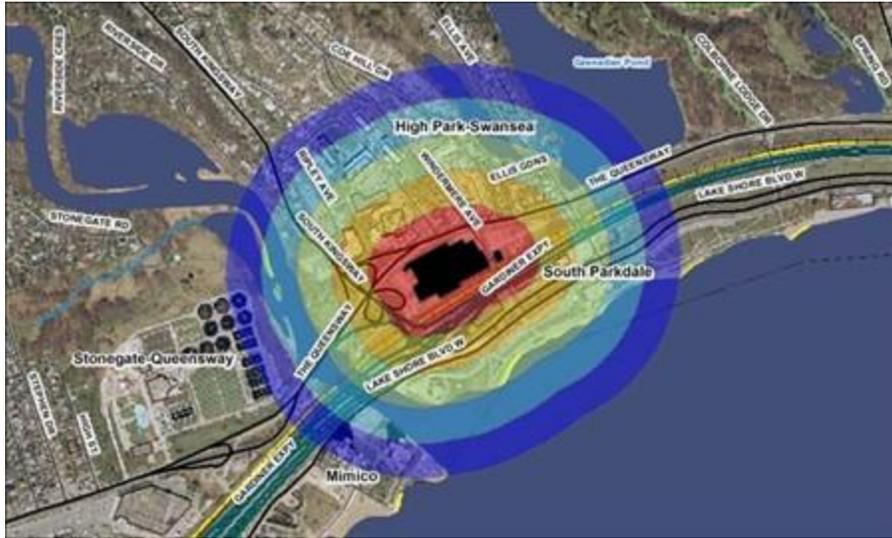**GEM 400 Introduction to GIS for Environmental Management**

The former Stelco brownfield site used as a case study in this course, showing 100 m buffer rings to a distance of 500 m.

COURSE SYLLABUS
Instructor: Michael Govorov, PhD
Email: govorovm@viu.ca

COURSE DESCRIPTION

This online course provides an introduction to digital mapping and spatial analysis using a geographic information system (GIS). The course begins by building a foundation of fundamental concepts such as scale and map projections, critical to all future GIS analytical work. Students then learn how to create their own maps, input their own data, and how to use GIS software to analyze geographic problems and learn techniques that can be applied to environmental management, as well as to a wide variety of other subject areas.

Students will use leading-edge industry data and a case study provided by EcoLog ERIS . The case study is the former Stelco brownfield site in Toronto, which has recently been rehabilitated and where new condominiums are now constructed. Analysis of this site includes working with a high-resolution aerial photograph of the study site, digitizing the outline of the Stelco parcel of land, querying and analyzing EcoLog ERIS environmental data surrounding the site, hyperlinking digital ground photographs to mapped features in the GIS software, and analyzing population density and distribution in the area immediately surrounding the site.

The online course notes and the textbook explain the underlying theory, and how it is implemented in GIS software. The practical assignments then give students the opportunity to learn for themselves how to put that theory into practice, gaining hands-on experience with ESRI ArcGIS 10 software, the latest version of the most popular GIS and an industry standard in many fields.

This course is part of the Certificate in GIS for Environmental Management offered by the School for the Environment and can not be applied to any degree program at the University of Toronto.

COURSE OUTCOMES
The goal of the course is to provide students with a strong understanding of introductory GIS concepts and theory, as well as practical skills, so that they are able to make informed decisions about how to approach a GIS-related problem and transfer their understanding to any GIS software. Upon successful completion of the course, students will understand how to acquire data from other sources, create and edit their own data using different file formats, perform queries from tabular or map data, perform map overlay analysis, and understand some basic techniques for designing a quantitative map for communicating analysis results to others. This will all be done within the context of a practical environmental problem using actual data sets taken from the environmental sector.

COURSE MATERIALS

Kang-tsung Chang, **2015**, Introduction to Geographic Information Systems, 8th Edition, McGraw-Hill Higher Education (Data set CD-ROM is not required).

This text (also used for GEM 401, GEM404) can be purchased online at http://www.amazon.ca/ or http://www.chapters.indigo.ca/ or http://www.uoftbookstore.com/.

Supplemental Readings:
The e-guides and tutorials from ESRI digital Library and Documentation. Additional Internet recourses will be recommended for particular modules during the course. Students will be provided with a variety of supplemental documents (PPT presentations) and handouts in digital form. Supplemental documents will be available on the Blackboard or/and GIS Server.

Online Resources:
• ESRI's Virtual Campus online courses

Access to Software

The ESRI ArcGIS 10 software runs on the School for the Environment's GIS server. This means that students can access their coursework from any computer using a regular web browser and a high speed internet connection (i.e. DSL or cable).

Prerequisite:

This course is designed for people with no prior GIS experience. There are no prerequisites for this course. A basic understanding of computers and familiarity with the Microsoft Windows operating system is assumed.

Evaluation

Students complete five assignments designed to provide practical experience with the software while simultaneously illustrating and reinforcing theoretical concepts. Each assignment includes exercises accompanied by questions that encourage students to think about the underlying principles that affect the tasks they are performing.

Quizzes will take place during the week five and ten of the course, and will cover all of the material discussed in the course.

Courses from the ESRI virtual campus will be assigned as additional homework. Proof (PDF copies of the certificates) of completion of these courses will be required.

Overall Assessment
This course requires that you maintain an average of 70% or greater in the course work for continuation in the course. There is an expectation for a high level of quality in the work produced by the student. For evaluation purposes, work will be graded under the following criteria:

Distance Education Certificate Program Grade Scale

Letter Grade Scale	Numerical Scale of Marks
A +	90-100%
A	85-89%
A -	80-84%
B+	77-79%

B	73-76%
B-	70-72%
FZ	0-69%

Schedule

The topics and schedule may be adjusted during the term.

Week	Topic	Tutorial	Lab / Assignment	Test	ESRI Courses
1	What is GIS?	Tutorial 1	Lab 1		Learning ArcGIS Desktop 10
2	Maps and GIS (Scale Coordinate Systems and Projections)		Lab 2		
3	Digital Representation of Geographic Data				
4	Digital Representation of Geographic Data (cont,)		Lab 3		
5	Spatial Data Acquisition and Input			Quiz 1	
6	Establish Spatial Database		Lab 4		
7	Spatial Data Geoprocessing and Analysis	Tutorial 2			Turning Data into Information using ArcGIS 10
8	Non-Topological Vector Analysis		Lab 5		
9	Feature-Based Vector Topological Analysis				
10	Layer Base Vector		Participation in online	Quiz 2	

	Topological Analysis		Forum discussions		