

GEOGRAPHY 2220A
Geographic Information Science I
Fall 2012

Course Information:

Lecture:	Lec-001	Tuesday	2:30 - 4:30 pm,	MC-110 (possible change)
Labs:	(1) Lab-005	Wednesday	2:30 - 4:30 pm,	GISc Lab (SSC. 1316A)
	(2) Lab-002	Thursday	9:30 - 11:30 am,	GISc Lab (SSC. 1316A)
	(3) Lab-003	Thursday	12:30 - 2:30 pm,	GISc Lab (SSC. 1316A)

Instructor Information:

Instructor:	Dr. Jinfei Wang, Professor, Department of Geography
Contact:	Office: SSC. 2402; Tel: (519) 661-2111 ext.85017; E-mail: jfwang@uwo.ca
Office hours:	Wednesday 3:30 - 5:30pm (SSC. 2402)

Teaching Assistants (TAs):

Lab instructor: Kathy Tang, GIS Analyst (ktang28@uwo.ca), SSC 1004C.
Graduate students: TBD.

Course Description:

Fundamental concepts, geographic information representation and spatial data entry. Basic spatial analysis and remote sensing. Practical skills developed through use of Geographic Information Systems (GIS).

Anti-requisite(s): The former Geography 280a/b.

Prerequisite(s): 1.0 course from [Geography 1100](#), [1300A/B](#), [1400F/G](#), [1500F/G](#) or the former Geography 020E; or completion of the second year of the Civil and Environmental Engineering, International Development Option; or enrollment in the Major in Physical Geography or in any Environmental Science module or in an Honors Earth Science Program for Professional Registration.
2 lecture hours, 2 laboratory hours, 0.5 course.

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."

Required Textbook (Available in the bookstore and on reserve in Weldon Library):

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).
<http://www.paulbolstad.net/gisbook.html>

Recommended Readings (on reserve in Weldon Library):

Chang, K.T., 2012. *Introduction to Geographic Information Systems* (6th Ed.). McGraw Hill, 418 p. (ISBN 978-0-07-746543-8).
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).
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).
Ormsby, T., Napoleon, E., Burke, R., Groessl, C., Bowden, L., 2010. *Getting to Know ArcGIS Desktop*, 2nd Ed., Updated for ArcGIS 10. ESRI Press. 604 p. (ISBN: 978-1-589-48260-9).

Methods of Evaluation:

Lab. Assignments	40%
Attendance and Participation (including written exercises)	10%
Midterm Test (1 hour 50 min., Tue., October 23, 2:30-4:20pm)	20%
Final Exam (3 hours, Check online)	30%

Course Requirements:

1. Attendance: Each student is required to attend all lectures and lab sections.
2. Exams: All students are required to take two close-book tests. During the tests, basic scientific calculators (not graphics calculators) are permitted and no other electronic devices are allowed. There will be no make-up test for the mid-term test. If you will miss the mid-term test under extreme circumstances, you must obtain permission from the Dean's office and provide sufficient documentation. When I receive the permission from the Dean's office, your final exam will account for 50%. If you miss the midterm with no good reason, you will receive no mark for the midterm. Make-up exams will be given for the final exam only under extreme circumstances. If you consider that you have grounds to write the final exam on an alternate date, you must follow the procedure established by the Dean's Office and complete the appropriate forms. 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 final exam.
3. Labs: You should select one lab section and stay in that group. Because of space and equipment constraints it will be difficult to arrange an alternative lab if you miss your regular lab. Assignments will be given and collected during the lab hours on the due dates and marked by the TAs. You should observe all the due dates for assignments. If you are submitting your assignment late you must have it date stamped by the Geography main office (Room 2322, Social Science Centre, hours 8:30-4:30). The penalty of a late assignment 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; 3 days, 8% off; 4 days, 16% off; 5 days, 32% off; 6 days, 64% off; 7 days, 100% off).

Except for Lab 2, all labs should be completed individually. Plagiarism is not allowed. If two students (in the same class or in different classes in the same or different years) submit identical or near identical answers for an assignment or parts of the assignment both students will receive a mark of zero for the entire assignment. The statement "we have worked as a group and therefore submitted identical answers" cannot be used as an excuse. According to the University's and the department's regulations and procedures, we have to report any plagiarism to the departmental chair, then to the Dean's office. This may be reflected on your transcripts.

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/scholoff.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.

TOPICS AND READINGS

1. GIS Overview

(Readings: Bolstad, 4th Ed.: Chapter 1, pp. 1-20; Longley, 3rd Ed.: Chapters 1 and 2, pp. 3-71)

- What is GIS
- GIS applications
- GIS software

2. GIS Data Models

(Readings: Bolstad, 4th Ed.: Chapter 2, pp. 25-64, Chapter 4, pp.164-173; Chapter 8, pp. 307-315; Lo: Chapter 3, pp. 66-107)

- Points, lines, areas
- Vector data model
- Raster data model
- Attribute data
- Map output

3. The Global Positioning System

(Readings: Bolstad, 4th Ed.: Chapter 5, 183-200)

- The Global Positioning System

4. Map Projection and Coordinate Systems

(Readings: Bolstad, 4th Ed.: Chapter 3: pp. 71-119)

- The shape of the Earth – Geoid, ellipsoid and datums
- Coordinate systems
- The UTM system
- An exercise of coordinates reading from a topographic map
- Map projection examples
- An example of distance calculation

5. GIS Data Collection

(Readings: Bolstad, 4th Ed.: Chapter 4: pp. 131-163; Chapter 7: pp. 271-303)

- Map data collection
- Collecting digital GIS/remote sensing data
- Digitizing, scanning and processing
- Field data

6. Basic Spatial Analyses - Vector Analysis

(Readings: Bolstad, 4th Ed.: Chapter 8: pp. 316-331, Chapter 9, pp. 347-389; The 2220 lab manuals and ArcGIS online help)

- Organizing geographic data for analysis
- Database query

- Analysis of the spatial data
- Analysis of the attribute data

7. Topics in Raster Analysis

(Readings: Bolstad, 4th Ed.: Chapter 10: pp. 407-437; Chapter 11, pp. 443-451; 2220 lab manuals and ArcGIS online help)

- Reclassification
- overlay operations / map algebra
- Some raster analysis functions
- Terrain Analysis
- Spatial data modelling

8. Spatial Data Modelling

(Readings: Bolstad, 4th Ed.: Chapter 13: pp. 521-544)

- Cartographic modelling
- Multi-Criteria Evaluation – Weighted Linear Combination

9. Introduction to Remote Sensing

(Readings: Bolstad, 4th Ed.: Chapter 6: pp. 223-264)

- Airborne remote sensing
- Satellite remote sensing
- Remote sensing applications

10. GIS/Remote Sensing case studies

Tentative Lecture/lab Schedule

	Date of Monday	Lecture topic	Labs assigned	Labs	Due dates (on lab day)
Week 0	Sept. 3		No lab		
Week 1	Sept. 10	1. Introduction to the course, GIS overview	No lab		
Week 2	Sept. 17	2. GIS data models	Lab #1	1. Introduction to ArcGIS 10	
Week 3	Sept. 24	3. The Global Positioning System; 4. Map projection and coordinate systems	Lab #1*		
Week 4	Oct.1	4. Map projection and coordinate systems	Lab #1*		Lab#1 due
Week 5	Oct.8	5. GIS data collection	Lab #2	2. GPS Data Collection**	
Week 6	Oct.15	6. Basic spatial analyses - vector analysis	Lab #2		Lab #2 due
Week 7	Oct. 22	Mid-term test on Oct. 23	Lab #3	3. Geo-referencing and On-screen Digitizing	
Week 8	Oct.29	6. Vector analysis	Lab #3		Lab #3 due
Week 9	Nov. 5	7. Topics in raster analysis	Lab #4	4. Vector Analysis	
Week 10	Nov. 12	7. Topics in raster analysis; 8. Spatial data modelling	Lab #4		Lab #4 due
Week 11	Nov. 19	9. Introduction to remote sensing	Lab #5	5. Raster Analysis	
Week 12	Nov. 26	10. GIS/RS case studies;	Lab #5		Lab #5 due
Week 13	Dec.3	Course review			
December	Check online	Final exam (Cumulative)			

Last day of classes: Dec. 5, 2012.

*This arrangement is to accommodate the students in the field camp course during Week 3 and Week 4.

**Field data collection; Weather permitting.