TRENT UNIVERSITY

Department of Geography/ Environmental and Resource Studies Program/
GEOG/ERSC-445H
Environmental and Life Sciences Graduate Program ENLS-5011H

Spatial Modelling with Geographical Information Systems

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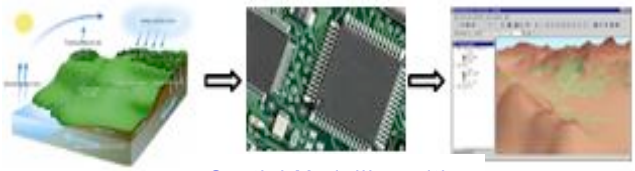

Spatial Modelling with

2008- 2009

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1. Introduction.

Geographical Information Systems (GIS) technology and procedures are commonplace in research and in agency and industry applications. Central to the analysis of spatial phenomena in the vast majority of such applications is the development of models of reality. Spatial modelling refers to models of phenomena distributed over the geographical space. This course introduces the technical issues and approaches to spatial modelling using GIS. The course assumes at least an introductory knowledge and skills in GIS. Graduate students are encouraged to enrol if their research will require spatial analysis. The course intends to provide exposure to more advanced topics in GIS, particularly to quantitative methods and modelling techniques for natural and anthropogenic phenomena over the geographical space. The course emphasizes independent work on problem-solving approaches within the GIS context, as a mechanism for learning.

2. Course Objectives.

This course has as its objectives, the following:

- Introduce a range of approaches to modelling phenomena distributed over the geographical space.
- Introduce a suite of qualitative and quantitative tools and procedures for analysis and development of models of spatial patterns using GIS.
- Examine advanced technical issues related to the development and application of spatial models supported by GIS functions and tools.
- Apply problem-solving approaches to developing and interpreting spatial models of natural and human phenomena, within a spatial modelling framework.

3. Course requirements, assignments, grading and deadlines.

The course will be instructed in one two-hour lecture weekly. One two-hour Laboratory fortnightly will complement the lectures.

Important Notice: The 2-hr lab period will be devoted to lab setup, demonstration and lab briefings. It is expected that lab work for a particular assignment will span beyond the 2-hr scheduled period. The time for completing each assignment will depend on personal GIS background, ability and dedication.

Other requirements for this course are:

- The completion and reporting of lab assignments

- A final written examination
- A small independent project on spatial modelling with a topic selected by the student.

This course is not based on any particular GIS software. It encourages software-independent thinking and problem-solving. Students are free to use **any** platform and GIS software available for their assignments.

Course Delivery:

MyLearningSystem will be used as far as possible for course delivery using internet resources. Students are strongly encouraged to become familiar with this interface.

A Two-tier system for course delivery. This course is offered to students who may bring a wide range of GIS knowledge and skills. Therefore, a two-tier system for course delivery may be implemented as follows:

- **Tier 1: Intermediate Students and students with lesser exposure to GIS**: These students may require more guided / structured course instruction. They are encouraged to undertake the lab assignments part of the course, and work independently on them in a problem-solving fashion (any variant to this format should be discussed with the instructor on an individual basis).

- **Tier 2: Advanced GIS students** (e.g. certified GIS applications specialists, some graduate GIS students or equivalents). These students are encouraged to work independently on their assignments in a problem-solving fashion. They can opt, after reviewing the course's lab content, for exchanging some of the lab content for a larger independent term-project involving the application of advanced spatial modelling concepts and techniques (usually involving the development of some kind of spatial model, GIS customization programming, Web GIS, or any other advanced spatial modelling topic). These students should discuss this option with the instructor and agree on topic, scope, deliverables and marking scheme on an individual basis.

Regardless of whether a student chooses tier 1 or 2, a small independent project will be undertaken by each student, in parallel to lab assignments. This is to stimulate problem-solving abilities. An identified problem should be discussed between student and instructor. The independent project involves the formulation in writing and oral presentation of:

- A project proposal. (Discussion of the approach and methods to be used (Deadline to be determined)
- A project defence (presentation and short written synopsis / report of project results, no page limits). (Deadline to be arranged)

Warning: Due to the variety of student GIS background and skills, the completion of some assignments may require time in excess of that indicated in the syllabus and timetable.

Unless otherwise instructed, the assignments are due automatically the following Workshop/Lab date.

4. Marking scheme:

- Lab assignments 45%
- Final exam 30%
- Independent Project 25%

5. Course policies on late submission of work and attendance in class/labs: Late submissions of work, unless agreed upon between the student and instructor carry a penalty of 5% of the assignment mark per day in the first 3 days and 10% of the assignment mark per day then after. Unforeseen circumstances and illness should require a written valid justification from a corresponding authority. While attendance to lectures and lab sessions is not compulsory in this course, this will be considered in situations where assigning a final mark requires of an overall assessment of student performance.

6. Schedule of topics and readings: There are no textbooks for this course. Instead, highly recommended titles are indicated below and chapters for complementary readings to the lectures will be suggested during the lecture time. The recommended (not mandatory) texts for this course are listed below:

Clarke, K.C., B.O. Parks and M.P. Crane (2002) Geographic Information Systems and Environmental Modeling. Prentice Hall Series in Geographic Information Science. Prentice Hall, N.J.. USA. ISBN0-13-040817-4

Longley, P and M. Batty -Eds. (1996) Spatial Analysis: Modelling in a GIS Environment. John Wiley and Sons, N.Y. ISBN 0-470-23615-9

Lillesand T.M., R.W. Kiefer and J.W. Chipman (2004) Remote Sensing and Image Interpretation. 5th Edition. Wiley. N.Y. ISBN 0-471-45152-5

Maguire, D.J., M. Batty and M. Goodchild (Eds.) (2005) GIS Spatial Analysis and Modeling. ESRI Press. Redlands, California, USA. ISBN 1-58948-130-5

Academic Dishonesty: Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offense and carries penalties varying from failure in an assignment to suspension from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent University's Academic Dishonesty Policy, which is printed in the University Calendar and on the university web site at: http://www.trentu.ca/deansoffice/policies_dishonesty.php. Although plagiarism most commonly refers to academic writing (reports, essays and theses) in the arts and social sciences, *lab courses are not exempt. Cooperation among students is encouraged in the laboratory sessions to strengthen their learning experience. However, this should not be misconstrued to include copying or sharing answers to the questions in the assignments.*

Grammar and Style: It is expected that written assignments in Geography courses will conform to high standards of grammar and style. Although the penalty may vary from course to course, and from one kind of written assignment to another, bad grammar and style will be penalized in all grading of written work submitted in Geography courses.

Access to Instruction : It is Trent University's intent to create an inclusive learning environment. If a student has a disability and/or health consideration and feels that he/she may need accommodations to succeed in this course, the student should contact the Disability Services Office (BL Suite 109, 748-1281; disabilityservices@trentu.ca as soon as possible. Complete text can be found under Access to Instruction in the Academic Calendar.