# Introduction to Geospatial Data Visualization II (advanced)

**Lecturers**: Viktor Lagutov, Elizaveta Khazieva, Joszef Laszlovsky, Ruben Mnatsakanian, Katalin Szende
**Credits**: 1 credit
**Duration**: November - December
**Course level:** PhD / MA
**Maximum number of students:** 15
**Pre-requisites:** Introduction to Geospatial Data Visualization I
**Software:** qGIS, online mapping tools (e.g. Google Earth Engine, ArcGIS Online)
**Course e-learning site:** http://ceulearning.ceu.edu

## Aims, Objectives and Learning Outcomes

Rapidly growing cross-disciplinary recognition and availability made Geospatial Methods in general, and Mapping a popular approach in many research areas. Latest advances in hardware and software have opened this area to researchers in many disciplines and allowed them to enhance traditional research methods. The wide spectrum of such technologies and approaches is often referred as Geographic Information Systems (GIS) and includes, among others, mapping packages, geospatial analysis, crowdsourcing with mobile technologies, drones, online interactive data publishing. The geospatial literacy is becoming not an optional advantage for researchers and policy officers, but a basic requirement for many employers.

The aim of the course is to build upon students' basic understanding of GIS applications, developed in the course "Introduction to Geospatial Data Visualization I", and further advance their skills in the use of geospatial data and various potential applications of GIS. The sessions provide both theoretical understanding and practical use of geospatial data and technologies for mapping societal and environmental phenomena. Students will learn basic features of GIS packages and the ways to utilize them for own research. The course will be accompanied by a series of guest lectures and workshops on mapping methods and applications conducted under the framework of Spatial Mapping and Analysis Research Group (SMARG).

The course is focused on practical skills in geospatial data visualization (mapping) and consists of

- Theoretical sessions on principles of geospatial data visualization, cartography and GIS basics;
- Practicals on learning GIS methods and getting mapping skills using free open source packages;
- Supervised and independent students' work on individual course projects.

By the end of the course students should be able to

- understand principles of data mapping and benefits of using different packages;
- acquire geospatial and other related datasets useful for mapping;
- develop own datasets based on different data sources;
- create simple maps using several mapping packages and online mapping tools (e.g. qGIS. GEE).

The most widespread basic geospatial software packages will be used to showcase the modern techniques of geospatial data collection, generation, and visualization. Alternative ways of collecting geospatial data will be considered, including both online data mining and datasets development by researchers. In addition, participatory science (geospatial data crowdsourcing) will also be discussed as one of data generation techniques. Both desktop and online packages will be considered. Geospatial data visualization will be conducted using free open sourced software packages: QuantumGIS (qGIS), Google Earth Engine.

Brief theoretical presentations and detailed step-by-step exercises will be followed by participants' individual practical work on short assignments and larger course projects. The course is based on "learn-by-doing" approach: the principles and tools described during the practical presentations will be accompanied by students' individual and supervised work on course projects. Successful participation in and completion of the course depends on student's ability for independent work and self-education.

| Learning outcomes | Assessment | Activities | Estimated workload (h) |
|---|---|---|---|
| Hands on experience with mapping software, basic spatial analysis techniques, datasets development | In-class exercises and homework | Self-study, library/ internet search and reading, consultations | 10 |
| Practical skills of data visualization and sharing using online mapping tools | In-class exercises and homework | Self-study, individual work and step-by-step exercises, consultations | 10 |
| Acquaintance with online satellite imagery / their products, basic image classification techniques | In-class exercises and homework | Self-study, individual work and step-by-step exercises, consultations | 10 |
| Knowledge of data collection in the field and crowdsourcing techniques | In-class exercises | Self-study, individual work and consultations | 4 |
| Development and implementation of Mapping Project | Individual project | Individual and supervised work on term project, reading, consultations | 20 |
| Awareness of mapping applications in public policy, humanities and social studies | Class participation | Case studies presentations by instructors; presentations of projects by course participants | 6 |
| **Total** | | | **60** |

## Sessions outline

| N | Session description | Instructors | Exercises |
|---|---|---|---|
| 1 | QGIS advanced – data manipulation, georeferencing and digitizing | V.Lagutov, TAs | Submit Ideas for Individual Project; Develop own dataset using georeferencing |
| 2 | QGIS advanced (cont.) – introduction to spatial analysis (in vector raster) | V.Lagutov, TAs | Submit own map based on the class exercise |
| 3 | Online tools – introduction to Google Earth Engine Explorer | V.Lagutov, TBC | Submit own map based on the class exercise |
| 4 | Online tools (cont.) - Data collection in the field and crowdsourcing, Esri Story maps | V.Lagutov, TAs | Individual project progress report |
| 5 | Applications of geospatial methods – case studies presentations by course instructors, invited guests | Course instructors | Work on individual project, consultations |
| 6 | Project presentations – work on final projects, consultations | V.Lagutov, TAs | Individual project |

## Course Assessment

The course enrolment is only for grade, what is based upon student's performance through:

- 30% practical sessions: several in-class exercises to be completed;
- 70% graded individual project: mapping project to be developed and presented.

A topic for course mapping project can be selected from the list provided or suggested by students. It can be relevant to thesis research or other courses.