GEOG2157 Open-source GIS

 # Fulfill requirements of method-related courses

TIMETABLE ARRANGEMENT: Annual; 2nd Semester **CREDITS:** 6

COURSE TEACHER(S): Dr. Yongsung LEE

ASSESSMENT:

COURSEWORK 100 %

- Individual weekly lab assignments
- Individual mini projects
- Group term project

OBJECTIVES:

This course has two main objectives. Firstly, it aims to demonstrate the increasing capacity of open-source GIS in disseminating spatial data sets in non-conventional formats. Secondly, it aims to impart practical skills in manipulating and analyzing data sets from both public and proprietary sources.

COURSE SYNOPSIS:

Advancement in information and communication technologies have led to unprecedented increases in spatial data in non-conventional formats. These data contain rich information about various parts of life in the cities and their management. Open-source GIS has thus become a critical tool for the retrieval, manipulation, analysis, and visualization of such data. We know that active user communities behind open-source GIS (e.g., Stack Exchange and GitHub) support effective and expedient handling of new forms of data, whereas commercial GIS software (e.g., ESRI ArcGIS) provides a reliable analytical environment for wide-ranging applications. In this context, the course introduces spatial analysis and data visualization options via open-source GIS. As an introductory course to undergraduate students in the lower division, this course includes a showcase of diverse datasets and their potential values, and hands-on practices about uses of these datasets. Upon completion of the course, students will be able to identify and handle relevant data, as well as apply spatial analysis tools to uncover patterns and processes in contemporary urban living environment.

LECTURE TOPICS:

- Basics in programming (e.g., variable/data types, join, iteration, and user-defined functions)
- Processing of data with spatial information (e.g., spatial join and processing)
- Retrieval and manipulation of data in various formats from diverse sources (e.g., Social Network Services (SNS), search engines, apps for business reviews, housing transactions, and mobility services)
- Communication with the non-technical audience, via interactive maps and charts (e.g., online dashboard)

RECOMMENDED READING LIST:

- Lovelace, R., Nowosad, J., & Muenchow, J. (2019). Geocomputation with R. Boca Raton, FL: CRC Press.
- Singleton, A. D., Spielman, S., & Folch, D. (2017). Urban Analytics (Spatial Analytics and GIS). Los Angeles, CA: Sage Publications Inc.
- Bivand, R. S., Pebesma, E. J., & Gomez-Rubio, V., (2013) Applied Spatial Data Analysis with R (2nd Edition). NY, NY: Springer.

	Course Learning Outcomes (CLOs) After completing this course, students would be able to:	**Alignment with Programme** Learning Outcomes (PLOs)*						**Course Assessment Methods**
		1	2	3	4	5	6	
1	understand basic knowledge in open-source GIS (e.g., variable/data types, join, iteration, and user-defined functions)			✔	✔			Weekly lab assignments
2	Handle data with spatial information (e.g., spatial processing of ESRI shapefiles and geocoded data)	✔	✔	✔	✔			Weekly lab assignments, mini projects & term project
3	collect and manipulate data in various formats from diverse sources, both public and proprietary	✔	✔	✔	✔			Weekly lab assignments, mini projects & term project
4	communicate underlying spatial patterns and processes to the non-technical audience, with intuitive, visually appealing, and interactive maps and charts			✔	✔	✔	✔	Mini projects & term project

*Geography Major Programme Learning Outcomes (PLOs)

In order to meet the demands and challenges in this dynamic and ever-changing world, the Department has designed a series of well-structured and contemporary courses to cater to the different interests of students. Its courses are designed to align with the University's educational aims which hope to nurture future generations not only with a critical and intellectual mindset, but also with a passion to contribute to society in general.

After completing the programme, Geography Major students should be able to:

PLO1 **critically analyse the geographical aspects of the relationship between people and the natural environment;**

PLO2 **demonstrate and develop an understanding of how these relationships have changed with space and over time;**

PLO3 **identify, collect and utilize primary and secondary data to investigate and analyse the issues and problems facing people, places and society;**

PLO4 **integrate, evaluate and communicate information from a variety of geographical and other sources;**

PLO5 **participate in promoting social, economic and environmental sustainability at the local, regional and global scales; and**

PLO6 **effectively apply a range of transferable skills in academic, professional and social settings.**