

# **Social Networks in Economic Geography**

## **(Spring 2025/2026)**

### **Instructor:**

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### **Aims and objectives and description of the course:**

The course aims to cover introduction to network science, network science methods, and recent research in spatial social networks and their impact on economic and technological progress. Students will learn R programming tools to work with network data, visualize networks and analyze them. Students will have to develop their research ideas on networked phenomena, with the potential to connections to their PhD project.

### **Learning outcomes:**

The completion of the course will enable to reach the following outcomes:

- Learn basic concepts and techniques of applied network science.
- Learn theory and concepts of social networks, and their relevance to economic outcomes.
- Learn about the recent research on social networks in cities and regions.
- Acquire skills in R programming and software tools to work with networks.
- Learn statistical methods to analyze networks and networked phenomena.
- Familiarize with agent-based modeling of spatial diffusion on networks.

### **Course description**

The 2024 spring sessions of the Social Networks in Economic Geography course deal with empirical approaches on spatial social networks and on economic and technological processes. The course includes lectures and discussion with students. The lectures will incorporate on how spatial social networks are described by quantitative tools, how the dynamics of social networks in space can be quantified and modelled, how these are related to economic- and technological progress and innovation diffusion. The coursework will focus on reading the given material and an assignment must be written by the students.

### **Schedule of the course**

<b>Week</b>	<b>Content</b>	<b>Reading</b>
1. March 13, 9.00- 12.00	<b>Network science introduction</b> <ul style="list-style-type: none"><li>• Definitions</li><li>• Network models</li><li>• Node and network characteristics</li><li>• Community detection</li></ul>	Barabási 2017  Mandatory Chapters: 2, 9  Optional Chapters that we will talk about: 3, 4, 5
2. March 20, 9.00-12.00	<b>Social networks in geographical space</b> <ul style="list-style-type: none"><li>• Costs and benefits of ties</li><li>• Distance effect</li><li>• Spatial modularity</li><li>• Networks in cities</li></ul>	Borgatti et al. 2009, Lengyel et al. 2015

3. March 27, 9.00-12.00	<b>Dynamics of networks</b> <ul style="list-style-type: none"> <li>• Advice networks in clusters</li> <li>• Proximity dimensions</li> <li>• Roles in networks</li> </ul>	Glückler 2007, Juhász and Lengyel 2018
4. April 17, 9.00-12.00	<b>Networks of innovation and regional development</b> <ul style="list-style-type: none"> <li>• Brokers in networks</li> <li>• Brokerage and atypical innovations</li> <li>• Co-worker networks and agglomeration externalities</li> <li>• Productivity growth</li> <li>• Network fragmentation and inequalities</li> </ul>	Abbasiharofteh et al 2023, Burt 2004, Eriksson and Lengyel 2019, Tóth et al. 2019
5. April 24, 9.00-12.00	<b>Spatial diffusion through networks</b> <ul style="list-style-type: none"> <li>• Innovation diffusion</li> <li>• Complex contagion vs virus spreading</li> </ul> Bass ABM	Lengyel et al. 2018, Brockman and Helbing 2013
6. May 8, 9.00-12.00	<b>Project Presentations</b>	

### **Methodology to be used:**

Students must read the papers for each class that we will discuss. Then, every class will provide a short tutorial in R coding to deal with the research problem in question.

Students will have to prepare research ideas on networked phenomena, ideally connected to their own PhD project. This research idea must be presented at the end of the course and a short research paper must be written about it.

### **Assignments:**

Students must prepare for every class by reading the papers assigned to the class. Their knowledge will be checked in detailed group discussion.

A research idea must be presented at the end of the course. Deadline: 6<sup>th</sup> week.

A short, written assignment is obligatory. The paper must cover the learned material and the research idea, and be prepared in pdf format, fulfilling the formatting requirements (font size 12, line spacing 1.5, 2.5 margins, times new roman font, page numbering) and essay standards. Deadline for submissions: to be discussed with students. Coverage: 5-7 pages.

### **Assessment, grading:**

1. **Discussion:** Papers must be read for the class, which will be checked in every meeting. – **30%**
2. **Presentation of research projects:** Students will prepare and present network-related research ideas – **20%**
3. **Written assignment.** It is obligatory to submit a short paper in order to complete the course – **50%**

### **Compulsory reading:**

Abbasiharofteh, M., Kogler, D.F., Lengyel, B. (2023) Atypical combination of technologies in regional co-inventor networks. *Research Policy*.

Burt, R (2004) Structural holes and good ideas. *American Journal of Sociology* 110 (2)  
<https://doi.org/10.1086/421787>

Borgatti, S. P., Mehra, A., Brass, D. J., & Labianca, G. (2009). Network analysis in the social sciences. *Science*, 323(5916), 892-895.

Brockmann, D., & Helbing, D. (2013). The hidden geometry of complex, network-driven contagion phenomena. *Science*, 342(6164), 1337-1342.

Eriksson, R. H., & Lengyel, B. (2019). Co-worker networks and agglomeration externalities. *Economic Geography*, 95(1), 65-89.

Glückler, J. (2007). Economic geography and the evolution of networks. *Journal of Economic Geography*, 7(5), 619-634.

Juhász, S., & Lengyel, B. (2018). Creation and persistence of ties in cluster knowledge networks. *Journal of Economic Geography*, 18(6), 1203-1226.

Lengyel, B., Bokányi, E, Di Clemente, R., Kertész, J., & González, M. C. (2020). The role of geography in the complex diffusion of innovations. *Scientific Reports* 10, 15065 (2020)

Lengyel, B., Varga, A., Ságvári, B., Jakobi, Á., & Kertész, J. (2015). Geographies of an online social network. *PLoS ONE*, 10(9).

Tóth, G., Wachs, J., Di Clemente, R., Jakobi, Á., Ságvári, B., Kertész, J., & Lengyel, B. (2021). Inequality is rising where social network segregation interacts with urban topology. *Nature Communications* 12, 1143 (2021).

### **Recommended readings:**

Barabási, A-L (2017) *Network Science*. <http://networksciencebook.com>