

## **Maps, Satellites and the Geospatial Revolution, GEOM1004 – Summer 2026**

Carleton University  
Department of Geography & Environmental Studies  
Summer 2026

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Office Hours: Mondays (8:45pm-9:45pm) or by appointment

### **COURSE DESCRIPTION**

This course provides an introduction to the creation and use of maps with a variety of geospatial tools to better understand their utility and applied use to approach physical, social, and environmental challenges. An overview of geomatics (cartography and map design, geographic information systems, GPS, and remote sensing) will be provided. In addition to industry-standard software, students will develop an introductory working knowledge and skills with cloud computing and free and open-source software (FOSS) digital map-based technologies, increasingly used in interdisciplinary fields and applications. Through this course, students will develop new skills to navigate a changing world—technologically, culturally, and environmentally—using map-making as pathways to fluidly participate in meaningful ways.

### **SCHEDULE**

**Lectures:** Monday and Wednesday 10:05am- 11:25am

**Lab sessions:** - section A1: Monday and Wednesday 12:35pm-2:25pm  
section A2: Monday and Wednesday 2:35am-4:25pm

### **COURSE TEACHING ASSISTANT**

Check Brightspace for TA contact information and office hours.

### **PRECLUSIONS**

Precludes additional credit for GEOM 2004 (no longer offered).

### **LEARNING OUTCOMES**

The main learning objectives are to: (1) to become familiar with the core sub-disciplines in the broad field of geomatics, (2) to develop an appreciation for how geospatial tools are used, and how they are shaping the way we make decisions, and (3) to develop practical, hands-on skills in cartography, GPS mapping, GIS analysis, and remote sensing and to learn how they can be used to help solve social and environmental problems.

### **COURSE FORMAT**

Lectures will follow the attached course outline. The schedule may require minor revisions to accommodate unexpected scheduling issues. The lectures will introduce and illustrate the major concepts in geomatics. Support material will be available on the Brightspace course site.

## **RECOMMENDED TEXTBOOK**

Jonathan Campbell and Michael Shin, 2011. [Essentials of Geographic Information Systems](#).

Saylor Foundation Brady, N.C. Open access textbook available on:

<https://www.saylor.org/site/textbooks/Essentials%20of%20Geographic%20Information%20Systems.pdf> Other reading materials will be posted on Brightspace.

## **Required Software:**

During this course you will make use of the following software and phone apps:

1. Google Earth Pro Desktop Version (free)
2. ArcGIS Pro v3.1.0 or greater (student license available)
3. Avenza Maps GPS App for iOS and Android (free version)
4. QGIS (free)
4. Google Earth Engine (EE) (free, cloud-based)

For more information about computing requirements to run the desktop GIS software packages (items 1-3 above), please visit: <https://carleton.ca/geography/computing-requirements-for-dges-courses/>

Apart from the Avenza Maps GPS app for your phone, and the online Google Earth Engine platform, all required software will be available on the desktop workstations in the GIS lab.

## **STUDENT RESOURCES AND COMMUNICATION**

### **Office Hours, Email and Appointments**

If you have questions pertaining to lecture material, I encourage you to come to my office hours or to meet me at the end of class to make an appointment.

All questions about missed assignments, missed exams, and other practical concerns about the course should be directed to me by email. Emails will be responded to during business hours only. Please place the course number GEOM1004 in the subject line. Private correspondence with the Instructor and Teaching Assistants should be through a Carleton email account (this is accessible in Brightspace).

### **Brightspace Course Site**

The Brightspace course site of GEOM1004 contains information on all aspects of the course. It includes partial outlines of lectures (not complete notes) and graphs or diagrams presented in class. You need to supplement these notes by attending the class lectures or by referring to the textbook. You will be able to access Brightspace course site and to download files on the first week of classes. If you are not able to login, please contact the course instructor. Follow this link to access the course Brightspace home page: [Maps, Satellites and the Geospatial Revolution GEOM 1004 - Winter 2024](#)

## EVALUATION

Final marks in the course are based on your performance in five categories as follows:

Lecture Participation Questions	15%
Lab Assignments	55%
Midterm Exam	15%
Story Map Project	15%

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.

### Lab exercises

There will be six lab assignments. The lab exercises are meant to complement the course materials and to facilitate application and integration of knowledge gained from lectures and readings. The lab exercises will be posted on Brightspace at least one day ahead of their corresponding lab session. These are normally due at the beginning of your lab section, one week after the assignment introduction. Please feel free to collaborate with others during the lab sessions to obtain common data, but please submit your own individually written lab reports that contain your own analyses and answers to questions. Lab assignments must be typed. The assignment reports must be received by the start of the lab period of the day on which they are due.

The geospatial laboratory assignments provide an opportunity to apply course concepts and get hands-on experience using geomatics tools. Assignments will be introduced during the online laboratory sessions by your teaching assistant and/or the course instructor, which usually includes a brief review of relevant course material, software demonstrations, and tips on how to successfully complete the assignment. While the assignments have been designed by the instructors, the TAs are primarily responsible for organizing and running the laboratory sessions, for providing assistance during their office hours, and for grading assignments. Please seek assistance as needed, but keep in mind that their role is to facilitate learning and not to provide answers.

### Late Midterm Exam

A late midterm exam will take place on **June 8<sup>th</sup>** during the regularly scheduled lecture period. The Exam will cover lecture materials.

Students who cannot attend on-campus assessments in person may apply to write their exams remotely, if they meet certain criteria. More information for instructors and students is available at <https://carleton.ca/ses/distance-exams/>.

### Story Map

[ArcGIS Story Maps](#) is an online platform for communicating engaging topics through maps, photos and written content. Over the course of the semester, you will be working on your own individual story map during lab work periods. The specific topic will be up to you. You may wish

to document a recent trip via photo documentation and a map, or create a fun map of your favourite coffee shops/pubs around Ottawa, or create an “homage” to the neighbourhood you choose to live in or grew up in. However, I would strongly encourage you to create a story map that documents a social/environmental issue of interest—use this as an opportunity to gather the skills you’ve gained in this course to create something impactful and meaningful, a project that you can be proud to carry with you through your studies, career, and/or advocacy engagement. You will receive additional guidelines early in the term. Your final story maps will be submitted through ArcGIS online.

## **COURSE POLICIES**

### **Late Assignments**

Late assignments will be penalized by subtracting 10% per day (including Saturday and Sunday) of the total value of the assignment. Students whose assignments are late because of a valid medical reason or family emergency will not be penalized, however, the completion of the [Academic Consideration for Coursework form](#) is requested.

If you are not able to hand your assignment directly to the Instructor or TA, you may email a copy of your work to demonstrate you have completed it on time (before the due date) and provide a hard copy (for marking) as soon as possible after that. Every student will be able to hand in any one assignment up to one week late without penalty.

### **Missed Exams**

Students who fail to write the midterm exam will receive an automatic grade of zero. The only exception will be for instances of significant illness or a family emergency, however, the completion of the [Academic Consideration for Coursework form](#) is requested and students must contact the instructor within 5 days of the missed midterm exam to coordinate for the make-up exam.

### **Standards of Written Work**

Any assignment submitted should be printed using *word processing software* and checked for spelling and grammar. The overall presentation quality of the assignments will be reflected in your grade.

## **ACADEMIC INTEGRITY**

Academic integrity is a necessary foundation for all meaningful scholarly activity and verified instances of intellectual dishonesty will be dealt with in full accordance with the procedures laid out in Academic Integrity Policy. Additional information regarding what constitutes plagiarism may be found on Carleton University web site: <https://carleton.ca/secretariat/wp-content/uploads/Academic-Integrity-Policy-2021.pdf> The University Senate defines plagiarism as “presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.” This can include:

- 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 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)
  - submitting a take-home examination, essay, laboratory report or other assignment written, in whole or in part, by someone else
  - 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
  - failing to acknowledge sources with proper citations when using another’s work and/or failing to use quotations marks.”

Plagiarism is a serious offence which cannot be resolved directly with 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.

### **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://wellness.carleton.ca/>. Additional resources follow.

### **Emergency Resources (on and off campus)**

- 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: call 613-238-3311, text 343-306-5550, or connect online at <https://www.dcottawa.on.ca/>

- Mental Health Crisis Service: call 613-722-6914 or toll-free 1-866-996-0991, or connect online at <http://www.crisisline.ca/>
- Empower Me Counselling Service: call 1-844-741-6389 or connect online at <https://students.carleton.ca/services/empower-me-counselling-services/>
- Good2Talk: call 1-866-925-5454 or connect online at <https://good2talk.ca/>
- The Walk-In Counselling Clinic: for online or on-site service <https://walkincounselling.com>

## ACADEMIC ACCOMMODATION

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: <https://students.carleton.ca/course-outline/>

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Pregnancy obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: <http://www.carleton.ca/equity/>

**Religious obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: <http://www.carleton.ca/equity/>

**Academic Accommodations for Students with Disabilities:** If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. For more details, visit the [Paul Menton Centre website](#).

**Survivors of Sexual Violence:** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the [Equity and Inclusive Communities website](#).

**Accommodation for Student Activities:** Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your

instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the [Senate Policy on Accommodation for Student Activities \(PDF, 25KB\)](#).

**Academic Consideration for Medical and Other Extenuating Circumstances:** Due to medical and other extenuating circumstances, students may occasionally be unable to fulfil the academic requirements of their course(s) in a timely manner. The university supports the academic development of students and aims to provide a fair environment for students to succeed academically. Medical and/or other extenuating circumstances are circumstances that are beyond a student's control, have a significant impact on the student's capacity to meet their academic obligations, and could not have reasonably been prevented. Students may request Academic Consideration for Coursework or Other Academic Deliverable. For further information please review the [Procedure for Academic Consideration](#) and the [FAQ page](#).

**Scheduling and Examination Support:** Scheduling and Examination Services provides various supports for both in-term and end-of-term tests and exams. Details can be found on the [Exam Support website](#).

**Maps, Satellites and the Geospatial Revolution (GEOM1004) Summer term 2026 Course Outline**

Week	Lecture Class	Lab	Readings
May 6	Course Introduction; Introduction: Maps, Satellites, and the Geospatial Revolution; Thinking spatially – Key Concepts	<i>No Lab</i>	
May 11-13	May 11 <sup>th</sup> – Introduction: Maps, Satellites, and the Geospatial Revolution; Thinking spatially – Key Concepts (cont.)  May 13 <sup>th</sup> – Coordinate Systems and Projections; Global Navigation Satellite Systems	Intro to Google Earth Pro and ArcGIS Pro Lab Assignment #1 Introduction to Google Earth Pro	Ch.1 Ch.2 (40-48)
May 18-20	No lecture this class. University closed May 18 <sup>th</sup>  May 20 <sup>th</sup> – An Introduction to Cartographic Design Principles	Lab Assignment#2: Mapping Nunavut communities with ArcGIS Pro.  <i>Assignment #1 is due</i>	
May 25-27	May 25 <sup>th</sup> – Introduction to Geographic Information Systems (GIS); <i>ArcGIS StoryMap Project Guidelines</i>  May 27 <sup>th</sup> – Introduction to GIS (cont.)	Introduction to Avenza Maps for GPS data acquisition Lab Assignment #3: GNSS data collection and accuracy assessment with ArcGIS Pro.  <i>Assignment #2 is due</i>	Ch.9
June 1-3	June 1 <sup>st</sup> – Guest lecture on GeoAI with Maria Brovelli, Observation di Milano  June 3 <sup>rd</sup> – Spatial Analysis Using GIS	Lab Assignment #4 – QGIS Intro and Symbolizing raster and vector data.  <i>Assignment #3 is due</i>	Ch.4.3
June 8-10	June 8 <sup>th</sup> – <b><i>Late Midterm Exam-During our Regular Class Period</i></b>  June 10 <sup>th</sup> : Introduction to Remote Sensing	Lab Assignment #5 – QGIS StoryMaps with qgis2web and Neocities.  <i>Assignment #4 is due</i> <i>Work on Story Map Project</i>	
June 15-17	June 15 <sup>th</sup> . Remote Sensing (cont.) and course wrap-up  June 18 <sup>th</sup> – No lecture this class. Last day of early summer classes	Lab Assignment #6: Introduction to Google Earth Engine.  <i>Assignment #5 is due.</i> <i>Assignment #6 is due Friday June 25<sup>th</sup></i> <i>Story Map project is due Friday June 25<sup>th</sup> 11:59pm via Brightspace upload.</i>	

## Additional Readings and Resources:

Lillesand, T.M., R.W. Kiefer and J. W. Chipman (2008) Remote Sensing and Image Interpretation. 6th Edition. Wiley, N.Y.

Global Assessment Report on Disaster Risk Reduction (GAR) 2019, United Nations Office for Disaster Risk Reduction. GAR Distilled, p. 1-28; Global Assessment Reports on Disaster Risk Reduction (GAR) 2022, United Nations Office for Disaster Risk Reduction: *EO into DRR actions; Global Navigation Satellite System for hazards; Indigenous Knowledge for DRR*

Indigenous Peoples' Rights and the 2030 Agenda, Briefing Note, Office of the High Commission for Human Rights (OHCHR) and the Secretariat of the Permanent Forum on Indigenous Issues, Division for Social Policy and Development, United Nations Department of Economic and Social Affairs, 2017, p. 1-15, with special reference to p. 4 "*Disaggregation of data*", and p. 6 reference to "*principle of free, prior and informed consent*"

Special Issue "Mapping Indigenous Knowledge in the Digital Age", ISPRS International Journal of Geo-Information (ISSN 2220-9964), Editors: Prof. Dr. D. R. Fraser Taylor, Dr. Romola Thumbadoo

UN-GGIM United Nations committee of experts on global geospatial information management, (2020), Future trends in geospatial information management: the five-to-ten-year vision, 3rd Edition. [https://ggim.un.org/meetings/GGIM-committee/10th-Session/documents/Future\\_Trends\\_Report\\_THIRD\\_EDITION\\_digital\\_accessible.pdf](https://ggim.un.org/meetings/GGIM-committee/10th-Session/documents/Future_Trends_Report_THIRD_EDITION_digital_accessible.pdf)

Peppoloni S., Di Capua G. (2022). Geoethics: Manifesto for an Ethics of Responsibility Towards the Earth. DOI: <https://doi.org/10.1007/978-3-030-98044-3>.

Rajabifard A. (2020). Sustainable Development Goals Connectivity Dilemma Land and Geospatial Information for Urban and Rural Resilience. CRC Press, Taylor & Francis Group. ISBN: 13: 978-0-367-25935-8.

Pirasteh S., Li J. 2017: Global Changes and Natural Disaster Management: Geo-information Technologies. ISBN 978-3-319-51844-2. DOI 10.1007/978-3-319-51844-2. Pages 229.

ESA Newcomers Earth Observation Guide <https://business.esa.int/newcomers-earth-observation-guide>

<https://www.hotosm.org/tools-and-data> Humanitarian Open Street Map (HOT)

[https://earthobservations.org/geo\\_blog\\_obs.php?id=476](https://earthobservations.org/geo_blog_obs.php?id=476) CI and GEO: connecting EO innovations with key actors of global significance, *and links therein*

Stanford Geospatial Center - YouTube (Stace Maples)

Residential Schools Land Memory Atlas <https://residentialschoolsatlas.org>

National Land and Water Information Service (NLWIS): [http://www.agr.gc.ca/nlwis/index\\_e.cfm](http://www.agr.gc.ca/nlwis/index_e.cfm)

NASA Fundamentals of Remote Sensing series: <https://appliedsciences.nasa.gov/join-mission/training/english/arset-fundamentals-remote-sensing>

Canadian Geospatial Data Infrastructure: <http://geodiscover.cgdi.ca/>

Natural Resources Canada: Geogratis: <http://geogratis.cgdi.gc.ca/>

The Geography Network: <http://www.geographynetwork.com/>

GlobeXplorer: <http://www.globexplorer.com/>

LAND INFO International: <http://www.landinfo.com/>

Terra Server: <http://www.terraserver.com/>