

QGIS: A HANDS-ON PRIMER TO EXPLORATORY “SPATIAL” DATA ANALYTICS (ESDA) AND VISUALIZATION

SEMESTER: FALL 2026 (August - December)

COURSE CODE: LH-E-811-E

INSTRUCTOR: Sriroop Chaudhuri

INTRODUCTION:

Sound knowledge of space forms a specialized brand of data science that has become a key policy tool these days. By the same token, the need of trained professionals in the science of Geographic Information System (GIS) have flourished. GIS is not just about simple map-making but performing more sophisticated spatial analysis for data extraction to support data-driven decision making about space. GIS talks about space, and more importantly, how that space changes over time, either due to natural process (e.g. sea-level rise) or human activities (e.g. unplanned urbanization). These days, GIS tools and techniques are being extensively used in natural resources conservation, business analysis, crime mapping, mining and mineral explorations, building defence security systems, smart city planning, laying out new road networks and sewer lines, to name a few.

This course will offer a hands-on training with QGIS, the most popular open-sourced GIS software toolkit in recent times, divided into 4 core modules.

CORE COURSE MODULES (TENTATIVE):

- VECTOR DATA ANALYSIS
 - Introduction to GIS Data and QGIS
 - Shapefiles and Thematic Mapping
 - Querying and Information Extraction
 - Editing Attribute Data
 - Geoprocessing (e.g. clip, merge, union, buffer)
 - Computing Statistics
 - Digitizing and Creating Shapefiles
- GOOGLE EARTH PRO
 - Digitizing points, lines, polygons
 - Creating New Shapefiles for Advanced Analysis in QGIS
- RASTER DATA ANALYSIS
 - Surface Interpolation with IDW and Spline
 - Contouring
- DIGITAL CARTOGRAPHY
 - Creating Visually Dynamic Layouts

COURSE GRADING RUBRIC:

- 3-4 in-class, hands-on assignments (15-20 points)
- A final component (~30 points)

COURSE PREREQUISITE:

- No prior mapping experience required

- Interest in spatial data analysis and map making

MODE OF INSTRUCTION:

- 100% hands-on, in-class exercises using QGIS and Google Earth Pro
- No Textbook necessary

MODE OF COURSE ASSESSMENT:

- Continuous

WHY TAKE THIS COURSE...?

As the earth surface is changing rapidly, GIS tools offer actionable guidelines for space-based management options to keep up with that change. What gives GIS clear edge over statistical data analytics is that it shows the underlying spatial patterns in the data (e.g. preferred area to set up a retail store based on customer accessibility), which is not apparent by traditional statistics. In this course, with several hands-on exercises, you will learn the functionalities of GIS, how to extract information, and use them for efficient decision making.