

GEOSPATIAL ANALYSIS

Instructor

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Office Hour: Thurs 2:30 – 3:30pm
or by appointment (email)

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GENERAL INFORMATION

The course offers students a comprehensive overview of both the theoretical and applied aspects of geographic information science and systems. Topics will include spatial analysis techniques, geographic models as abstractions of the real world, spatial data manipulation and management, and conceptual issues related to geographic data and technology. Supplemental to a conceptual and practical understanding of GIScience, students will be introduced to leading commercial software packages including ESRI's ArcGIS Pro. This is a lab-intensive course in which students will learn the ins and outs of GIS software as well as the theoretical underpinnings of GIScience.

This course is open to any and all students with an interest in geographic information science and related disciplines. The **prerequisite** for this course is **Geography 201** or permission from the instructor. Students taking the course are expected to be familiar with geospatial data formats and demonstrate a basic understanding of core geospatial concepts.

LEARNING OUTCOMES FOR THE COURSE

Upon successful completion of the course students will be able to:

- Demonstrate an understanding of the complexity involved in analyzing geo-computational models as abstractions of the real world.
- Demonstrate an applied understanding of GIS software.
- Think critically about maps, geographic information, and the process that goes into creating and collecting them.
- Organize, communicate, and solve theoretical and practical geospatial problems both individually and in a team environment.

COURSE SCHEDULE

- **Lectures** in Burnside Hall 306
 - Tuesdays 1:05pm – 2:25pm
- **Tutorials** in Burnside Hall 306
 - Thursdays 1:05pm – 2:25pm
- **Lab Section** (one of) in Burnside Hall 511
 - Fridays 10:05am – 12:55pm
 - Fridays 1:05pm – 3:55pm

COURSE MATERIALS

- Longley, P., Goodchild, M., Maguire, D., Rhind, D., (2015) *Geographic Information Science and Systems*. Wiley. [[ebook available from McGill Library](#)]. **This ebook is optional but useful in supporting the material introduced in lectures and labs.**
- Supplementary readings assigned through myCourses.
- A physical notebook and pen to take notes
- A USB memory stick (to backup your work)

COURSE SOFTWARE

The labs will be held in the e-classroom of Burnside Room 511, which provides every student access to a desktop computer with the same software (ArcGIS Pro) installed. In addition, each student at McGill is eligible to install a copy of ArcGIS Pro (1-year license) on their personal (Windows only) computer – for more information see <https://gic.geog.mcgill.ca/resources/gis-faq/>.

COURSE COMMUNICATION

The main course communication will be carried out through the course portal within the McGill University course management system (myCourses). All students enrolled in the course have access to the system. In addition to communications, this portal will be used by the instructors and the TAs to post assignments and grades, and by the students to submit their assignments.

CLASS STRUCTURE

Lectures

The lectures will introduce concepts, techniques, analytic methods, and theoretical problems that are fundamental to understanding GI systems and science, data formats, and spatial analysis techniques. Lecture attendance is strongly encouraged.

Tutorials

During the tutorials, I will apply many of the concepts introduced in lecture, to real-world example and dataset. I will present a series of questions during the tutorial and walk through the analysis required to address these questions in ArcGIS Pro. The types of problems and analysis that will be presented will be very similar to those assigned during the labs. Tutorial attendance is strongly encouraged.

Lab Assignments

The course includes a lab component in which students will apply much of what they learned in lecture. During the lab sessions students will work individually and in small groups to practice skills developed in class within the course's GIS environment. All deliverables, as described in each lab assignment, should be submitted online before posted deadlines. Late assignments will be penalized at a rate of 2% per hour. Each lab assignment should take 1-2 hours to complete.

Midterm Exam

There is one written midterm exam in this course that will be administered in Week 8 of the semester (see schedule below). The reason for this exam is that there are both theoretical and practical concepts that must be well understood early in the course as they are the foundation on which more complex concepts are built. The exam will be written during class time. Further details will be made available early in the semester.

Final Project

There is a final, take-home, project for this course that will be assigned during the final week of classes. This is an independent project that will require writing a report, generating maps, and conducting GIS analyses. The final report will be due on the date assigned by the McGill Registrar and must be submitted as a PDF file through myCourses. More details on the final project will be presented after the midterm exam.

PROVISIONAL SCHEDULE

Please, note that modifications may be introduced to the schedule as the semester progresses. Updated schedules will be made available to all students via myCourses as soon as possible.

Week	Tuesday	Thursday	Friday
Jan 3		Welcome	No Lab
Jan 9	Digital Rep. & Conceptual Models	Tutorial	Lab 0*
Jan 16	Scale & Resolution		Lab 1
Jan 23	Cartography		Lab 2
Jan 30	Querying Geospatial Data		Lab 3
Feb 6	Overlay Analysis & Map Algebra		Lab 4
Feb 13	Neighborhood Analysis		Lab 5
Feb 20	<i>Midterm Review</i>		Midterm Exam
Feb 27	<i>Winter Break</i>		
Mar 6	Terrain Analysis	Tutorial	Lab 6
Mar 13	Zonal Analysis		Lab 7
Mar 20	Aggregation		Lab 8
Mar 27	Network Analysis		Lab 9
Apr 3	Interpolation Analysis		No Lab
Apr 10	Future of GIScience	Lab 10**	
April 24	Final Project Due (Submit through myCourses)		

* Not graded, but provides essential knowledge for future labs.

** Due to the Good Friday holiday, Lab 10 has been moved to Thursday, April 13 (make-up day).

GRADE DETERMINATION

- Lab Assignments (Best 8 of 10): 40% (5% x 8)
- Midterm: 30%
- Final Project: 30%

EXPECTATIONS OF STUDENTS IN THIS COURSE

- Students should be aware that the material presented during lectures and labs are complementary, meaning each serves a different purpose and all are essential to successfully completing this course. Students are encouraged to do the readings (suggested in each lecture) and take notes during lectures and lab sections as not all material will be presented on the slides.
- Students are expected to complete their lab assignments, attend lectures, and actively participate in lab sessions. All lab assignments are to be submitted via McGill's myCourses by the specified due date and time.
- Students are expected to treat each other with respect. Disruptive behavior of any kind will not be tolerated. Students who are unable to demonstrate civility with one another, the teaching assistants, or the instructors will be subject to referral to the Office of Student Conduct or to the McGill Campus Security. You are expected to adhere to the [Code of Student Conduct](#).

OTHER MATTERS

- 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 <https://www.mcgill.ca/students/srr/academicrights>).
- For information on university and department policies for student assessment, please go to <http://www.mcgill.ca/geography/studentassessment>.
- 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.
- In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.
- If you have a disability for which you need special accommodations, 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](#) before you do this.
- Additional policies governing academic issues which affect students can be found in the [McGill Charter of Students' Rights](#).
- McGill University shall strive to be recognized as an environmentally safe and responsible institution, and as a model of environmentally responsible living (see https://www.mcgill.ca/sustainability/files/sustainability/enviro_policy.pdf).