

SOSC 3240 APPLICATION OF GEOGRAPHICAL INFORMATION SYSTEMS

Fall, 2019

Instructor: Prof. John Ma (Office: 3384 Email: sojohnma@ust.hk Phone: 2358 7829)

Assistant Instructor: Daphne Deng (Office: 3005 Email: daphned@ust.hk Phone: 2358 6020)

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

LECTURE: Friday: 12:00-13:20 Room 1409 by Lift 25-26

LAB: Friday: 13:30-14:50 Room 4402 by Lift 17-18

Office Hour: TBA 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 (every week in first two months)

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

* **PREREQUISITE:** Required to take a pretest in terms of database, 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: Independently perform a spatial analysis of a real world problem with a presentation (20 minutes).

* GIS projects can be both technical demanding and time consuming. Peer evaluation will be conducted in each group.

TENTATIVE COURSE SCHEDULE

Week 1 (Sep 6)

Course Introduction & pretest

Lab: Tutorial Introduction

- Introduction to ArcCatalog/ArcMap: creating your first map
- Examples of past students' GIS projects

Week 2 (Sep 13)

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 ArcView GIS

- Introduction to ArcTools
- Create your map using GoogleEarth map

Week 3 (Sep 20)

Lecture: GIS basics

- GIS, computer systems, and information systems

Lab: Basic functions of ArcView

- Data input, storage output in ArcView GIS
- Navigating layers and tables in ArcView GIS
- Data selection and querying for social analysis

Week 4 (Sep 27)

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 ArcGIS (layers and layouts)

Week 5 (Oct 4)**Lecture: GIS Project Introduction**

- Project grouping
- Related topics introduction

Lab: Georeferencing

- Georeferencing with XY data
- Georeferencing with Geocoding

i. Project Grouping**Week 6 (Oct 11)****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

ii. Project Proposal Submission**Week 7 (Oct 18)****Lecture: Feature relationship and topology****Lab: Analyzing feature relationship using ArcMap**

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

iii. Project Topic Discussion**Week 8 (Oct 25)****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 10.6

- Spatial Analysis in social science and other fields

iv. Project Topic Finalizing and Processing**Week 9-11 (Nov 1, 8, 15)****Project Progress discussion with instructors****Lab: Project data collection, input, and analysis****Week 12-13 (Nov 22, 29)****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/>