

# SOSC 3240 APPLICATION OF GEOGRAPHICAL INFORMATION SYSTEMS

Fall, 2023

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COURSE WEBSITE: <http://canvas.ust.hk>

LECTURE: Friday: 3:00-4:20 PM Room 4472 by Lift 25-26

LAB: Friday: 4:30-5:50 PM Room 4402 (Computer Barn A) by Lift 17-18

Office Hour: Wednesday: 1:30 -2:30 PM Room 2359 by Lift 3

## COURSE DESCRIPTION

Geographic Information Systems (GIS) is a set of computer-based systems integrated for collecting, checking, storing, integrating, analyzing, and presenting spatial information.

### Objectives:

1. the fundamental understanding and comprehensive knowledge of GIS basic concepts
2. a working knowledge of GIS technical issues
3. a practical training of using ArcMap 10.8.2 from ESRI and associated hardware
4. GIS applications to various fields such as marketing, planning, social and environmental studies.

Main Form: a lecture section + a lab tutorial section (Computer Barn A from the 1<sup>st</sup> class)

Evaluation: attendance & quizzes (10%), lab exercises & assignments (20%), exam (30%), group project (40%) = presentation (20%) + discussion (5%) + report in PPT file (15%)

- PREREQUISITE: Basic computer and computing skills.
- QUIZZES: In-class exercises
- EXAM: The test will be close-notes with multiple choices and essay question
- ASSIGNMENTS & LABS: Lab tutorials and two assignments (each assignment due in two weeks).
- GROUP PROJECT: a spatial analysis of a real world problem and a group presentation for about 20 minutes.
- GIS projects can be both technical demanding and time consuming. Peer Evaluation may be conducted.

## TENTATIVE COURSE SCHEDULE

### Week 1 (Sep 1)

#### Course Introduction

##### Lab: Tutorial Introduction (in Computer Barn A)

- Introduction to lab section
- Examples of past students' GIS projects

### Week 1 (Sep 8)

#### Lecture: Introduction to GIS and Social Analysis

- What is GIS? Why use a GIS? Who uses a GIS?
- Applications of GIS to Social Science and other fields

##### Lab: Introduction to ArcGIS Pro

- Introduction to ArcCatalog/ArcMap/ArcTools
- Creating your first map

### Week 2 (Sep 15)

#### Lecture: GIS basics

- GIS, computer systems, and information systems

##### Lab: Basic functions of ArcGIS Desktop

- Introduction to ArcCatalog/ArcMap, ArcTools
- Data input, storage output in ArcView GIS
- Navigating layers and tables in ArcView GIS
- Data selection and querying for social analysis

### Week 3 (Sep 22)

#### Lecture: GIS data and data presentation

- Spatial information, spatial data, data models, and maps
- GIS coordinate and projection systems
- GIS Data input and output

**Lab: Data displaying**

- Symbolizing data
- Labeling features
- Mapping using ArcMap (layers and layouts)

**i. Project Grouping****Week 4 (Sep 29)****Lecture: GIS Data Structures I**

- Basic data structures and algorithms in GIS (raster data and vector data)

**Lab: Data operations in ArcMap**

- Creating new data in ArcMap
- Editing spatial data and social data using ArcMap
- Joining and relating tables of socio-demographic attributes

**Week 5 (Oct 6)****Lecture: Feature relationship and topology****Lab: Georeferencing**

- Georeferencing with XY data
- Adding background by using GoogleEarth map

**ii. Project Topic Discussion****Week 6 (Oct 13)****Lecture: GIS Applications (Case studies)**

- Resource planning and management - Case 1: Conservation studies.
- Marketing and network planning - Case 2: Precise marketing.
- Social Science - Case 3: Clinton-Gore election

**Lab: Analyzing feature relationship using ArcMap**

- Union and intersect
- Merge and dissolve
- Buffering data
- Spatial join

**iii. Project Proposal Submission****Week 7 (Oct 20)****Project Progress discussion with instructors****Lab: Analyzing Spatial Data using ArcGIS**

- Spatial Analysis in social science and other fields

**iv. Project Topic Improving and Finalizing****Week 8-10 (Oct 27 & Nov 3, 10)****Project Progress discussion with instructors****Lab: Project data collection, input, and analysis****v. Project Processing****Week 11-12 (Nov 17, 24)****PowerPoint Presentation of Project Report (to be announced)****ESSENTIAL LEARNING MATERIALS**

We will not use a required textbook for this course, but instead use material we created or available on Canvas:

1. Lecture notes and Lab tutorials
2. ESRI. 2012. *What is GIS*. ESRI.
3. ESRI. 2018. *Introducing GIS. Getting to Know ArcGIS Desktop, Chapter 1, Fifth Edition*.
4. ESRI. *Getting to Know ArcGIS. Getting Started with ArcGIS, Chapter 1*.

**USEFUL Spatial Data WEBSITES:**

<http://hub.arcgis.com/pages/open-data> <https://earthexplorer.usgs.gov/>  
<http://sedac.ciesin.columbia.edu/> <https://opentopography.org/> <http://www.diva-gis.org/>