

GEOGRAPHY 3222B *Geographic Information Science II* Winter 2015

Instructor: Dr. Micha Pazner, Office: 1416 SSC
Office Hours: Tuesdays and Wednesdays 4:00-5:00 or by Appointment
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Teaching Assistant: Heather Peacock

Lecture: Tuesday 1:30-3:30 pm, SSC 1316a (GIS Lab)
Lab: Wednesday 1:30-3:30 pm, SSC 1316a (GIS Lab)

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 2220A/B.

2 lecture hours, 2 laboratory hours, 0.5 course.

Adequate mathematical background is needed to succeed in this 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 Text (available in the bookstore):

Chang K., 2014, *Introduction to Geographic Information Systems* (7th Ed.) McGraw Hill, (ISBN 978-0-07-352290-6)

Recommended Readings (Will be Provided):

Listed in Appendix A below.

Method of Evaluation:

Lab Assignments (Four)	40%
Home Readings Tests (Four)	20%
Project Proposal	5%
Project Presentation	10%
Project Paper	25%

Other requirements

Computer accounts:

You need a computer account to log on the computers in the two computer labs ([GISci Lab – SSC 1316A](#) and/or SDAL lab – SSC 1425). You have 24-hour access to both labs.

Computer storage devices:

One USB memory key or other portable storage device for storing your data and results. A CD or DVD disk to submit your final project. Retain a copy of all your deliverables; in case of loss, for reference, etc. *** Make sure to always store and **back up** your assignment and GIS project folders and files. ***

Print credits:

You will be given a limited number of free 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. The TA will provide more information on printing.

Attendance:

You should study the weekly readings and attend all the lectures and labs. Active participation in lectures and labs, e.g. via questions and discussion, is encouraged.

Lab assignments and the GIS project:

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).

GIS Project:

Step 1: Selection of a topic (Feb. 4th, 2015)

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 11th, 2015)

The proposal should include: (1) the title; (2) brief introduction; (3) description of data sources; (4) what methods do you plan to use; and (5) what are the expected results.

Step 4: Oral Presentations (April 6th & 8th, 2015)

Step 5: Project report (Due Apr. 8th, 2015)

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, affiliation and date)
- 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)
- Methods (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

Academic Offences:

Do NOT commit scholastic offenses, eg. **Plagiarism:**

"*Plagiarism:* Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar)."

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."

UWO Policy on Accommodation for Medical Illness:

"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. "

Support Services:

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://www.registrar.uwo.ca/>

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

***** See Graphic Course Outline and Schedule *****

Geography 3222B Geographic Information Science II- Winter 2015 (Pazner)

Course Schedule

Term Week	Lecture Period	Assigned Readings (Chapter Headings)	Lab	Deliverable Due
1 Jan 5-11	Introduction to the Course			
2 Jan 12-18	Introduction to GIS	1 Introduction	Assignment 1 Brief	
3 Jan 19-25	Coordinate Systems GIS Data Models	2 Coordinate Systems 3 Vector Data model 4 Raster Data Model	Assignment 1	
4 Jan 26-Feb 1	Spatial Data Input	Project Topic Brief 5 GIS Data Acquisition 6 Geometric Transformation	Assignment 2 Brief	Assignment 1
5 Feb 2-8	Attribute Data Input and Vector Analysis	8 Attribute Data Management 11 Vector Data Analysis	Assignment 2	Project Topic
4 Feb 9-15	Raster Analysis	Project Proposal Brief 12 Raster Data Analysis	Assignment 3 Brief	Assignment 2
7 Feb 16-22	<i>Spring Break</i>			
8 Feb 23-Mar 1	Cartography, Geovisualization Graphic Design	9 Data Display and Cartography	Assignment 3	
9 Mar 2-Mar 8	Exploratory Data Analysis and Related Methods	10 Data Exploration	Project Clinic: Proposal Counseling and Supervised Lab Work	Assignment 3
10 Mar 9-15	Terrain Modeling	13 Terrain Mapping and Analysis	Assignment 4 Brief	Project Proposal
11 Mar 16-22	Problem Solving and Modeling	18 GIS Models and Modeling	Assignment 4	
12 Mar 23-Mar 29	Special Topics, e.g. Interpolation, Network, Viewshed, Watershed Analysis, etc.	15 Spatial Interpolation 17 Least-Cost Path Analysis and Network Analysis	Project Clinic: Counseling and Supervised Lab Work	Assignment 4
13 Mar 30- Apr 5	Topics from External Readings		Project Clinic: Counseling and Supervised Lab Work	
14 Apr 6-12	Student Project Presentations	Course Wrap-Up	Student Project Presentations	Final Project: Paper, PPT and SDB

Appendix A: Recommended Readings (Will be Provided):

Avery T.E. and G. L. Berlin, *Fundamentals of Remote Sensing and Airphoto Interpretation*, Fifth Ed., Macmillan Publishing Co, USA. **Chapter 15 “Digital Image Processing” pp. 405-465.**

Burrough, P.A. and McDonnell, R.A., *Principles of Geographical Information Systems*, 1998, Oxford University Press, UK. **Section on “Digital elevation models as a special case of continuous surfaces created by interpolation” pp. 121-131 and Chapter on “Spatial analysis using continuous fields” pp. 183-219.**

Chrisman N., *Exploring Geographic Information Systems*, 2002, John Wiley & Sons, USA. **Chapter 5 “Overlay: Integration of Disparate Sources” pp. 119-152.**

Kimerling A. Jon, A. R. Buckley, P. C. Muehrcke, and J. O. Muehrcke, *Map Use: Reading and Analysis*, Sixth Edition, 2009, ESRI Press Academic Publications, Redlands, CA, USA. **Chapter 16 “Surface analysis” pp. 346-365 and Chapter 17 “Spatial pattern analysis” pp. 366-390.**

Lo C.P., A.K.W.Yeung, *Concepts and Techniques of Geographic Information Systems*, Second Edition, 2006, Prentice Hall, USA. **Chapter 8 “Remote Sensing and GIS Integration” pp. 286-327.**

Longley P.A., M.F.Goodchild, D.J.Maguire, and D.W.Rhind, *Geographic Information Systems and Science*, Third Edition, 2011, John Wiley & Sons, USA. **Chapter 1 “Systems Science and Study” and Chapter 2 “A Gallery of Applications” pp. 3-71.**

McHarg Ian L., *Design With Nature*, Wiley Reprint 1 edition, 1995, USA. **Intro vii-viii, “The River Basin” pp 126 – 151.**

Nyerges T. L. and P. Jankowski, *Regional and Urban GIS – A Decision Support Approach*, 2010, The Guilford Press, USA. **Chapter 3 “GIS Decision Support Methods and Workflow” pp. 38-66, and Chapter 6 “Fundamentals of GIS-Based Data Analysis for Decision Support” pp. 115-135, and part of Chapter 7 “Making Choices About GIS-Based Multicriteria Evaluation” pp. 136-150.**

Tomlin C. D., *Geographic Information Systems and Cartographic Modeling*, 1990, Prentice Hall, USA. **“Data” (First part of the chapter) pp. 1-25 and 46-54.**

Tomlin C. D., *Geographic Information Systems and Cartographic Modeling*, 1990, Prentice Hall, USA. **Part of Section on “Functions of Immediate Neighborhoods” (in Chapter 5 “Characterizing Locations Within Neighborhoods”) pp. 96-105.**

Tomlin C. D., *Geographic Information Systems and Cartographic Modeling*, 1990, Prentice Hall, USA. **Section on “Functions of Extended Neighborhoods” (in Chapter 5 “Characterizing Locations Within Neighborhoods”) pp. 118-150.**

Tufte Edward R., *Envisioning Information*, Graphics Press, USA, 1990. **Chapter 5 “Color and Information” pp. 81-95.**

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