

Course syllabus «Introduction to Network Analysis»

Approved by
Programme Academic Council
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Authors	Dr. Vladimir Batagelj
Number of credits	4
Contact hours	48
Self-study hours	104
Course	1
Educational format	Without use of online course

I. Aim, Results of Mastering the Discipline and Prerequisites

This course is an introductory course in network analysis, designed to familiarize graduate students with the general concepts and basic techniques of network analysis in sociological research, gain general knowledge of major theoretical concepts and methodological techniques used in social network analysis, and get some hands-on experience of collecting, analyzing, and mapping network data with SNA software. In addition, this course will provide ample opportunities to include network concepts in students' master theses work.

The goal of the course is ensure that students understand topics and principles of network analysis.

As a results, students should:

Know:

- the basic principles of network analysis
- the advantages and disadvantages of various network analytic tools and methods
- the major network modeling programs

Be able to:

- explore the advantages and disadvantages of various network analytic tools and methods
- correctly selects appropriate model / method of network analysis for a given problem
- confidently uses available data to test proposed network hypotheses
- develop a solid network theoretical foundation for the project at hand
- integrate network information found from various sources and compensate for lack of data by adjusting models
- master advanced research methods, including network methods, without direct supervision, and is capable of using these methods to analyze complex models

Have:

- the skill to processe learned information, and integrate learned material into a cohesive research toolchest
- the skills to expresses network research ideas in English in written and oral communication
- the skills to effectively presents network research ideas to peers, instructors, and general audience

Basic knowledge of theories and quantitative methods of social sciences are required for this course.

The basics of this discipline should be used in the following courses and activities:

- Master thesis writing
- all other program related courses

The course is strongly related and complementary to other compulsory courses provided in the first year (e.g. Research Seminar) and sets a crucial prerequisite for later courses and research projects as well as for the master thesis. The course gives students an important foundation to develop and conduct their own research as well as to evaluate research of others.

II. Content of the Course

SESSION ONE: Introduction

Social network analysis: Methods or theory? Structural approach. Interdisciplinary interest in network analysis. Network theories most popular in sociology. Key network concepts: network, structure, nodes, ties, sociogram, structural and compositional variables, etc. Types of network data. Sampling and data collection in network analysis.

SESSION TWO: SNA methodology

Survey instruments for collecting network data. Network data collection and ethical issues. Basic measures of network characteristics. Graphic representation of network relations.

SESSION THREE: SNA methodology II

Network measures for dyads and triads. The forbidden triad. Clustering. Identifying tightly connected groups and subgroups in social networks. Small-world phenomenon. Homophily principal in personal relationships. Cultural and historical differences in network connectivity. Personal ties and social support.

SESSION FOUR: SNA methodology III

Centrality and Influence. Measures of Centrality. Two-mode networks: transformation, graphical representation, and analysis. Centrality and two-mode networks in the studies of power and influence.

SESSION FIVE: SNA models I

The strength of weak ties. Social capital at the individuals and community level. Social capital in companies' economic activities. Social capital in the labor market and its role in social mobility. Structural holes in competition.

SESSION SIX: SNA models II

Social networks and education. Representation of mental models as social networks. Diffusion of innovation through social networks. Social networks and technology. Deviant behavior, crime and social networks. Social stratification, social change, and social networks.

SESSION EIGHT – Conclusion

This session will bring all approaches to social network analysis together and apply it to the students' current projects.

III. Grading

Course grades will be computed as follows:

Course Element	% Towards Final Grade
Course Project	50%
<i>Final Research Project</i>	50%
Participation and responsibility grade	50%
<i>Homework Assignments (5 x Varied points)</i>	20%
<i>In-Class Labs (9-10 x Varied points)</i>	20%
<i>Quizzes (Best 9 of 10, Varied points)</i>	10%
Extra credit	As assigned
Total	100%

IV. Grading Tools

Project. Detailed information on topic presentations will be provided in class. Some example broader topics are listed below.

- The Dark Side of Social Capital
- Embeddedness and Firm's Financial Performance
- Social Capital in the Labor Market
- Homophily in Personal Ties
- Cultural Differences in Personal Networks
- Technology and Personal Networks
- Networks and Innovations
- Connections between Government and Corporations: Consequences for Democracy
- Network Analysis of International Trade Relations
- Deviant Behavior and Social Networks
- Social Networks and Crime
- Use of Social Network Analysis in Criminal Investigations
- Social Network Analysis of Social Networks
- Use of Centrality Measures in Identifying Powerful Individuals
- Graphic Representation of Network Connections
- The Role of Embeddedness in Times of Economic or Political Instability
- Small World Phenomenon
- Social Support and Health
- Are Weak Ties Always Strong?
- Social Isolation

- Current Topics in Social Network Theory
- Social Capital and Social Mobility
- Gender/Ethnic/Class Differences in Personal Networks

Homeworks

Homework assignments are handed out in class (during seminars) and will be available electronically. Late homeworks are not accepted. All homeworks should be submitted via LMS.

Quizzes

Every seminar will have a quiz on the lecture material and all assigned readings for the week. This includes the very first seminar, which will focus on Lecture 1 material. All quizzes will be done online and submitted via SurveyMonkey (links will be given in class).

In-class Labs

There will be a lab assignment in almost every seminar. Seminar labs should help with R. You can submit in-class assignment with the homework.

Rounding and grade calculation

The final grade is an average of a cumulative grade and a final project grade. Grades earned as percentages will translate into point grades in 10% increments: 10% - 1 point. 20% - 2 points, etc. Grades will be assigned as whole grades only. Grade rounding follows the standard mathematical averaging rules: 34.9% is a 3: 34.99999% is a 3, and only 35.0% is a 4.

V. Sources

5.1 Main Literature

1. Alhajj, Reda, and Jon Rokne. Encyclopedia of social network analysis and mining. Springer Publishing Company, Incorporated, 2018. URL <https://link.springer.com/referencework/10.1007/978-1-4939-7131-2>. Springer Link.
2. De Nooy, Wouter, Andrej Mrvar, and Vladimir Batagelj. Exploratory social network analysis with Pajek. Cambridge University Press, 2005. URL <https://ebookcentral.proquest.com/lib/hselibrary-ebooks/detail.action?docID=237594&query=Exploratory+social+network+analysis+with+Pajek>. Proquest.
3. Models and Methods in Social Network Analysis, edited by Peter J. Carrington, John Scott, and Stanley Wasserman. Cambridge University Press, 2005. ProQuest Ebook Central. URL <https://ebookcentral.proquest.com/lib/hselibrary-ebooks/detail.action?docID=228772#>. Proquest
4. Luke, Douglas A. A user's guide to network analysis in R. London, England: Springer, 2015. URL <https://link.springer.com/book/10.1007/978-3-319-23883-8>. Springer Link.
5. Kolaczyk, Eric D., and Gábor Csárdi. Statistical analysis of network data with R. Vol. 65. New York: Springer, 2014. URL <https://link.springer.com/book/10.1007/978-1-4939-0983-4>. Springer Link.

Additional Literature

1. Lazega, Emmanuel, and Tom AB Snijders, eds. Multilevel network analysis for the social sciences: theory, methods and applications. Vol. 12. Springer, 2015. URL <https://link.springer.com/book/10.1007%2F978-3-319-24520-1> Springer Link.
2. Kadry, Seifedine, and Mohammed Z. Al-Taie. Social Network Analysis : An Introduction with an Extensive Implementation to a Large-Scale Online Network Using Pajek, Bentham Science Publishers, 2014. ProQuest Ebook Central. URL <https://ebookcentral.proquest.com/lib/hselibrary-ebooks/detail.action?docID=1610031#>. Proquest.
3. Newman MEJ. Networks: An Introduction. Oxford: OUP Oxford; 2010. URL <http://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=458550>. Ebsco.

5.2 Software

№ п/п	Name	Access conditions
1.	MicrosoftWindows 7 Professional RUS MicrosoftWindows 10 MicrosoftWindows 8.1 Professional RUS	<i>From the university's internal network (contract)</i>
2.	Microsoft Office Professional Plus 2010	<i>From the university's internal network (contract)</i>
3.	R, R studio, R Markdown	<i>From the university's internal network (contract)</i>

5.3 Material and technical support

Classrooms for lectures on the discipline provide for the use and demonstration of thematic illustrations corresponding to the program of the discipline, consisting of:

- PC with Internet access (operating system, office software, antivirus software);
- multimedia projector with remote control.