

## Introductory Geo-Information Science (GEOG201)

Department of Geography  
McGill University

Fall 2023

Lectures:

Mondays and Wednesdays, 13:05 - 14:25,  
in Rutherford Physics Building,  
room 112

Lab sessions:

Slot 2: Mondays 8:35 – 11:25, in BH511  
Slot 3: Tuesdays 8:35 – 11:25, in BH511  
Slot 4: Wednesdays 8:35 – 11:25, in BH511  
Slot 5: Fridays 8:35 – 11:25, in BH511

**Instructor:** Dr. Tim Elrick [tim.elrick@mcgill.ca](mailto:tim.elrick@mcgill.ca)  
**Office hours:** Tuesdays 15:30 – 16:30, BH515 or Zoom (please indicate in advance)

**Teaching Assistants:** Clara Féré [clara.fere@mcgill.ca](mailto:clara.fere@mcgill.ca)  
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For all office hours with Tim Elrick, please send an email a day in advance and indicate if you want to attend the office hour in person or online. I will then send you the exact time to reduce your wait time and, if needed, a Zoom link for the meeting. All office hours with the TAs are in person. They will announce office hours for each lab during the respective lab sessions. Thank you for your understanding and cooperation.

### Course Overview

This course serves as an introduction to the methods and techniques utilized in gathering, analyzing, presenting and thinking critically about geospatial information. Topics include the basics of locational reference systems; map projections; satellite and airborne remote sensing; global navigation satellite systems; geographic information systems; geoweb; and cartography.

The course is a gateway to technical classes in Geoinformatics. It will provide students with a broad overview of Geographic Information Science and Technology (GIS&T), which is a large intellectual field that encompasses many disciplines beyond the geographical sciences. We will, therefore, cover the key topics in GIS&T at an introductory level of detail in class. For the most part, this will involve covering the key concepts and definitions per topic in-class, and discussing some examples.

This course lays the theoretical foundations for working with geospatial data and is a pre-requisite for advanced GIS and remote sensing courses. Lectures will be accompanied by introductory level labs in one of the industry-standard Geographic Information Systems, ArcGIS Pro, to illustrate certain aspects covered in class.

## Learning Outcomes

Upon a successful completion of the course you will

- have gained a broad understanding of the scientific principles associated with geography, cartography, and geodesy along with their associated research methodologies, including Remote Sensing (RS), Global Navigation Satellite Systems (GNSS) and Geographic Information Science (GIS).
- be able to apply mathematical concepts to use geographic and Cartesian coordinate systems, analyze basic statistical data, and construct maps and charts using online tools.
- be able to critically evaluate contemporary debates surrounding map accuracy, map misuse and map visualization to assess the scientific limits of computer based cartographic representations.
- be able to analyze scientific questions surrounding Global Earth Observation Systems to understand how such questions influence and are shaped by contemporary geographic, economic, social and political dimensions.
- have an introductory level of understanding how use ESRI ArcGIS Pro software.

## Mode of Delivery

All lecture parts of this course as well as the lab sessions take place in person in the classroom (with the exception of three lectures indicated in the class schedule on page 6). The course follows the usual lecture approach. This means you should read the required texts for each week before class starts. Material for lectures and labs, and any other class information will be posted on MyCourses (<https://mycourses2.mcgill.ca/d2l/home/658447>). The mid-term and final exam are held online.

Polling will be used in this course to enhance engagement and increase interactivity. During a class with polling questions, you will respond to questions from the instructor from a personal device (smartphone, tablet, or laptop). You should come to class with your device charged and connected to the Internet. Polling will be available through <https://www.mcgill.ca/polling>. To participate in a Polling session, you will be provided with a QR code that can be scanned or a Slido code that can be entered at <https://app.sli.do>. If you are asked to Login with SSO (Single Sign-On), enter your McGill credentials and follow any Two-Factor Authentication prompts. For more information, please visit the *Getting Started for Students* section at [www.mcgill.ca/polling](https://www.mcgill.ca/polling). For any technical problems with polling, please contact the IT Service Desk. Participation is optional, of course.

## Required Reading

We will be using the following text book from which you will get chapters assigned to read each week (details see below in the course schedule):

- Bolstad, P and S. Manson (2022): GIS Fundamentals. 7<sup>th</sup> edition. Eider Press.

This textbook is available in multiple copies for three-hour loans at McGill's Schulich Library as course reserve. They are placed behind the Service Desk. Please ask at the Service Desk to get access to them. You can also purchase a paper or online copy of this book at <https://www.gisfundamentals.org>. I have also asked *the McGill Bookstore (Le James)* (corner of Sherbrooke St W and University St) to have these in stock for you.

In certain weeks there will be additional texts assigned as outlined and provided on MyCourses and in the course schedule below.

## Further Reading Suggestions

- Jensen, J., and Jensen, R., 2013. Introductory Geographic Information Systems. Pearson.
- Krygier, J. and Wood, D. 2016: Making Maps. A Visual Guide to Map Design for GIS.
- Longley, P., Goodchild, M.F., Maguire, D., and Rhind, D., 2015. Geographic Information Science and Systems, 4th Edition.

These books are available in the McGill Library.

The required readings represent the foundation of the course content. The obvious assumption is that you have read these texts to be able to understand the concepts better, contribute to classroom discussions and be able to answer questions in the exams. Not every aspect of these readings may be discussed during course sessions; however, all aspects of these texts may be part of a course assignment or of an exam.

## Course Evaluation & Assignment Details

Your performance in this course will be evaluated in the context of two mid-term exams, ten assignments and one final exam. Midterm examinations will be held online on MyCourses and will test your knowledge of key aspects of the material that we review in class, through assignments and in assigned readings. The midterm exams will take place during class time. Each midterm will cover the material not yet covered in the the previous midterm (or start of the course for the first midterm). The final exam will be a take-home exam handed out on a certain date (still to be determined by the exam office). The final exam will be cumulative, meaning it will involve questions related to all course material, but mainly will focus on several tasks to be worked on using ESRI ArcGIS Pro software.

There are nine lab assignments for this course, roughly one per week. Lab assignments will be based on the lecture material and lab sessions and help you to apply your acquired knowledge. You are expected to complete these lab assignments on your own time. You can use the ESRI ArcGIS Pro software in many locations throughout the campus, e.g. in the Geographic Information Centre (GIC). The GIC offers access to the computers containing the software in person as well as remotely (for remote access see instructions on the home page of <https://gic.geog.mcgill.ca> in the section on Public Computer Access). You can also request a student license free of charge from [gicsupport@mcgill.ca](mailto:gicsupport@mcgill.ca). Lab assignments are posted on MyCourses. Assignments are due exactly one week after your respective lab ended. Lab assignments that are submitted after the due date/time will be given a grade of zero.

Your final grade will be assessed as follows:

- |                    |                              |
|--------------------|------------------------------|
| 1. Lab assignments | 30 % of final mark (10 x 3%) |
| 2. Mid-term exams  | 40 % of final mark (2 x 20%) |
| 3. Final exam      | 30 % of final mark           |

The course exams serve a dual purpose: firstly, they serve as a guiding framework to structure your coursework and study efforts, ensuring a focused approach throughout the course. Secondly, they are tailored to facilitate long-term retention of the course material even after its completion. The final examination, in particular, presents a diverse array of challenges that require you to leverage ArcGIS Pro in conjunction with the knowledge gleaned from lectures. This empowers you to engage in creative, real-world problem-solving, applying the course's concepts to an area of personal interest.

### *Academic Integrity*

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see <http://www.mcgill.ca/students/srr/honest> for more information). (approved by Senate on 29 January 2003)

L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site [www.mcgill.ca/students/srr/honest/](http://www.mcgill.ca/students/srr/honest/)).

### *Language of Evaluation*

“In accord with McGill University’s Charter of Students’ Rights, students in this course have the right to submit in English or in French any written work that is to be graded.” (approved by Senate on 21 January 2009)

“Conformément à la Charte des droits de l’étudiant de l’Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté (sauf dans le cas des cours dont l’un des objets est la maîtrise d’une langue).”

### *Attendance*

The course consists of 13 weeks; classes are roughly 1.5 hours long; the classes are complemented of teaching assistant-led lab sessions that last up to 3 hours. During class time we will interactively discuss what you have read up on and apply the concepts to examples, in lab sessions we will practice applying your acquired theoretical knowledge to different tasks, in the first two weeks, discussing texts, in the following seven lab sessions using ESRI ArcGIS Pro software, followed by a Q&A lab session at the end. Full and complete attendance is suggested as not all content will be covered by the assigned readings. However, attendance is not mandatory (except for the midterm exams) and all material you need to learn about the content will be made available on MyCourses. If you choose not to attend classes, please make sure you *regularly check your e-mail account registered with MyCourses as well as the MyCourses Announcement section* as I will post required organisational messages there, additionally to announcing them in class. Your participation and content-wise engagement during classes like taking part in discussions or posing questions to clarify content is highly welcome and appreciated, both by me, your instructor, and your fellow students. I assume that you are interested in the course content; therefore, I take for granted that you will respect usual customs of behaviour in a learning environment in class as well as during lab sessions.

### *Grading*

You can find McGill grading policies here: [https://www.mcgill.ca/study/2023-2024/university\\_regulations\\_and\\_resources/undergraduate/gi\\_grading\\_and\\_grade\\_point\\_averages](https://www.mcgill.ca/study/2023-2024/university_regulations_and_resources/undergraduate/gi_grading_and_grade_point_averages)

### *Grade appeals*

The Instructor and teaching assistants take the marking of assignments very seriously, and we work diligently to be fair, consistent, and accurate. Nonetheless, mistakes and oversights occasionally happen. If you believe that to be the case, you must adhere to the following rules:

- If it is a mathematical error simply alert the TA of the error who graded your assignment.
- In the case of more substantive appeals, you must:
  1. Wait at least 24 hours after receiving your mark.

2. Carefully re-read your assignment/exam, all guidelines and marking schemes, and the grader's comments.
3. If you wish to appeal, you must submit to the instructor a written explanation of why you think your mark should be altered. Please note statements such as "I need a higher grade to apply to X" are not compelling. If you need a certain grade to apply to X, try to comprehend the material well and you will perform well in the assignments. Also, please note that upon *re-grade your mark may go down, stay the same, or go up*.

### *Accommodation*

For any COVID-19 related accommodation please fill in the COVID-19 Academic Accommodation Request Form on Minerva in the Personal menu. The University will advise you and me about a suggested accommodation.

In cases of personal or academic difficulty not directly related to COVID-19, consideration may be given as well. Requests for consideration should be made well before the assignment due date, and must be accompanied by documentation with sufficient detail to describe whether a student can perform academic assignments and the duration of the problem. In this case, contact the instructor, not the TA.

Excuses for missed assignments and examination will not be accepted, except in serious cases for which written proof from an appropriate authority must be provided to the instructor. Requests for consideration of late submissions should be made to the instructor and not the TA.

### **Queries**

I am open to discuss matters related to course topics, assignments, exams or your academic interest related to the course content. Please approach me during office hours or by e-mail. In line with McGill policy, I prefer correspondence via your McGill e-mail addresses. In e-mails, please insert your full name. E-mail is a piece of formal correspondence and should be treated as a permanent record of communication. I will endeavour to respond to e-mails within 48 hours, but this may not always be possible. Please note, that I am generally offline weekdays after 5 pm and on weekends. E-mails containing questions that can be answered by referring to this syllabus, or to administrative matters discussed in class or posted on MyCourses (e.g. specifics of assignments, instructions on how best to prepare for the exam) may not receive a response.

### *Office hours*

Office hours by the instructor are held in person or on Zoom, preferably at the weekday and time indicated on page 1 of this syllabus. Alternatively, you can ask for a different day and time to meet if your academic schedule doesn't allow otherwise. Please announce your intention to attend one of the office hours by sending an e-mail the day before.

### **MyCourses Policy**

Please check MyCourses regularly for updated course information, required readings or materials. All use of MyCourses, especially 'Discussions' content, must relate to the content of course material. MyCourses should not be used as a forum for evaluations about the course or other content that is unrelated to sessions or readings (You will have a chance to evaluate the course near the end of the term). All student posts are expected to be respectful in tone and content. Violations of this policy will result in restricted access and other penalties at the instructor's discretion.

**Class/Lecture Schedule**

Week	Lecture #	Date	Topic	Text book pages	Notes
1	1	30 August	Introduction		
2	2	6 September	What is a map?	1-19	
3	3	11 September	History of geospatial data	-	
3	4	13 September	Visualization of geospatial data I	168-175	
4	5	18 September	Visualization of geospatial data II	375-382	
4	6	20 September	Object-based modelling I	36-50, 61-66, 154-164	
5	7	25 September	Object-based modelling II	363-375, 382- 383, 388-403	
5	8	27 September	Field-based modelling I	51-60	
6	9	2 October	Field-based modelling II	435-464	
6		4 October	<b>Midterm I</b>	-	
<b>Fall break</b>					
8	10	16 October	Orientation on the globe	25-34	
8	11	18 October	Generalization and the question of scale	-	
9	12	23 October	Projections & Coordinate reference systems I	116-134	<i>Lecture on Zoom</i>
9	13	25 October	Projections & Coordinate reference systems II		<i>Lecture on Zoom</i>
10		30 October	<b>Cancelled due to tuition fee demonstration</b>		
10		1 November	<b>Midterm II</b>		
11	14	6 November	Data modelling I	67-73	
11	15	8 November	Data modelling II		
12	16	13 November	Geodesy & GNSS	35, 89-115, 193-223	
12		15 November	<b>GIS Day</b>		
13	17	20 November	Remote sensing	241-290	
13	18	22 November	Web GIS	293-294	
14	19	27 November	Open & Crowdsourced Data	295-300, 642- 646	
14	20	29 November	Ethics & GIS	-	
14	21	30 November	Mobile GIS	-	
15	22	4 December	GeoAI	-	
		8 December	final exam		<i>take home, 10 days, you need access to ArcGIS Pro</i>

**Lab schedule**

Week	Lab #	Dates	Topic	Assignment
2/3	1	Wed, Sep 6 to Tue, Sep 12	Discussion of text	Quiz
3/4	2	Wed, Sep 13 to Tue, Sep 19	Discussion of texts	Quiz
4/5	3	Wed, Sep 20 to Tue, Sep 26	Intro to ArcGIS Pro	ArcGIS assignment
5/6	4	Wed, Sep 27 to Tue, Oct 3	Working with vector data in ArcGIS Pro	ArcGIS assignment
7 & 9	5	<b>Wed, Oct 4, Fri, Oct 13, Mon, Oct 16, Tue, Oct 17</b>	Working with raster data in ArcGIS Pro	ArcGIS assignment
9/10	6	Wed, Oct 18 to Tue, Oct 24	Creating nice looking maps in ArcGIS Pro	ArcGIS assignment
10/11	7	Wed, Oct 25 to Tue, Oct 31	Working with scale in ArcGIS Pro	ArcGIS assignment
11/12	8	Wed, Nov 1 to Tue, Nov 7	Working with projections in ArcGIS Pro	ArcGIS assignment
12/13	9	Wed, Nov 8 to Tue, Nov 14	Queries and joins in ArcGIS Pro	ArcGIS assignment
14/15		Wed, Nov 29 to Tue, Dec 5	Questions & Answers on ArcGIS Pro	

*NOTE: This course schedule may change based on class progress or extraordinary circumstances beyond my control.*

**Further policies***Netiquette*

The University recognizes the importance of maintaining teaching spaces that are respectful and inclusive for all involved. To this end, offensive, violent, or harmful language arising in contexts such as the following may be cause for disciplinary action:

1. Username (use only your legal or preferred name)
2. Visual backgrounds
3. "Chat" boxes

To maintain a clear and uninterrupted learning space for all, you should keep your microphone muted throughout your class, unless invited by the instructor to speak.

You should follow instructors' directions about the use of the "chat" function on remote learning platforms.

*Disability*

If you have a disability, please contact the instructor to arrange a time to discuss your situation. It would be helpful if you contact the *Office for Students with Disabilities* at 398-6009 before you do this.

### *Student Rights & Responsibilities*

Policies governing academic issues which affect students can be found in the Handbook on Student Rights and Responsibilities, Charter of Students' Right: <https://www.mcgill.ca/apo/new-tsas-guide/student-life-learning>

### *Policy Concerning the Rights of Students with Disabilities*

If you need any accommodation, please contact the Office for Students with Disabilities (<http://www.mcgill.ca/osd> or 514-398-6009). You may also contact me directly. I will make every reasonable effort to accommodate you.

### *Copyright of course material*

Instructor generated course materials (e.g. Power Point slides, handouts, notes, summaries, exam questions, etc.) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor. Note that infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures. Recording and distributing recordings of lectures is prohibited unless the instructor gives written consent.

I remind everyone of their responsibility in ensuring that this video and associated material are not reproduced or placed in the public domain. This means that each of you can use it for your educational (and research) purposes, but you cannot allow others to use it, by putting it up on the Internet or by giving it or selling it to others who may also copy it and make it available. Please refer to McGill's Guidelines for Instructors and Students on Remote Teaching and Learning for further information. Thank you very much for your help with this.

### *Course Changes in Extraordinary Circumstances*

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

### *Indigenous Land Statement*

McGill University is on land which has long served as a site of meeting and exchange amongst Indigenous peoples, including the Haudenosaunee and Anishinabeg nations. We acknowledge and thank the diverse Indigenous people whose footsteps have marked this territory on which peoples of the world now gather.

L'Université McGill est sur un emplacement qui a longtemps servi de lieu de rencontre et d'échange entre les peuples autochtones, y compris les nations Haudenosaunee et Anishinabeg. Nous reconnaissons et remercions les divers peuples autochtones dont les pas ont marqué ce territoire sur lequel les peuples du monde entier se réunissent maintenant.

### *Respectful learning environment*

The University is committed to maintaining teaching and learning spaces that are respectful and inclusive for all. To this end, offensive, violent, or harmful language arising in course contexts may be cause for disciplinary action under the Article 10 of the Code of Student Conduct and Disciplinary Procedures and Section 2.7 of the Policy on Harassment, Sexual Harassment, and Discrimination Prohibited by Law.