

Western University
Geography 3222A
Geographic Information Science II

Course Outline

Fall 2017

Course Information

Lectures: Wednesdays 12:30 - 2:30 pm, SSC 3024
Labs: Thursdays 12:30 - 2:30 pm, GISci Lab (SSC. 1316A)

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: Wednesdays 3:00-5:00 pm

Teaching Assistant: Boyu Feng (PhD candidate)
Office: SSC 2434; Email: bfeng24@uwo.ca
Office Hours: Thursdays 2:30-4:30 pm

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

Unless you have either the requisites 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.

Course Materials

Required Textbook (available in the bookstore):

Peter A. Burrough, Rachael A. McDonnell, and Christopher D. Lloyd, 2015, *Principles of Geographical Information Systems* (3rd Ed.). Oxford University Press. (ISBN: 9780198742845)

Recommended Readings

Longley, P.A., M.F.Goodchild, D.J.Maguire, and D.W.Rhind, 2016. *Geographic Information Systems and Science* (4th Ed.). John Wiley & Sons, Inc., 469 p. (978-1-119-03130-7 or ISBN : 978-1-118-67695-0).

Bolstad, Paul, 2016. *GIS Fundamentals: A First Text on Geographic Information Systems* (5th Ed.). XanEdu Publishing Inc., 770 p. (ISBN 1506695876 or 978-1506695877).

Chang, K.T., 2016. *Introduction to Geographic Information Systems* (8th Ed.). McGraw Hill, 448 p. (ISBN10: 0078095131 | ISBN13: 9780078095139; eText ISBN: 9781259613449, 1259613445)

Methods of Evaluation

Lab. Assignments (5 labs)	40%
Midterm Test (Wed., Nov.8, 12:30pm-2:20pm, Room SSC 3024; Scientific calculators are permitted; No other aids)	30%
Project title/topic/data due (Oct. 25)	2%
project Presentations (Nov. 29 and Dec. 6)	8%
Term Paper (Due Dec. 8, 2017)	20%

Course Requirements

1. Attendance and participation: Each student is required to attend all the lectures and labs. Additional material will be provided during classes, including in class exercises that will be important for the midterm test and for understanding GISci.
2. Midterm test: All students are required to take the midterm 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 midterm 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 test.

Students with special accommodation will write make-up tests administered by the department on Fridays during respective periods of fall term. To prevent prior disclosure, the format and contents of make-ups may differ substantially from the scheduled test or examination. Please see Additional Statements below.

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). Note: Late assignments can be submitted to the drop off box located under the TV screen in front of the main office before 4 pm. Please write the course number, the instructor and TA name on your assignment. Otherwise, it will not be delivered to your TA.

4. 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.

5. 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 GISci lab. So make sure you check your print balance often. Consult your TA for details.

Lab assignments

Lab 1 Download Geospatial Data from the Internet	(5%)
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	(10%)
Lab 5 Network Analysis	(5 %)

Additional Statements

For UWO Policy on Accommodation for Medical Illness and a downloadable SMC see:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

[downloadable Student Medical Certificate (SMC):

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

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.

Statement on Use of Electronic Devices

Scientific calculators are permitted during the midterm test. No other aids are permitted.

Statement on 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/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Mental Health

If you or someone you know is experiencing distress, there are several resources here at Western to assist you. Please visit the site below for more information on mental health resources:

<http://www.uwo.ca/uwocom/mentalhealth/>.

Western's commitment to accessibility

The University of Western Ontario is committed to achieving barrier free accessibility for persons studying, visiting and working at Western.

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 for any specific question regarding an accommodation.

Support Services

Registrarial Services: <http://www.registrar.uwo.ca/>

Student Development Services: <http://www.sdc.uwo.ca/>

Topics and Recommended Readings

Part 1. Introduction - GIS Overview

Readings: Burrough, *Principles of Geographical Information Systems* (3rd Ed.) Chapter 1

Part 2. Datum, Coordinate Systems and Map Projection

Readings: Bolstad, 4th Ed.: Chapter 3

Part 3. Geospatial Data

Readings: Burrough, *Principles of Geographical Information Systems* (3rd Ed.) Chapter 2; Chapter 3.

Part 4. Digital Elevation Models

Readings: Burrough, *Principles of Geographical Information Systems* (3rd Ed.) Chapter 11

Part 5. Cost Distance and Least Cost Path

Readings: ArcGIS online help.

Part 6. Spatial Interpolation

Readings: Burrough, *Principles of Geographical Information Systems* (3rd Ed.) Chapter 8; Chapter 9.

Part 7. Network Analysis

Readings: Chang, K.T., 2016. *Introduction to Geographic Information Systems* (8th Ed.). Chapter 17.

Part 8. Spatial Analysis – Raster and Vector Geoprocessing

Readings: Burrough, *Principles of Geographical Information Systems* (3rd Ed.) Chapter 7; Bolstad, 4th Ed.: Chapters 8, 9, 10 and 11.

Part 9. Remote Sensing and GIS Integration

Reference: Bolstad, 4th Ed.: Chapter 6.

Part 10. GIS Case Studies – Guest lectures

Tentative Lecture/lab Schedule

	Date of Wed.	Lecture topics (Wednesday)	Labs assigned -Thursday	Lab due dates (Thursday)
Week 0	Sept.6	No lecture	No lab	
Week 1	Sept.13	Introduction to the course; 1. GIS Overview	No lab	
Week 2	Sept.20	1. GIS Overview 2. Datum, coordinate systems and map projection	Lab #1	
Week 3	Sept.27	2. Datum, coordinate systems and map projection	Lab #2	
Week 4	Oct.4	3. Geospatial data collection 4. Digital Terrain Modeling	Lab #2	Lab#1 due
Week 5	Oct.11	Thanksgiving, Fall reading week, no class,	No labs	
Week 6	Oct.18	4. Digital Terrain Modeling. 5. Cost distance and least cost path	Lab #3	Lab #2 due
Week 7	Oct.25	5. Cost distance and least cost path 6. Spatial interpolation Discussion of project titles/topics/data collection	Lab #3	
Week 8	Nov.1	6. Spatial interpolation 7. Network analysis	Lab #4	Lab #3 due
Week 9	Nov. 8	Midterm test, Nov. 8, 2017 (12:30 pm - 2:20 pm)	Lab #4	
Week 10	Nov. 15	8. Spatial analysis – Raster and vector geoprocessing 9. Remote sensing and GIS integration GIS project discussion	Lab #5	Lab #4 due
Week 11	Nov. 22	9. Remote sensing and GIS integration 10. GIS/RS case studies GIS project discussion	Lab #5	Lab #5 due
Week 12	Nov.29	GIS project presentations	Presentations if needed	
Week 13	Dec. 6	GIS project presentations		Term paper due Dec. 8

Last day of classes: Dec. 8, 2017.