

Graduate School in Social and Political
Sciences
University of Milan

Social Network Analysis
Academic Year 2020-21

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Office hours: By email appointment only

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Course duration: 30 hours

ECTS Points: 3

Objectives

The course aims at providing Ph.D. students with concepts and tools to independently pursue an empirical social network research. By engaging in hands-on, case-based lectures, students will be able to:

- assess whether and which social network research design is appropriate to a target research question
- design a network survey
- compute statistics to describe network- and individual-level properties

- test hypotheses of causal mechanisms through state-of-the-art statistical modelling

Prerequisites

Substantial

The course requires:

1. basic understanding of probability theory and statistics covered by the GSSPS mathematical and statistical courses;
2. working knowledge of R, RStudio, and Rmarkdown, as covered by the GSSPS *Introduction to R* course.

The reading of [Bonacich and Lu \(2012\)](#) (chapters 1-4, 7-8, 14) (available on shared folder, see email communication) is recommended before the course.

Technical (for those attending from home)

Students will be required to use a computer with the latest versions of the following softwares installed (both free and available for all OS):

- R
- RStudio Desktop

Assessment

Students will be required to actively participate to classes by engaging in discussions and performing assignments. During the final meeting, students will be required to make an oral presentation reporting:

- a) a simple analysis of network data (provided by the instructor or collected by self);
- b) a critical analysis of a previously assigned article reporting empirical network research;
- c) the design of an empirical network research related to their own dissertation project.

Material

All course material (readings, code notebooks, lecture slides, etc.) will be uploaded on a shared folder in due time (see email communication). Lecture slides and code notebooks will be uploaded after each class meeting.

Auxiliary readings will be provided throughout the course, mostly as selected chapters of [Robins \(2015\)](#), [Borgatti, Everett, and Johnson \(2013\)](#), and [Scott \(2013\)](#).

A reading list with suggested readings will be provided during the course.

Programme

Note: all hours are CET time

1. 26 April, 2.30 pm
 - why social network research
 - social relationships vs. relational data
 - graphs: layers, levels, modes
2. 28 April, 12.30 am
 - research design: sociocentric vs. egocentric
 - name (resource) generators and interpreters
 - network survey questions: memory, social desirability, ethics
3. 3 May, 2.30 pm
 - workflow tools: version control and collaboration with `git` and GitHub
 - data import and management: edgelist and adjacency matrices
 - introducing `sna/igraph` and `tidygraph`
4. 5 May, 12.30 am
 - connectivity: degree distribution and density
 - distance and paths
 - subgraphs, cliques, clusters
5. 10 May, 2.30 pm
 - centrality and centralization
 - cohesion

- core-periphery
6. 13 May, 12.30 am
 - statistical testing for network data
 - QAP tests and (multivariate) correlation
 7. 20 May, 12.30 am
 - statistical modelling of network data
 - *Exponential Random Graph Models* (ERGM) for cross-sectional data with `statnet`
 8. 27 May, 12.30 am
 - *Stochastic Actor-Oriented Models* (SAOM) for panel data with `RSiena`
 - *Agent-Based Models* (ABM) of behaviour-network co-evolution
 9. 31 May, 2.30 pm
 - wrap-up
 10. 7 June, 2.30 pm
 - students' presentations

References

- Bonacich, Phillip, and Philip Lu. 2012. *Introduction to Mathematical Sociology*. Princeton, NJ: Princeton University Press.
- Borgatti, Stephen P., Martin G. Everett, and Jeffrey C. Johnson. 2013. *Analyzing Social Networks*. London: Sage.
- Robins, Garry. 2015. *Doing Social Network Research. Network-Based Research Design for Social Scientists*. London: Sage.
- Scott, John. 2013. *Social Network Analysis*. 3rd ed. London: Sage.