Topics covered

- Introduction to spatial statistics.

- Examples of datasets in spatial analysis. Geostatistical data, lattice data, spatial point patterns, spatial set patterns.

- Software for spatial analysis. R.

- Spatial objects and methods in SP package.

- GIS (geographic information systems).

- Spatial objects and methods in SF package.

- Conversion of spatial objects between SP and SF packages.

- Geographic maps in R.

- Spatial exploratory data analysis.

- Introduction to random fields theory.

- Stationarity, covariance and variogram models, isotropic models. Anisotropy.

- Covariance functions as positive definite functions. Their basic properties.

- Estimation of random fields.

- Prediction of random fields. Kriging methods.

- Random fields model diagnostics.

- Monitoring network optimization.

- Spatial point processes.

- Point pattern representation in SPATSTAT package.

- Estimation of point patterns. Investigating intensity. Covariates.

- Poisson spatial process.

- Simulation of spatial processes.

- Investigating spatial randomness. Kolmogorov-Smirnov test of CSR.

- Fitting models for spatial processes.

- Marked point processes.

- Distance methods for point processes.

- Spatio-temporal point processes.

- Working with Big spatial data.