

Course proposal

Geographic Information Systems (Master level course)

Planned start: Spring 2015

Credits: 10

Teacher: Andreas Forø Tollefsen (a.f.tollefsen@sosgeo.uio.no) and invited external lecturers

Course Content

This course explores in-depth how Geographic Information Systems (GIS) can be used to study social processes. GIS has become an important tool, not only for planners and in risk assessment, but also in studies of the society, environment, and the interactions between them. Through lectures, the students will learn about the fundamental components of GIS, and apply this knowledge in a series of hands-on seminars and an individual project.

Spatial data is special data. In this course, the students will learn about the unique methodological aspects concerning spatial data which includes collecting, managing, analyzing and presenting such data and the respective results. A larger section of the course is devoted to spatial analytical methods and introducing the students to basic spatial econometrics, including spatial regression.

In addition, the course will introduce the students to qualitative GIS, an expanding tool in critical geographical research using bottom up approaches and participatory information collection to study social processes.

A larger share of the course will use ESRI ArcGIS, but open-source alternatives, such as QuantumGIS and R will also be introduced, highlighting the diversity of available GIS software.

Learning outcome

The students will learn about the fundamental components of a GIS, from the user and software side to the particular methods used to obtain information from spatial data. More specifically, this involves distance measurements, spatial dependency and autocorrelation, spatial clustering, spatial interpolation, and spatial regression methods.

The students will also learn how qualitative GIS can be used in social science research, both as an analytical tool as well as an information collection tool in participatory GIS.

Knowledge

- Understand the special nature of spatial data and how they are different from non-spatial data
- Learn about the key components of a GIS, including users, databases, software, and networks
- Learn how we can collect and manage spatial data in both file formats and databases
- Learn basic to advanced spatial analytical methods, including interpolation and clustering
- Learn about bottom-up GIS and participatory GIS
- Learn basic visualization techniques and cartographic principles

Skills and competence

- Develop skills to master GIS software such as ArcGIS, QuantumGIS, and R
- Apply methods and techniques discussed in lectures in hands-on seminars
- Unite experience from lectures and seminars to complete a project where GIS will be used to study a social phenomenon
- Discuss sources of uncertainty and error in spatial data
- Create data models used to answer specific spatial questions

Suggested previous knowledge

SGO1910 or similar introductory GIS courses. Basic understanding of computer systems recommended.

Teaching

The teaching will consist of 10 (TBD) lectures and 12 seminars. In addition, the students will individually on a larger project. The seminars will consist of hands-on lab exercises where each student will work on solving spatial questions using GIS. The seminars will also function as a project helpdesk, where the students can receive assistance with their ongoing project work.

Examination

Assessment of the course is based on the individual project report, adjusted through an oral examination centered on the project report.

Lectures

Key readings

Longley, Paul. Geographic information systems and science. John Wiley & Sons, 2005.

Chun, Yongwan, and Daniel A. Griffith. Spatial Statistics and Geostatistics: Theory and Applications for Geographic Information Science and Technology. SAGE, 2013.

Cope, Meghan, and Sarah Elwood, eds. *Qualitative GIS: a mixed methods approach*. Sage, 2009.