GEOGRAPHY 3222A
Geographic Information Science II
Fall 2013

Instructor Information

Instructor: Dr. Jinfei Wang, Professor, Department of geography
Office: SSC. 2402; Tel: (519)661-2111 ext.85017; E-mail: jfwang@uwo.ca
Office hours: Thursday 4:30-6:30 pm, or by appointment

Teaching Assistant: Chris (Chuiqing) Zeng
Office: SSC 2430; Tel: (519)661-2111, ext. 80269; Email: czeng7@uwo.ca
Office Hours: Thursdays 12:30 - 2:30 pm, or by appointment

Course Information

Lecture: Thursday   10:30 am - 12:30 pm,   KB-K208
Labs: Thursday   2:30 - 4:30 pm,   GISc Lab (SSC. 1316A)

Course Description

Methods and techniques in Geographic Information Science. Spatial data encoding from maps and geographic database implementation. Spatial interpolation and other modeling techniques. Integration of remote sensing, GIS, and Visualization. Hands-on experience using ESRI ArcGIS software.

Prerequisite(s): Geography 2210A/B and Geography 2220A/B
2 lecture hours, 2 laboratory hours, 0.5 course.
Adequate mathematical background is needed to be successful.

Prerequisite checking - the student's responsibility

You are responsible for ensuring that you have successfully completed all course prerequisites, and that you have not taken an anti-requisite course. Lack of prerequisites may not be used as a basis for appeal. "Unless you have either the prerequisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites."

Recommended Readings

Lo, C.P., A.K.W.Yeung, 2007. *Concepts and Techniques of Geographic Information Systems* (2nd Ed.). Prentice Hall, Englewood Cliffs, New Jersey. 532 p. (ISBN 0-13-149502-X).
Ormsby, T., Napoleon, E., Burke, R., Groessl, C., Bowden, L., 2010. *Getting to Know ArcGIS Desktop, Updated for ArcGIS 10* (3rd Ed.). ESRI Press. 604 p. (ISBN: 978-1-589-48260-9).

Burrough, P.A. and McDonnell, R.A., 1998, *Principles of Geographical Information Systems*. Oxford University Press. (ISBN: 0198233655)

Longley, P.A., M.F.Goodchild, D.J.Maguire, and D.W.Rhind, 2011. *Geographic Information Systems and Science* (3rd Ed.). John Wiley & Sons, Inc., 539 p. (ISBN 978-0-470-72144-5).

Bolstad, Paul, 2012. *GIS Fundamentals: A First Text on Geographic Information Systems* (4th Ed.). Eider Press, White Bear Lake, MN, USA. 674 p. (ISBN 978-0-9717647-3-6).

Chang, K.T., 2012. *Introduction to Geographic Information Systems* (6th Ed.). McGraw Hill, 418 p. (ISBN 978-0-07-746543-8).

Jensen, J.R., 2005, *Introductory Digital Image Processing – A Remote Sensing Perspective* (3rd Ed.). Prentice Hall. (ISBN 978-0-13-145361-6).

Jensen, J.R., 2007, *Remote Sensing of the Environment: An Earth Resource Perspective*, (2nd Ed.). Prentice Hall. (ISBN 978-0-13-188950-7).

Method of evaluation

Lab. Assignments (4 labs)	40%
Attendance and participation	5%
Term Test (2 hours, Nov. 14, 10:30am-12:20pm, Location: TBA)	30%
project Presentation	5%
Term Paper (Due Dec. 12, 2013)	20%

Course Requirements

1. Attendance and participation: Each student is required to attend all the lectures and labs. Attendance may be taken randomly during any lecture and lab session. Participation in class/project discussions and lab activities may be counted.

2. Term test: All students are required to take the term test. Non-programmable scientific calculators are permitted. No other electronic devices are permitted. No other written aids are allowed. No make-up test will be given unless under extreme circumstances. If you consider that you have grounds to write the term test on an alternate date, you must obtain permission from the Dean's office and provide sufficient documentation. In addition, you must inform the instructor at least 2 days in advance before the term test.

3. Lab assignments and the GIS project:
   You must attend all labs. You should observe all the due dates for the lab assignments and the GIS project. Assignments are due at the beginning of the lab hours of the assignment due dates. Plagiarism or copying is unacceptable. If there are two identical answers to the lab. or parts of the lab., both students will be given a mark of 0 for that lab. Please follow the instructions for the GIS project. The penalty of a late assignment and late project paper is 2^n percent of the maximum mark for the assignment, where n = number of days late. (i.e., If you are late one day, 2% off; two days, 4% off; three days, 8% off; four days, 16% off; five days, 32% off; six days, 64% off; seven days, 100% off).

4. Academic offences: " Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:
http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf."

5. "For UWO Policy on Accommodation for Medical Illness and a downloadable SMC see: http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf Downloadable Student Medical Certificate (SMC): https://studentservices.uwo.ca under the Medical Documentation heading. Students seeking academic accommodation on medical grounds for any missed tests, exams, participation components and/or assignments worth 10% or more of their final grade must apply to the Academic Counselling office of their home Faculty and provide documentation. Academic accommodation cannot be granted by the instructor or department. "

6. Required computer storage devices: One or two USB memory key, or a portable hard drive for storing data and results. I suggest that you double backup your work on two USBs, in case one USB has problems. Please note: do not insert your USB with the data from the Windows system to a Mac computer, since this may cause errors on your data.

7. Print credits: You will be given a limited number of free print credits for this course. If you need, you may purchase more credits for printing using the B/W laser printer(s) and colour laser(s) printer in the GIS lab. So make sure you check your print balance often. Consult your TAs for details.

Additional information

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 (http://www.sdc.uwo.ca/) for any specific question regarding an accommodation.

If you or someone you know is experiencing distress, there are several resources here at Western to assist you. Please visit http://www.uwo.ca/uwocom/mentalhealth/ for more information on these resources and on mental health.

Registrarial Services: http://www3.registrar.uwo.ca/index.cfm
Student Development Services: http://www.sdc.uwo.ca/

Lab assignments:

Lab 1 Download Geospatial Data from the Internet (10%)
Lab 2 Mini GIS Project (10%)
Lab 3 ArcGIS Model Builder and Finding the Least-cost Path (10%)
Lab 4 3D Building Model Generation from LiDAR data and its Application (10%)

Topics and Recommended Readings

Part 1. Introduction - GIS Overview
Readings: Longley, 3rd Ed.: Chapters 1 and 2, pp. 3-71; Bolstad, 4th Ed.: Chapter 1 and 2, pp. 1-20; 25-64.

Part 2. Datum, Coordinate Systems and Map Projection
Readings: Bolstad, 4th Ed.: Chapter 3, pp. 71-119.

Part 3. Geospatial Data Collection
Readings: Longley, 3rd Ed.: Chapters 9 and 10, pp. 229-274; Lo, Chapters 2, pp. 22-63; Bolstad,4th Ed.: Chapter 4: pp. 131-163; Chapter 7: pp. 271-303.

Part 4. Digital Terrain Modelling
Readings: Lo, Chapter 9, pp.329-348; Bolstad, 4th Ed.: Chapter 11, pp. 443-451.

Part 5. Cost Distance and Least Cost Path
Readings: ArcGIS online help.

Part 6. Spatial Interpolation
Readings: Burrough: Chapters 5&6, pp. 98-161.

Part 7. Spatial Analysis – Raster Geoprocessing
Readings: Lo, Chapter 5, pp. 143-188; Bolstad, 4th Ed.: Chapter 10: pp.407-437; Chapter 11, pp. 443-451.

Part 8. Spatial Analysis – Vector Geoprocessing
Readings: Lo, Chapter 6, pp. 192-236; Bolstad, 4th Ed.: Chapter 8: pp. 316- 331, Chapter 9, pp. 347-389.

Part 9. Remote Sensing and GIS Integration
Reference: Jensen (2005), 3rd Ed.: Chapter 2 and Chapter 9, pp.35-105; 337-379; Jensen (2007), 2nd Ed: Chapter 5 and 10, pp. 127-147; pp.335-354; Bolstad, 4th Ed.: Chapter 6: pp. 223-264.

Part 10. GIS Case Studies

Tentative Lecture/lab Schedule

	Date Thurs.	Lecture topics	Labs assigned	Lab due dates (Thursday)
Week 1	Sept.12	Introduction to the course	No lab	
Week 2	Sept.19	1. GIS Overview	Lab #1	
Week 3	Sept.26	2. Datum, coordinate systems and map projection	Lab #2	
Week 4	Oct.3	3. Geospatial data collection 4. Digital Terrain Modeling	Lab #2	(field camp)
Week 5	Oct.10	5. Cost distance and least cost path 6. Spatial interpolation	Lab #2	Lab#1 due
Week 6	Oct.17	6. Spatial interpolation	Lab #3	Lab #2 due
Week 7	Oct.24	7. Spatial analysis - Raster geoprocessing 8. Spatial analysis - Vector geoprocessing	Lab #3	
Week 8	Oct.31	Study break, no class, no lab		
Week 9	Nov.7	8. Spatial analysis - Vector geoprocessing 9. Remote sensing and GIS integration;	Lab #4	Lab #3 due
Week 10	Nov.14	Term test, Nov.14, 2013 (10:30 am - 12:30 pm)	Lab #4	
Week 11	Nov.21	10. GIS/RS case studies	Lab #4	Lab #4 due
Week 12	Nov.28	GIS project presentations		
Week 13	Dec.5	GIS project presentations		
	Dec.12			Term paper due

Last day of classes: Dec. 6, 2013.