

Geographic Information Systems for Environmental Design EVDP 611

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Course instructor:

Paul Galpern

pgalpern@ucalgary.ca

office: 403.220.7436

PF 3192

Introduction

This course offers students an opportunity to develop skill in geographic information systems (GIS) and their applications to environmental design questions. The laboratory-centred course takes a hands-on approach to learning with several student projects that address authentic problems in urban planning, regional planning and landscape design. The main emphasis of the course is on the use of GIS tools and the interpretation of findings. Relevant theory is discussed in order to support effective application of these tools. The course assumes no background in GIS, and begins by examining a range of basic operations on spatial data to support cartography, proceeding to more advanced manipulations of these data to perform spatial analyses of sites, neighbourhoods, communities, regions and landscapes. The intent is to offer students broad exposure to applications of spatial information relevant to environmental design, and includes operations on data representing urban, demographic and environmental phenomena, in the forms of vector and raster datasets, digital elevation models (DEMs), remote sensing products and road networks.

Objectives

1. To develop an **empirical evidence-based** orientation when undertaking planning and design decisions, and to assess the quality of evidence that may be used in professional work.
2. To expose students to selected **concepts in geography, cartography, remote sensing, spatial analysis, and network analysis** that are relevant to planning and designing at a variety of scales.
3. To introduce the GIS skills necessary to assess **the characteristics of sites, the suitability of sites, and the need for design interventions at neighbourhood, community, regional and landscape scales.**
4. To use **spatial analytical techniques** to prepare quantitative and cartographic empirical evidence upon which to base planning and design decisions.
5. To develop **confidence to obtain, handle and manipulate spatial data** using mainstream GIS technologies for the purposes of cartographic representation and spatial analysis.

Teaching Approach

This chiefly laboratory-based course combines instructor-centred and student-centred classroom time with hands-on computer coaching by instructor and teaching assistants. Assessment focuses on the effective application of GIS-related knowledge rather than on recording evidence of its acquisition. Four course assignments collectively provide opportunities to develop effective graphic and written communication skills within a planning and design context, produce and interpret quantitative spatial analyses relevant to environmental design.

Topics

1. Cartography (e.g. effective map design; spatial data types; spatial data manipulation).
2. Spatial analysis of vector and raster data representing geographic features (e.g. connectedness; adjacency; containment; proximity; overlap; pattern; and flow)
3. Site analysis (e.g. digital elevation models; terrain conditions; drainage; remote sensing)
4. Service area analysis (e.g. walksheds; commuter sheds; service areas; road network analysis)
5. Site selection (e.g. multi-criteria decision analysis)

Course structure

The primary contact time will depend on the course section, and falls on either **Wednesday or Friday mornings 9:15 to 12:00**. All activities will occur in the EVDS computer room. We have access to this room until 12:45, and from time-to-time the instructor and teaching assistants will make ourselves available for extra help and coaching between 12:00 and 12:45.

A detailed course schedule will be handed out in class, and is available on D2L.

Late policy

In order to be fair to all students, assignments submitted after the deadline will be assessed using the rubric, the mark converted to a percent, and then **10% deducted** from the assignment total. Thank you for your help in avoiding this uncomfortable situation. If you find yourself in an emergency situation that you could not have planned for, and that you believe warrants an exception, please contact Paul.

Recommend text

Krygier, J., and Wood, D. 2016. Making Maps: A visual guide to map design for GIS. 3rd edition. Guilford Press, New York. This is an excellent cartography and design reference book. It is available at several online retailers. Opt for the **third edition**, as earlier ones are not as good. While likely to be useful, it is not a required text.

Evaluation

The course evaluation will be based on four assessments. There will be no final examination. Class time will be provided to develop the skill necessary to complete these assignments. There will also be time reserved to complete them with coaching assistance of the instructor and TA. Complete details for these assignments as well as assessment criteria will be provided in class when the assignment is first introduced. All assignments will be done individually.

ArcMap portfolio (25%)

Create a portfolio that assembles evidence of in-class experimentation with ArcMap cartographic and basic spatial analysis tools. The product will be a collection of map artifacts that meet certain criteria that will be provided. These maps will be associated with text that describe the process used to create the map and interpret what it shows. Full instructions will be provided on an assignment sheet distributed in class. **(Due: before 9:00 am, electronically on D2L as a single PDF on Wednesday February 8th for L02 or Friday February 10th for L01).**

Physiographic site analysis (20%)

Working with digital elevation and remote sensing data perform a site analysis, and prepare a short report describing the findings. Full instructions will be provided on an assignment sheet distributed in class **(Due: before 9:00 am, electronically on D2L as a single PDF on Wednesday March 1st for L02 or Friday March 3rd for L01).**

Service area analysis infographic (15%)

Perform analyses of service areas using a variety of tools and present quantitative comparisons of the properties of these areas in the form of a small poster infographic. Full instructions will be provided on an assignment sheet distributed in class. **(Due: before 9:00 am, electronically on D2L as a single PDF on Wednesday March 15th for L02 or Friday March 17th for L01).**

Final project: Site selection report (40%)

Given a scenario for the selection of a site, students will prioritize the factors that are necessary to meet the client's expectations, and assemble spatial data inputs in order to perform multi-criteria decision analyses. The product of this decision-support exercise will be a report to the client recommending a site, complete with cartographic and other empirical evidence. Full instructions will be provided on an assignment sheet distributed in class. **(Due: Wednesday April 12th before 4:30 pm, in print, at EVDS Main Office for BOTH sections)**

Notes: Final grades will be reported as letter grades, with the final grade calculated according to the 4-point range. All assignments will be evaluated by percentage grades, with their letter grade equivalents as shown

Grade	Grade Point Value	4-Point Range	Percent	Description
A+	4.00	4.00	95-100	Outstanding - evaluated by instructor
A	4.00	3.85-4.00	90-94	Excellent - superior performance showing comprehensive understanding of the subject matter
A-	3.70	3.50-3.84	85-89	Very good performance
B+	3.30	3.15-3.49	80-84	Good performance
B	3.00	2.85-3.14	75-79	Satisfactory performance
B-	2.70	2.50-2.84	70-75	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	2.15-2.49	65-69	All final grades below B- are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements.
C	2.00	1.85-2.14	60-64	
C-	1.70	1.50-1.84	55-59	
D+	1.30	1.15-1.49	50-54	
D	1.00	0.50-1.14	45-49	
F	0.00	0-0.49	0-44	

A student who receives a "C+" or lower in any one course will be required to withdraw regardless of their grade point average (GPA) unless the program recommends otherwise. If the program permits the student to retake a failed course, the second grade will replace the initial grade in the calculation of the GPA, and both grades will appear on the transcript.

1. Written work, term assignments and other course related work may only be submitted by e-mail if prior permission to do so has been obtained from the course instructor. Submissions must come from an official University of Calgary (ucalgary) email account.
2. Academic Accommodations. Students who require an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to their Instructor or the designated contact person in EVDS, Jennifer Taillefer (jtaillef@ucalgary.ca). Students who require an accommodation unrelated to their coursework or the requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Vice-Provost (Student Experience). For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/
3. Plagiarism - Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Most commonly plagiarism exists when:(a) the work submitted or presented was done, in whole or in part, by an individual other than the one submitting or presenting the work (this includes having another impersonate the student or otherwise substituting the work of another for one's own in an examination or test),(b) parts of the work are taken from another source without reference to the original author,(c) the whole work (e.g., an essay) is copied from another source, and/or,(d) a student submits or presents work in one course which has also been submitted in another course(although it may be completely original with that student) without the knowledge of or prior agreement of the instructor involved. While it is recognized that scholarly work often involves reference to the ideas, data and conclusions of other scholars, intellectual honesty requires that such references be explicitly and clearly noted. Plagiarism is an extremely serious academic offence. It is recognized that clause (d) does not prevent a graduate student incorporating work previously done by him or her in a thesis. Any suspicion of plagiarism will be reported to the Dean, and dealt with as per the regulations in the University of Calgary Graduate Calendar.
4. Information regarding the Freedom of Information and Protection of Privacy Act (<http://www.ucalgary.ca/secretariat/privacy>) and how this impacts the receipt and delivery of course material
5. Emergency Evacuation/Assembly Points (<http://www.ucalgary.ca/emergencyplan/assemblypoints>)
6. Safewalk information (<http://www.ucalgary.ca/security/safewalk>)
7. Contact Info for: Student Union (<https://www.su.ucalgary.ca/contact/>); Graduate Student representative(<http://www.ucalgary.ca/gsa/>) and Student Ombudsman's Office (<http://www.ucalgary.ca/ombuds/>).