.

- There are many other great SNA textbooks. Read as you like.
    - Introductory books:
        - Scott, J., & Carrington, P. J. (2011). The SAGE handbook of social network analysis. SAGE publications.
        - McLevey, J., Scott, J., & Carrington, P. J. (2024). The Sage handbook of social network analysis. (Vols. 1-0). Sage Publications Ltd, https://doi.org/10.4135/9781529682618
            - Highly recommended if you want to know more about the applications of SNA in social science contexts, such as environmental policy, gender, ethnicity, cognition and social media and digital networks.
        - Newman, M. (2018). Networks. Oxford University Press.
        - Wasserman, S., & Faust, K. (1994). Social network analysis: Methods and applications.
    - (Advanced) Methods specific:
        - Lusher, D., Koskinen, J., & Robins, G. (Eds.). (2013). *Exponential random graph models for social networks: Theory, methods, and applications*. Cambridge University Press.
        - Cranmer, S. J., Desmarais, B. A., & Morgan, J. W. (2020). *Inferential network analysis*. Cambridge University Press.
- R resources
    - We will use some packages from the STATNET project (e.g., 'sna,' and 'ergm,') and 'igraph.'
    - A more recent SNA book with R:
      Rawlings, C. M., Smith, J. A., Moody, J., & McFarland, D. A. (2023). *Network analysis: integrating social network theory, method, and application with R*. Cambridge University Press. (link)
- A curated list of SNA resources: Awesome-network-analysis

# Course Policies

## Attendance and Tardiness

You are expected to attend *all* scheduled classes. If you are unable to attend a class, notify me *before* that class.

### Absences and Grades

- 5 absences will lead to an F for your participation grade.
- 8 absences will lead to a 30% reduction in your final grade.

*Updated March 2023*

- 10 absences will lead to failure of the course.

**Absence Exceptions**

*Observance of Religious Holidays:* You may miss class for the observance of religious holidays. If you anticipate being absent because of religious observance, notify me in advance so we can create a plan for making up missed work. For more on this policy: https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/university-calendar-policy-on-religious-holidays.html

*Competitions, Conferences, Presentations:* You are permitted to be absent from classes to participate in competitions, conferences, and presentations, either at home or out of town, as approved by the Associate Provost for Academic Affairs. Review the Undergraduate Bulletin for the conditions you must meet to obtain approval for this kind of absence.

*Illness:* When students are ill, they are expected to notify professors in advance of class, if at all possible. If the instructor determines that it is an excused absence then the student should negotiate with the professor the time and place for make-up of assignments, tests and/or examinations missed. Students who have been seriously ill, hospitalized and/or miss more than a week of classes due to medical reasons, should contact their academic advisor to discuss appropriate options for missed classes and/or coursework.

A student with an injury or medical condition that requires ongoing accommodations (temporary or permanent) should contact the NYU Moses Center for Student Accessibility (CSA). If an accommodation is recommended by the Moses Center, then Academic Affairs may communicate on behalf of students to advocate for excused absences/extensions. Reasonable accommodations, considering the course objectives, student learning, and fair standards, are ultimately decided by the professor.

Students who, in the judgment of the instructor, have not substantially met the requirements of the course or who have been excessively absent are not considered to have withdrawn from the course if they remain on the roster and may be given the final grade of F.

**Tardiness**

Punctual arrival is mandatory for this class. Be on time. Please do not leave in the middle of class unless it is an emergency.

## Late Assignments

Assignments are due **at the date and time indicated on this syllabus**. The late penalty for any assignments is one third of a letter grade per day (an A becomes an A-, etc.) All other late assignments will earn an F.

## Electronic Devices

*Updated March 2023*

*Mobile Devices:* You may not use mobile devices in class unless otherwise indicated.

*Recording Class:* To ensure the free and open discussion of ideas, you may not record classroom lectures, discussion and/or activities without my advance written permission; any such recording can be used solely for your own private use. If you have approved accommodations from the Office of Disability Resources permitting the recording of class meetings, you must present the accommodation letter to me in advance of any recording. Distribution or sale of class recordings is prohibited without the written permission of the instructor and other students who are recorded.

## Instructional Technology

*Email Communication:* I will contact you regularly via the NYU LMS (Brightspace). You should check for emails from me (reminders, logistics, updates, etc.) at the email address connected to NYU LMS (Brightspace). Please note that I will try to respond to your emails within 24 hours. Do not expect immediate responses to emails sent late at night or on the weekends.

*Assignment Notification:* All assignments will be posted to our class NYU LMS (Brightspace) Site. You are responsible for looking at NYU LMS (Brightspace) after each class period to learn about the next homework assignment.

*Instructional Technology Tools and Assistance:* If you need background on specific instructional technology tools, such as Zoom, NYU LMS (Brightspace) and Voicethread, check the RITS Student Toolkit. You may also email shanghai.rits@nyu.edu for assistance.

## Academic Honesty/Plagiarism*

Carefully read NYU Shanghai's *Statement on Academic Integrity* (in the Undergraduate Bulletin). Breaches of academic integrity could result in failure of an assignment, failure of the course, or other sanctions, as determined by the Academic Affairs office.

## Disability Disclosure Statement*

NYU Shanghai is committed to providing equal educational opportunity and participation for students with disabilities. It is NYU Shanghai's policy that no student with a qualified disability be excluded from participating in any NYU Shanghai program or activity, denied the benefits of any NYU Shanghai program or activity, or otherwise subjected to discrimination with regard to any NYU Shanghai program or activity. Any student who needs a reasonable accommodation based on a qualified disability should register with the Moses Center for Student Accessibility for assistance. Students can register online through the Moses Center and can contact the Academic Accommodations Team at shanghai.academicaccommodations@nyu.edu with questions or for assistance.

## Title IX Statement

Title IX of the Education Amendments of 1972 (Title IX) prohibits discrimination on the basis of sex in educational programs. It protects victims of sexual or gender-based bullying and harassment and survivors of gender-based violence. Protection from the discrimination on the basis of sex includes protection from being retaliated against for filing a complaint of discrimination or harassment. NYU Shanghai is committed to complying with Title IX and enforcing University policies prohibiting discrimination on the basis of sex. Shakera Turi (shakera.turi@nyu.edu), Executive Director of the Office of Equal Opportunity, serves as the University's Title IX Coordinator. The Title IX Coordinator is a resource for any questions or concerns about sex discrimination, sexual harassment, sexual violence, or sexual misconduct and is available to discuss your rights and judicial options. University policies define prohibited conduct, provide informal and formal procedures for filing a complaint and a prompt and equitable resolution of complaints.

**Links to the Title IX Policy and related documents:**

- Sexual Misconduct, Relationship Violence, and Stalking Policy
- Procedures for Complaints Against Students
- Procedures for Complaints Against Employees
- Resource Guide for Students
- Resource Guide for Employees

## Policy on the Use of AI/GenAI Tools

Use of AI or GenAI tools, such as ChatGPT, is permitted in this course. To adhere to NYUSH's guidelines for academic integrity and our scholarly values, you must disclose any AI-generated material they use and properly attribute it, including in-text citations, quotations, and references.

**Required Disclosure**

You should include the following statement in assignments to indicate use of a GenAI tool: "I/We acknowledge the use of [Generative AI Tool Name] (version [if applicable]), in the preparation of this assignment. Specifically, [Generative AI Tool Name] was utilized for [list specific purposes, e.g., brainstorming ideas, suggesting coding syntax, proofreading, formatting citations]." Failure to acknowledge the use of a GenAI tool will result in penalties.

If you used AI or GenAI tools for the R assignments, you must submit the log file documenting your prompts and chat with the tools. This log will be used solely by the instructor to understand students' learning processes and improve instruction. Your privacy will be respected, and the content will not be shared or used for any other purpose.

Be aware that all large language models still have a tendency to make up incorrect facts and fake citations and code generation models have a tendency to produce inaccurate outputs. Critical evaluation of AI-generated content is essential.

**Responsible Uses**

When engaging with AI or GenAI tools, do not provide information such as name, University ID#, phone number, address etc. which is personal information. Doing so is a violation of privacy regulations.

**Permitted and Prohibited Uses**
Students are welcome to use AI tools to learn coding, including annotating scripts and asking for coding syntax and debugging suggestions. Use of GenAI/AI Tools is strictly prohibited in the following areas: writing research questions or paper statements; writing the project proposal or outline; writing any part of the paper or paper elements, except for proofreading or critiquing.

Suspected violations of academic integrity will be referred to Academic Affairs. If uncertain, students should consult their professor for guidance.

# Academic Resources

## ARC Services

The Academic Resource Center (ARC) offers both individual, one-on-one tutoring as well as group sessions in a variety of ways, in a variety of courses. You can log on to WCOnline to book an appointment with a Global Writing & Speaking Fellow or a Learning Assistant (LA). The Global Writing & Speaking Fellows conduct individual consultations on writing, speaking, reading, and academic skills coaching. LAs provide both individual and small-group tutoring support in over 30 STEM, Business, Economics, IMA/IMB, and Chinese Language classes. Visit shanghai.nyu.edu/arc for more information about ARC services.

## Library Support

**Library Services**
The Library is available to support your research needs. They have access to over 27,000 print resources, 2,000 DVDs, and 1,000 databases (including over a million e-books, as well as streaming audio and video and image databases).

Librarians with expertise in your research topic are available to meet either *in person* or *online* by appointment or by email to help you navigate the research process. Our library team features experts in Business, Arts & Humanities, STEM, Social Sciences & Economics, and data tools & resources. Ask us how we can assist you in developing a research question and formulating a research strategy, to selecting databases, requesting materials, and citing your sources. Visit shanghai.nyu.edu/library for more information on:

- 24/7 access to e-books, e-journals, streaming media, and databases
- Booking one-on-one consultations for research help
- Asking the Library questions via chat or email

**Electronic Reserves**

*Updated March 2023*

Students can access course readings using their NYU credentials for courses they currently enrolled in at https://ares.library.nyu.edu/.

**Interlibrary Loan Service**

For materials not available to you immediately, you can request scanned copies of a book chapter or journal article through our Interlibrary Loan (ILL) service. If you don't know which chapter you need, you can request a Table of Content through ILL.