

## SOSC 3240 APPLICATION OF GEOGRAPHICAL INFORMATION SYSTEMS

Fall, 2017-2018

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

Assistant Instructor: Ying Deng (Office: 3005 Email: [daphned@ust.hk](mailto:daphned@ust.hk) Phone: 2358 6020)

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

LECTURE: Wednesday: 10:30-11:45 LSK 1027 by Lift 4

LAB: Wednesday: 12:05-13:20 Room 3006 by Lift 4

Office Hour: Monday 14:00-16:00 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 10.2 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.

Evaluation: attendance & quiz (10%), lab exercises (10%), assignments (20%), test (20%), group project (40%): 1. presentation (20%) 2. discussion (5%) 3. report in PPT file (15%)

PREREQUISITE: computer skills.

### Week 1 (Sep 6)

#### Course Introduction

### 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 ArcGIS/ArcView GIS
- Create your first ArcView 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 ArcView GIS (layers and layouts)

### Week 5 (Oct 4)

#### Lecture: GIS Data Structures I

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

### **Lab: Data operations in ArcView GIS**

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

### **Week 6 (Oct 11)**

#### **Lecture: Feature relationship and topology**

#### **Lab: Analyzing feature relationship using ArcView GIS**

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

### **Week 7 (Oct 18)**

#### **GIS Applications (Case studies)**

- Resource planning and management.
  - Case 1: Conservation studies.
- Marketing and network planning.
  - Case 2: Precise marketing.
- Project discussion

#### **Lab: Analyzing Spatial Data using ArcView 10.1**

- Spatial Analysis in social science and other fields

### **Week 8-11 (Oct 25 –Nov 15)**

#### **Project group discussion with instructors**

#### **Lab: Project data collection, input, and analysis**

#### **Demonstration of TripPro DJI drone**

### **Week 12-13 (Nov 22 –Nov 29)**

#### **Test and PowerPoint Presentation of Project Report (to be announced)**

### **Special topics: Mapping the world with drone (to be announced)**

Quiz: in-class PRS exercises with multiple choices

Test: The test will be in-class close-notes with multiple choices.

ASSIGNMENTS AND LABS: two assignments, each due in two weeks.

Group Project: spatial analysis of a real world problem with a power point presentation (15 minutes).

### **ESSENTIAL LEARNING MATERIALS**

1. ESRI. 2012. *What is GIS*. ESRI.
2. ESRI. 2013. *Getting to Know ArcGIS Desktop, Third Edition*. ESRI.
3. Paul Longley, Michael Goodchild, David Maguire and David Rhind, 2005, *Geographic Information Systems and Science, 2nd edition*, John Wiley & Sons, Ltd. ISBNs: 0-470-87000-1 (HB); 0-470-87001-X (PB)

### **REFERENCES**

1. Stillwell, J. and Clarke, G. 2004. *Applied GIS and Spatial Analysis*. John Wiley & Sons: Chichester, UK.
2. Walker, Joan and Li, Jieping. 2007. *Latent Lifestyle Preferences and Household Location Decisions*. Journal of Geographical Systems, Vol 9, No.1, pp. 77-101. Springer Berlin / Heidelberg.
3. ESRI, Jul 2011, *Understanding GIS: An ArcGIS Project Workbook*, ESRI
4. Dangermond, Jack & Goodchild, Michael F., Apr 2013, *Introducing Geographic Information Systems With Arcgis: A Workbook Approach to Learning GIS*, John Wiley & Sons Inc

### **USEFUL WEBSITES:**

1. <http://www.esri.com/>
2. <http://www.gislounge.com/>
3. <http://www.geocomm.com/>
4. <http://www.diva-gis.org/>