IMPRS for Population, Health and Data Science
INTERNATIONAL MAX PLANCK RESEARCH SCHOOL

MAX PLANCK INSTITUTE FOR DEMOGRAPHIC RESEARCH

IDEM 156
GIS and spatial analysis in interdisciplinary research

Stefan Leyk

Start: 16 June 2025
End: 20 June 2025
Location: Max Planck Institute for Demographic Research. Onsite-only course.

Instructor:

- Stefan Leyk, University of Colorado Boulder

Course description

Were you ever thinking it would be useful to create compelling maps and visuals to present your data and analysis results to a broader audience more effectively? Were you ever hoping to be able to extend your statistical analysis of demographic and epidemiological data through means of geospatial analytics? How much would you learn from studying spatial distributions and spatial patterns of mortality and how these relate to environmental conditions and population characteristics?

This course will equip you with the skills and knowledge needed to tackle these and many other tasks. It is designed as an introductory class to Geographic Information Systems (GIS) suitable for graduate and postgraduate students with interest in research ranging from social to environmental sciences as well as interdisciplinary settings including demography, epidemiology and data science. Students will learn about GIS tools and their underlying principles and how to apply GIS to analytical and mapping-related tasks.

The course will introduce basic theoretical and practical elements of GIS and the geospatial sciences that are important to get started on an independent GIS project, handling and managing geospatial data, creating maps and conducting GIS-based analysis. Students will work in QGIS software on tasks typically encountered in their research or in GIS-related work generally. The concepts discussed during lectures will be directly put into practice to better understand underlying mechanics, results, problems and important implications resulting from decisions made based on such results.

Organization

Each of the five morning lectures will provide a general introduction to the topics of the day and explore relevant concepts and methods. These topics include properties of geospatial data, the fundamentals of mapping, concepts of scale, resolution and uncertainty, spatial analytics in vector and raster data, as well as automated geoprocessing and cartographic modeling. The afternoon sessions will consist of a guided set of computer exercises. Morning lectures are held from 10:00-11:30 CEST and afternoon sessions are held from 13:00-15:30 CEST. It is expected that students will spend about 6-8 hours per day on the course (including lectures and lab sessions as well as pre- and post-lecture studies and computer work). The course will be held as in-person event. A maximum of 18 students will be admitted to the course.

Course prerequisites

Students will need a laptop (if not please contact phds@demogr.mpg.de) and are expected to have installed the latest version of QGIS software on their computer. They should be able to navigate through their operating system and understand principles of file management. Prior experience in GIS software will be helpful but is not required.

Instructions on how to download and install QGIS will be sent to participants before the start of the course.

Examination

There will be no final exam at the end of the course. Students will be graded and receive a certificate based on attendance and successful completion of the afternoon assignments.

General readings

- Bolstad, P. and Manson, S. 2022 GIS Fundamentals: A First Text on Geographic Information Systems. 7th Ed. Eider Press.

Additional readings will be provided prior to the course. The textbook will be available at the MPIDR library during the course.

Tuition

There is no tuition fee for this course. Students are expected to pay their own transportation and living costs. If you are accepted, MPIDR can provide advice on convenient places to stay in Rostock.

Recruitment of students external to the IMPRS-PHDS network

- Applicants should either be enrolled in a PhD program or have received their PhD.
- A maximum of 18 students will be admitted.
- The selection will be made by the MPIDR based on the applicants' scientific qualifications.

How to apply

- Applications have to be submitted online via https://survey.demogr.mpg.de/index.php/185674
- You will need to attach the following items integrated in a *single pdf file*:
    - (1) Curriculum vitae, including a list of your scholarly publications.
    - (2) A one-page statement of your research and how it relates to the course. At the end of your statement, in a separate paragraph, please confirm that, if admitted, you will be able to come without financial aid from our side.
- Application deadline is 31 March 2025.
- Applicants will be informed of their acceptance by 15 April 2025.
- Applications submitted after the deadline will be considered only if logistically feasible.

Email inquiries about the course, the application process, MPIDR, IMPRS-PHDS, and IDEM should be sent to phds@demogr.mpg.de.