

SOSC 3240 APPLICATION OF GEOGRAPHICAL INFORMATION SYSTEMS

Fall, 2021

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

LECTURE: Wednesday: 13:30-14:50 Room 4502 by Lift 25-26

LAB: Wednesday: 15:00-16:20 Room 4402 (Computer Barn A) by Lift 17-18

Office Hour: Friday: 12:00-14:00 Room 3005 by Lift 4

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 ArcGIS 10.6 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 (in-person, Computer Barn A from the 1st class)

Evaluation: attendance & 5 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: Regular in-class PRS exercises with MCQs
- 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 will be conducted.
- **Lecture recording is not provided except for that in the add-drop period.**

TENTATIVE COURSE SCHEDULE

Week 1 (Sep 1)

Course Introduction

Lab: Tutorial Introduction

- Introduction to lab section (Computer Barn A)
- Create your first ArcGIS Map

Week 2 (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 and Basic functions of ArcView GIS

- 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 15)

Lecture: GIS basics

- GIS, computer systems, and information systems

Lab: Data displaying

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

Week 5 (Sep 29)

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 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 6 (Oct 6)

Lecture: GIS Data Structures I

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

Lab: Georeferencing

- Georeferencing with XY data
 - Adding background by using GoogleEarth map
- i. **Project Grouping**

Week 7 (Oct 13)

Lecture: Feature relationship and topology

Lab: Analyzing feature relationship using ArcMap

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

ii. **Project Proposal Submission**

Week 8 (Oct 20)

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 Spatial Data using ArcGIS

- Spatial Analysis in social science and other fields

iii. **Project Topic Discussion**

Week 9-11 (Oct 27, Nov 3, 10)

Project Progress discussion with instructors

Lab: Project data collection, input, and analysis

iv. **Project Topic Finalizing and Project Processing**

Week 12-13 (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/>