Geographic Information Systems (GIS) – BISC 7529

Held remotely

Instructor: Peter Galante pgalante3@fordham.edu
Dates: Thursday, 27 May – Monday, 31 May ; 9AM – 5PM

Overview:
Geographic information systems (GIS) are powerful tools for analyzing fundamental geographic questions. GIS involves generating, managing, linking, manipulating, and implementing data in many different formats. The most common way is as visualized information in the form of two-, and sometime three-, dimensional maps. This course will cover major topics in GIS with applications for the broad field of Biology and natural sciences, yet theories can easily be applied to economic development, urban planning, epidemiology, and many aspects of the anthropogenic world. The goal of this course is to teach students a level of GIS proficiency such that they will be self-sufficient in their further learning and use of GIS.

GIS can be implemented in many forms, from looking at paper maps and spreadsheets, to using stereographic images, to computer graphical user interfaces (ESRI ArcMap, QGIS, DIVA-GIS), to programmatically using R or python.

This course is an intense, five-day short course combining short lectures that will cover basic ideas and concepts, paired with longer, hands-on computer laboratory exercises that will provide experience learning the free, open-source GIS software QGIS.

Basis for evaluation:
Students will be evaluated on the following:

- Attendance and participation 5%
- Lab exercises 10%
- Project proposal 25%
- Independent Project 60%

Assignments:
Each section of laboratory exercise will be turned in digitally (via email). There will be one or two laboratory exercises each day. Each student is expected to develop a unique project proposal that will demonstrate their comprehensive understanding of GIS to further their graduate research. Through feedback between instructors and fellow graduate students, these proposals will be developed into a major GIS analysis that will combine spatial, tabular, and other sources of information to create a project that will in some way benefit their larger graduate projects.

Powerpoints (etc.) of final projects will be due within 1 month of the final class (27 June, 2019) and include (but not limited to): What question are you interested in asking? What is your expected final product? What types of analyses do you expect to use? What types of data do these analyses require? Accurate and complete methods description. What results did you find from GIS? How do your results relate to your overall question?

Academic integrity:

All students are expected to abide by the standards of academic integrity. All work submitted is expected to be an individual effort, unless explicitly instructed to work in groups. Plagiarism, cheating, and dishonest research will not be tolerated and result in a zero grade for all parties involved.

Tentative schedule:

Thursday 27 May, 2019

- Introduction to GIS
  - What is GIS
  - Vector data
  - Raster data
- Locality Information
  - Datums
  - Coordinate Systems
  - Projections
- Using QGIS
  - Overview
  - GIS data files
  - Basic operations
  - The QGIS interface
  - Follow along using QGIS
  - Maps

Labs

- GBIF and Mapping

Friday 28 May, 2019

- Deep dive: vector data
  - Tables
    - Field types
    - Editing fields
    - Adding fields
    - Follow along joining tables
- Deep dive: raster data
- Follow along data conversions
- Introduction to GPS

Labs

- GPS
- Vector editing

Saturday 29 May, 2019

- Remote sensing
- Raster calculator
- Follow along using plugins

Labs

- Raster Calc Remote Sensing

- NDVI

Sunday 30 May, 2019

- Georeferencing a map follow along
- Spatial Analysis follow along

Labs

- Spatial Analysis
- Independent project development

Monday 31 May, 2019

- Make-up work
- Topic review
- Independent project development