GEOM 4008 – Advanced Topics in Geographic Information Systems
DRAFT Course outline - Fall 2025
Department of Geography and Environmental Studies
Carleton University

This is a DRAFT course outline – the final version will likely be extremely similar, but we have found it useful to review the details of the numbers and sometimes weighting of the deliverables at the beginning of each year, to make sure it is a good fit with the number and backgrounds of the students in the course that year. We will discuss this in the first class, and finalize this outline accordingly.

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Course web site: Brightspace will be used to manage course materials; files may also be distributed through the Geomatics shared directory on the campus network, or dges.carleton.ca, but there will always be directions and links in Brightspace.

Course learning objectives:

1. Explore and understand advanced aspects of some current issues in geomatics, including:
    a. error and uncertainty analysis and visualization/communication in spatial data and analysis;
    b. spatial decision support systems;
    c. spatial interpolation and field models; elevation modelling and data sources;
    d. spatial pattern measurement or characterization;
    e. spatial databases;
    f. open data, data standards and open-source software development: impact and role in spatial data and analysis (standards, data exchange, open tools); and
    g. spatial data policy including Indigenous data sovereignty.

    Understanding these concepts will be primarily developed using a combination of exploring the literature, class discussion, and in many cases, practical exercises. There will be presentations throughout the course to introduce and discuss topics, but there is a large component of independent learning in this class, and you will each contribute to the delivery of one of the seminars.

2. Develop skills and understanding of how your training in GIS relates to new software packages and "end to end" workflows (from data collection, to storage, to analysis, to presentation). Use this learning to provide new user documentation or tutorials to help others learn to do specific tasks in free or open-source software packages, and/or accessing, transforming and making use of open data.

Prerequisites: GEOM 3005 (OR equivalent alternative GIS experience), and honours standing. Prospective students from other schools or backgrounds should contact us about other acceptable prerequisites. Several students have already been given permission to take this course without the official prerequisite this year to accommodate unusual circumstances – we will adjust as needed.

Marking:	Activity	Marks	Approximate timing[1]
	Tutorial improvement:	10%	First month of class
	Seminar:	20%	Sign up for timing within term
	Project proposal:	5%	Just before or after Reading Week
	Quizzes:	10%	Spread through term
	Project presentation:	5%	Last week of classes
	Project (includes exam*):	25%	End of term
	Workshop completion:	15%	Throughout course
	Overall participation:	10%	Throughout course

A take-home exam will be administered at the end of the course based on the student's term project.

Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.

Course Format:

This course uses an in-person format. Informed by COVID's forced switch to online courses, we have designed this course using a blend of content and activities that worked well in the various versions of the course. Each week will include an in-person lecture and discussion sessions, and practical workshops in the campus labs. Where valuable, some recorded material may supplement the in-person delivery.

Requirements:

The computers in DGES GIS labs will be used in this course. (see Brightspace for specific locations and times). If you also want to work on your own computers, we can provide advice given our experience with the past online versions of this course, and use of one's own computer will remain a backup solution if needed.

The exact computing requirements and recommendations will necessarily be a work in progress, since we anticipate learning new restrictions and fixes as we test the software and then bring the students in as the term begins. Updates will be posted on Brightspace.

In this class, you are expected to become familiar with GIS software you have never used before. Students are expected to already be proficient in at least one GIS package (probably ESRI ArcGIS, and for many of you, perhaps QGIS and Geomatica or SNAP), and able to learn new software using a good deal of independent work. Software training is not a part of this course in the fashion you are used to in other GEOM courses, however many of the tools we use will probably be new to you, and you will get help where needed.

Learning to process and analyse spatial data in a new software environment will be the focus of your final project for this course. The deliverables will include a tutorial with any required training materials, which will be published on the Internet under a Creative Commons license. The take-home final exam reports on this project.

[1] Exact timing varies each year; **detailed schedule will be developed interactively over the first few weeks,** adjusted according to numbers and interests of enrolled students. The full schedule will be worked out before course drop deadline.

Major topics covered in class will be accompanied by quizzes, in Brightspace, designed to make sure you grasped the main concepts in that topic. Each quiz will be done in class. There will be a time limit, simply to make sure nobody is obsessing over a small quiz instead of working on more important things, but it will be designed to provide much more time than is actually needed. Exact scheduling details will be worked out in the first weeks of class, according to the distribution of students signing up for different topics.

Late assignments will receive a penalty of ten percent of the total grade, for up to 2 days late, and after that they will not be accepted without appropriate reasons. All assignments must be produced on a computer and submitted digitally through Brightspace or the tutorial wiki site.

Readings:

Journal articles and other academic readings will be assigned. Students will prepare and present summaries of readings and their associated concepts in class. Readings supporting these presentations will be chosen in cooperation with the instructor.

Students are not required to purchase textbooks or other learning materials for this course.

Instructional & Conduct Offences:

Instructional offences include, among other activities, cheating, contravening examination regulations, plagiarism, submitting similar work in 2 or more courses without prior permission, and disrupting classes. Conduct offences apply in areas of discrimination and sexual harassment. Further information about University regulations which define and regulate these offences is presented in the Undergraduate Calendar: http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/ and the university's Academic Integrity Policy.

Plagiarism:

The University Academic Integrity Policy defines plagiarism as "*presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own.*" This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to: books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, artworks, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, material on the internet and/or conversations.
Examples of plagiarism include, but are not limited to:

- any submission prepared in whole or in part, by someone else, including the unauthorized use of generative AI tools (e.g., ChatGPT);
- using ideas or direct, verbatim quotations, paraphrased material, algorithms, formulae, scientific or mathematical concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another's data or research findings without appropriate acknowledgement;
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and
- failing to acknowledge sources through the use of proper citations when using another's work and/or failing to use quotations marks.

Plagiarism is a serious offence that cannot be resolved directly by the course's instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of "F" for the course.

As our understanding of the uses of AI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of AI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course.

Statement on Student Mental Health

As a student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. If you need help, please speak to someone. There are numerous resources available both on- and off-campus to support you. For more information, please consult https://carleton.ca/wellness/.

Emergency Resources (on and off campus)

Telephone Resources:
• Crisis/Urgent Counselling Support: 613-520-6674 (Mon-Fri, 8:30-4:30
• Suicide Crisis Helpline: call or text 9-8-8, 24 hours a day, 7 days a week.
• For immediate danger or urgent medical support: call 9-1-1

Carleton Resources:
• Mental Health and Wellbeing: https://carleton.ca/wellness/
• Health & Counselling Services: https://carleton.ca/health/
• Paul Menton Centre: https://carleton.ca/pmc/
• Academic Advising Centre (AAC): https://carleton.ca/academicadvising/
• Centre for Student Academic Support (CSAS): https://carleton.ca/csas/
• Equity & Inclusivity Communities: https://carleton.ca/equity/

Off Campus Resources:
• Distress Centre of Ottawa and Region: (613) 238-3311 or TEXT: 343-306-5550, https://www.dcottawa.on.ca/
• Mental Health Crisis Service: (613) 722-6914, 1-866-996-0991, http://www.crisisline.ca/
• Good2Talk: 1-866-925-5454, https://good2talk.ca/
• The Walk-In Counselling Clinic: https://walkincounselling.com

Academic Accommodations:

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances, are outlined on the Academic Accommodations website (students.carleton.ca/course-outline).