ADVANCED GIS & SPATIAL ANALYSIS

Geography 4211 – Winter 2013

Instructor:	Dr. Todd A. Randall Office: RC-2006C Tel: 343-8381 Email: randall@lakeheadu.ca	Office Hours (or by appointment): No specific hours. Please contact me for an appointment or catch me at or after class.
Teaching Assistant:	*none*	

Course Description:

This course covers advanced topics in spatial analysis and geographic information systems (GIS). The course will be a mix of lectures, discussions and laboratory periods that cover the following: data collection / creation; spatial analysis tools; and specific applications of GIS software. Students will develop working knowledge of ESRI's ArcGIS 10[1].

Course Grading:

Lab Assignments (small) (2 @ 5% ea.)	10%	
Lab Assignments (large) (2 @ 15% ea.)	30%	*(see note 2)*
Case Studies in GIS (4)		
Participation in Class Discussion	10%	
ArcGIS Modules (7 @ ≈3% ea.)	20%	
ArcGIS Lab Test	10%	
Final Exam	20%	
$\sum =$	**100 %**	

Notes:

1. *Alternatives for absence from assignments and exams will only be possible with provision of a medical or equivalent note.*

2. *If interested, you may propose your own project or paper on a topic in GIS or its applications in lieu of an assigned "large" lab. **This must be proposed by January 31st**.*

3. *Late labs will be deducted 10% per academic day*

Course Organization:

Lecture:	Mondays and Wednesdays 10:30 to 11:30 in AT-2020
Lab:	lab section W1: Thursdays 8:30 to 10:30 in AT-3009
	lab section W2: Fridays 10:30 to 12:30 in AT-3009

AT-3009 is to be used only in this and other authorized courses (i.e., Geog 3253 and Geog 4013). As well, no beverage or food is permitted in this classroom (this is University policy for all labs). Should you abuse your privileges, the instructor has to right to restrict or remove your use of computer labs.

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[1] As of July 2011, Lakehead University is currently supporting ArcGIS 10. Course text (Chang 2012) is geared towards ArcGIS 10, so there *should* be fewer problems than encountered in previous versions of the course.

When completing assignments using GIS, storage space often becomes an issue. In trying to circumnavigate these problems, TSC has created a temporary work space (drive T) on the computers in AT-3009. This space is approximately 1 Gigabyte and is to be used when completing your assignments. It has been designed as a "thaw space" so that data can be stored here, protected from the University's "Deep Freeze" program. However, as any student logging onto the machines can have access to this drive, it is essential that you transfer your data to a USB device at the end of (or preferably during) your work sessions. A good management practice is to wipe this drive clean at the beginning of a work session, thereby avoiding complications with other students' data.

Course Resources:

- (***required text***): Chang, K., 2012[2]. *Introduction to Geographic Information Systems*, 6th Edition (New York, NY: McGraw-Hill), 418 pages with companion CD [ISBN 978-0-07-336931-0] *(You will need to bring the textbook and its companion CD to each lab period)*
- (***required***): USB device for data storage

In addition to these required readings, the following books and ***select*** articles are on reserve in the Chancellor Paterson Library. These will be used as supplementary reading for some lectures and the labs. Articles to be read for the three case studies will be circulated electronically. A lengthier list of articles of "GIS Applications" is available from Dr Randall.

books

Aronoff, S. 1989. *Geographic Information Systems: A Management Perspective*.
Burton, P.J., Messier, C., Smith, D.W., and Adamowicz, W.L. (editors) 2003. *Towards Sustainable Management of the Borest Forest*. Ottawa, ON: NRC Research Press.
Dent, B.D. 1993. *Cartography: Thematic Map Design*.
Jones, C.B. 1997. *Geographic Information Systems and Computer Cartography*.
Longley, P.A., Goodchild, M.F., Maguire, D.J., and Rhind, D.W. 1999. *Geographical Information Systems*.
Monmonier, M.S. 1996. *How to lie with maps*. 2nd Edition, Chicago: University of Chicago Press.
Ormsby, T., Napoleon, E., Burke, R., Groess, C. and Feaster, L. 2004. *Getting to Know ArcGIS Desktop: Basics of ArcView, ArcEditor, and ArcInfo*. 2nd Edition, Redlands, CA: ESRI Press.
Tyner, J. 1992. *Introduction to Thematic Cartography*.

book chapters, journal articles, etc. (supplementary readings, on reserve in Paterson Library)

(for Harvest Plan lab, if applicable) Messier, C. *et al.* (9 co-authors not listed) 2003. Modelling tools to assess the sustainability of forest management scenarios. Chapter 14, pp 531-580, **In:** Burton *et al.* (2003) – see book citation above.
(for Harvest Plan lab, if applicable) Pulkki, R. 2003. Minimizing negative environmental impacts of forest harvesting operations. Chapter 15, pp 581-628, **In:** Burton *et al.* (2003) – see book citation above.

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[2] This is the same text as used in Geog 3251, so you may be able to find a used copy of the text. Earlier editions published in 2010 and earlier have comparable content, so may be suitable as well.

Course Schedule (*subject to changes*) – Winter 2013

Week of	Lecture[1] Mon 10:30 (AT-2020)	ArcGIS Modules / GIS Case Study Wed 1:30 (AT-3009 / AT-2020)	2-hr Lab Slot (AT-3009) Thurs 8:30-10:30 or Fri 10:30-12:30
Jan 6	Organizational Meeting and lecture 1: Re-fresher of GIS and Cartographic Display (Chang chs. 1, 3, 4, 9) – both Monday and Wednesday class meetings		**(Module 1)** ArcGIS Intro and Data Management
Jan 13	2: Data Sources, Data Quality, Error Mgmt (Chang chs. 5, 7, 8 & Aronoff)	**(Case Study 1)** Read & prep TBA[2]	**(Lab 1)** CMA Data Management and Choropleth Mapping
Jan 20	3: Site Selection (Chang section 18.2)	**(Module 2)** Data Display and Cartography *(in LAB)*	*Lab 1 continued … independent period (TR absent)*
Jan 27	4: Terrain and Watershed Analyses (Chang chs. 13, 14)	**(Case Study 2)** Read & prep TBA[2]	*Lab 1 continued …*
Feb 3	5: Modeling Using a GIS (Chang ch. 18)	**(Module 3)** Vector Data Analysis *(in LAB)*	**(Lab 2)** Heads-up Digitizing: Soils of the Thunder Bay Region
Feb 10	6: Adv'd Network Analysis & Dynamic Segmentation (Chang chs. 16, 17)	**(Module 4)** Terrain Mapping and Watershed Analysis *(in LAB)*	*Lab 2 continued …*
Feb 17	**STUDY WEEK (Feb 18 – 22) (no classes)**		
Feb 24	7: Spatial Interpolation Methods (Chang ch. 15)	**(Module 5)** Spatial Interpolation Techniques *(in LAB)*	*Lab 2 continued …*
Mar 3	8: Tutorial: Spatial Correlation	**(Case Study 3)** Read & prep TBA[2]	**(Lab 3)** Intro to Spatial Correlation
Mar 10	9: Spatial Autocorrelation and Pattern Analysis (Chang sect. 11.4)	**(Module 6)** Network Applications *(in LAB)*	*Lab 3 continued …*
Mar 17	10: Land Use Diversity Indices (Sprawl Indices)	**(Module 7)** Binary and Index Models *(in LAB)*	**(Lab 4)** Developing a Sprawl Index Model
Mar 24	**(Case Study 4)** Read & prep TBA[2]	*Lab 4 continued …*	**Good Friday – No Class**
Mar 31	**Easter Monday – No Class**	Flex Time	**LAB TEST**
Apr 7	Review & Exam Hints (see note 5)	no class	no lab

Notes: 1) Course readings from Chang (2012) and other reserve materials are indicated in parentheses; 2) Case study articles to be discussed at these classes will be e-mailed in advance of these in-class discussions; 3) **Final exams** run from April 12th to 24th, 2013, inclusive. *There is no flexibility in changing exams*. 4) Good Friday and Easter Monday holidays are March 29th and April 1st, respectively; 5) Last day of classes is Tuesday April 9th, 2013.