The University of Western Ontario
Department of Geography
GEOGRAPHY 9110B- Winter 2012
Introduction to Geographic Information Systems

Instructor: Jacek Malczewski
Office: SSC 2422
Tel: 661-2111 ext.85030
E-mail: *jmalczew@uwo.ca*
Office hours: Monday 1:30 – 2:30pm
Wednesday 1:30 – 2:30pm
Lecture: Wednesday 11:30am – 1:30pm SSC 1425
Lab hours: Monday 5:30pm – 7:30pm SSC 1425

Teaching Assistant: Mohammadreza Jelokhani-Niaraki
Office: SSC 2306
E-mail: *mjelokha@uwo.ca*
Office hours: Monday 4:30 – 5:30pm
Wednesday 1:30 – 2:30pm

Course Objectives

This course is designed to introduce graduate students to fundamental concepts and techniques of Geographic Information Systems (GIS). There are three major objectives of this course: (1) to understand the concepts and theory of commonly used GIS spatial analysis functionality; (2) to gain hands-on experience using GIS software and other spatial techniques, and to develop problem solving skills; and (3) to complete a GIS project, including data collection, georeferencing, data analysis and output, oral presentation, and report writing.

Course Description

Geographic Information Systems play important roles for many academic disciplines, government organizations and commercial enterprises. GIS applications cover a very wide variety of subject matter ranging from social sciences to environmental sciences, including urban and regional planning, civil engineering, resource management, agriculture, forestry, geology, environmental monitoring, waste management and business.

A GIS is a combination of the computer hardware, software, data, methods and people which provides input, management, retrieval, analysis, and presentation of spatially referenced information. By linking attribute data with maps, a GIS can reveal relationships not apparent using traditional paper maps and item-reference information systems. A GIS provides a powerful tool for spatial analysis, mapping, visualization and communication of information.

Practical skills will be developed through the use of ArcGIS and extensions. Students may choose to use other GIS software for the project if they wish.

By the end of the course, the students should be able to apply what they have learned to their own GIS related research, to solve problems on their own, to learn new functions and to be prepared to continue with more advanced GIS courses.

Course Prerequisites

There are no formal prerequisites. Familiarity with Windows environment is required. A general understanding of geography is helpful, but no geography courses are required.

Required textbook

Chang K., 2006, *Introduction to Geographic Information Systems* (4th Ed.) McGraw Hill, 450 p. (ISBN 0-07-305115-2)

Recommended textbooks:

Burrough, P.A. and McDonnell, R.A., 1998, Principles of Geographical Information Systems, Oxford University Press. (ISBN 0-19-823365-5)

Bolstad, P., 2006. GIS Fundamentals (2nd Ed.). Eider Press, 539p. (ISBN 0-9717647-1-9)

Lo, C.P., A.K.W.Yeung, 2006. Concepts and Techniques of Geographic Information Systems (2nd Ed.). Prentice Hall, 532 p. (ISBN 0-13-149502-X)

Longley, P.A., M.F.Goodchild, D.J.Maguire, and D.W.Rhind, 2005. Geographic Information Systems and Science (2nd Ed.). John Wiley & Sons, Inc., 517 p. (ISBN 0-470-87001-X)

ESRI, 2004. Getting to know ArcGIS desktop. ESRI Press, 572 p. (ISBN 1-58948-083-X)

Other requirements

Computer accounts:

You need a computer account to log on the computers in the two computer labs (SDAL lab – SSC 1425 and/or GISci Lab – SSC 1316A). You have 24-hour access to both labs. Please contact Mary Van de Ven in SSC1008 if you have problems with your computer account.

Computer storage devices:

One USB memory key or other portable storage device for storing your data and results. A CD-R disk to submit your final project results.

Print credits:

You will be given certain print credits for this course. If you have used all your credits, you may purchase print credits for printing using the B/W laser printer(s) and colour laser(s) printer in the GISci lab.

Late penalty:

Late labs have a penalty of 2% per day. Labs submitted more than 1 week late will not be accepted.

Schedule

DATE	LECTURES	DATE	LABS	PROJECTS
Jan. 11	Introduction to the course			
Jan. 18	**Lecture 1** GIS overview Sources of information on GIS Geographic data sources			
Jan. 25	**Lecture 2** Geographic data representation Coordinate systems			
Feb. 1	**Lecture 3** Spatial data input Attribute data input	Feb. 6	**Lab #1**	
Feb. 8	**Lecture 4** Data exploration Vector data analysis Raster data analysis	Feb. 13	**Lab #2** *Lab #1 due*	**Select a topic**
Feb. 15	**Lecture 5** Spatial interpolation Network analysis			
Feb. 20 Feb. 22	**Reading week** No classes			
Feb. 29	**Lecture 6** Spatial statistics GIS models and modelling	Feb. 27	**Lab #3** *Lab #2 due*	
Mar. 7		Mar. 5	**Lab #4** *Lab #3 due*	Discussion of topics/ data collection Developing project proposals
		Mar. 12	*Lab #4 due*	**Project proposal due** Supervised lab work
		Mar. 19		Supervised lab work
		Mar. 26		Supervised lab work
		Apr. 2 Apr. 4		Class presentations
		Apr. 9		**Project report due**

GIS Project

Step 1: Selection of a topic (Feb. 8, 2011)

Step 2: Preparation of the data base

If data are already in digital format, you need to import data, do proper format conversion and georeference your data. In other cases, you will have to digitize your maps, or collect field data.

Step 3: Project proposal (Due March 12, 2012)

The proposal should include: (1) the title; (2) brief introduction; (3) data sources and collection; (4) hard copy of collected map data; (5) attribute data descriptions; (6) what methods do you plan to use; (7) what are the expected results; and (8) references.

Step 4: Oral Presentations (Week of Apr. 2, 2012)

Step 5: Project report (Due Apr. 9, 2012)

Submit a written report of your project along with the results you have produced. The written report must be typed, double space, around 10 pages plus figures and tables. It should include the following:

- A title. (Followed by your name and affiliation)
- Introduction (including statement of project objectives and a brief literature review).
- Data description (including discussion of the data used, rationale for selecting the variables for input to GIS, sources of data, and any problems /limitations of the data/data sources used, description of data format, any conversion between data format involved and why this is necessary)
- Methodology (including the procedures of the project, description of GIS functions used in the project and the principles behind them)
- Data analysis and interpretation of the results
- Conclusions
- Acknowledgement if applicable
- References