

# GEOGRAPHY AND PLANNING

## GPHY 105: The Digital Earth: Geospatial Data and Earth Observation



<b>Contact Time</b>	One-hour Lectures 3x per week
<b>Format</b>	Lectures, Assignments, Labs
<b>Class Assessment</b>	Lab Assignments (seven): 65% Quizzes (six): 30% Participation: 5%

### COURSE OVERVIEW

The past several decades have witnessed an exponential growth in geospatial data, more and more of which is available to non-specialists through powerful smartphones, mobile mapping applications, high-resolution satellite imagery, and increasingly accurate positioning systems. What is more, even if the data is not explicitly geospatial, it has been estimated that more than half of all the data produced today has some geographic component. In this world of nearly ubiquitous geospatial data it is crucial to understand the sources of this data, critically assess their accuracy, and apply the data to solve pressing problems at both the global and local levels. This course will introduce the sources of this data, from data-collection at the ground level with smartphones, to low-level aerial photography with UAVs, to satellite remote sensing and the Global Navigation Satellite System (GNSS). Through the use of Geographical Information Systems we will explore and integrate data at different scales to start to answer questions about human and physical processes in our world. Topics will include the use of GIS and Remote Sensing for monitoring environmental change, urban and regional planning, agriculture, navigation, business, and government decision-making. Weekly lectures will be complemented by software demonstrations that will prepare students to complete assignments. All software used is either freely available or available free to Queen's students by campus-wide licensing agreements.

### LEARNING OUTCOMES

1. To identify sources of Geospatial data
2. To apply Geospatial data to real-world problems using GIS software
3. To assess critically the accuracy and limitations of Geospatial data

### COURSE TOPICS

Co-ordinates systems, Projections, Satellite Positioning, Geographical Information Systems (GIS), Spatial Analysis with GIS, Making a Map, Network Analysis, Geocoding, Aerial Photography, UAVs/Drones, Photogrammetry, Anatomy of the Digital Image, Multi-Spectral Imaging, Passive Remote Sensing, Satellite Remote Sensing, Earth Observation, Monitoring Environmental Change, Terrain Data, Active Remote Sensing, Digital Elevation Models.

### COURSE READINGS

Textbook: Shellito, Bradley A. Introduction to Geospatial Technologies. 5th edition. Macmillan Higher Education, 2020.