
Instructor(s): Dr. Christopher Greene (csgreene@dal.ca)

Office Hours: Mondays from 1:30 to 3:30 in LSC-2045 (Earth and Bio Wing)

Lectures: Monday-Wednesday-Friday from 11:35 to 12:25 in ROWE-1009

Laboratories: One 3-hour lab per week in the GIS Teaching Laboratory, LSC-2012 (Earth & Bio).

Course Description

Geographic Information Systems (GIS), as a tool for the management of georeferenced data, have become indispensable for disciplines where location of objects and pattern of processes is important. GIS plays a significant role a wide range of applications, from modeling, to analysis and predictions, to decision making. The course is aimed at a broad base of potential users and draws on examples of the role of GIS in global climate change, mineral exploration, preservation of biodiversity, coastal zone management, resource depletion, and many other present and future environmental issues. The course material will be of interest to those studying geoscience, environmental science, ecology, marine biology, oceanography, epidemiology, urban and rural planning, civil engineering, and any other field involving spatial data. Laboratory exercises emphasize the principles of raster and vector GIS, and the integration of databases and GPS (global positioning systems) data into GIS. Exercises draw on the diversity of GIS applications in a number of application areas. (from calendar)

Course Objectives/Learning Outcomes

With successful completion of the course, students will be able to:

- recognize and describe how geographic information science governs (or should govern) the use of geographic information systems;
- recognize and describe the components (and component functions) of geographic information systems
- explain and demonstrate how geographic data is generated, managed, modified, visualized;
- critique the quality of geovisualization from a range of sources (popular media, memes, peer-reviewed manuscripts);
- conduct basic, non-inferential spatial analysis using GIS software; and
- compare / contrast how geographic information systems can be used to aid decision-making across several disciplines.

Course Prerequisites

PREREQUISITES: Two years of university study or equivalent or instructor's permission

CROSS-LISTING: EARTH 5600, GEOG 3500, ENVS 3500

EXCLUSIONS: Credit will only be given for one of EARTH 3500.03, EARTH 5600.03, GEOG 3500.03, SCIE 3600.03 or ENVS 3500.03

Course Materials

Recommended Textbook: Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographic Information Science and Systems* (4th ed.). Wiley Publishing.

Other: A dedicated USB drive with a minimum of 16 gigabytes of storage formatted to the NTFS file management system. **Recommended is a USB 3.0 drive with 64 gigabytes** of storage formatted to the NTFS file management system.

Course Assessment. Both undergraduate (Left) and Graduate (Right) requirements are provided.

Category	Component	Weight U-GRAD (% of Final Grade)	Weight GRAD (% of Final Grade)	Date
Applied	Workshop Assessments	8	10	Throughout Term
	Lab Project 1	15	10	Mon, Oct. 1 st at 8:30 am
	Lab Project 2	15	10	Mon, Nov. 5 th at 8:30 am
	Lab Project 3	12	-	Wed, Dec. 5 th at 8:30 am
	Individual Project ^a .	-	30	Wed, Dec. 5 th at 8:30 am
Theoretical	Midterm Exam	20	15	Wed, Oct. 10 th , in-class
	Final Exam	25	20	Scheduled by Registrar
	In-class exercises ^b . LMS-delivered quizzes ^c .	5	5	Throughout Term (<i>ad hoc</i>)
Total		100		

^a. The individual project is only applicable to graduate students enrolled in ERT5600 and not undergraduate students enrolled in ENV5/ERTH/GEOG3500.

^b. In-class exercises, quizzes do not have a fixed schedule. They are assigned arbitrarily to reinforce concepts from the theoretical portion of the course.

^c. Students are provided seven calendar days to complete LMS delivered quizzes.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

Grade	Range	Definition and Expectations
A+	90-100	Excellent: Considerable evidence of original thinking; demonstrated outstanding capacity to analyze and synthesize; outstanding grasp of subject matter; evidence of extensive knowledge base.
A	85-89	
A-	80-84	
B+	77-79	Good: Evidence of grasp of subject matter, some evidence of critical capacity and analytical ability; reasonable understanding of relevant issues; evidence of familiarity with the literature.
B	73-76	
B-	70-72	
C+	65-69	Satisfactory: Evidence of some understanding of the subject matter; ability to develop solutions to simple problems; benefitting from his/her university experience.
C	60-64	
C-	55-59	
D	50-54	Marginal Pass: Evidence of minimally acceptable familiarity with subject matter, critical and analytical skills (except in programs where a minimum grade of 'C' is required).
F	<50	Inadequate: Insufficient evidence of understanding of the subject matter; weakness in critical and analytical skills; limited or irrelevant use of the literature.

Course Content

Week	Lecture Topics	Reading	Lab Period	Assessment Due ^{a.}
1. Sept 5, 7	What are GI Science, Systems?	Text C01	W1 – Overview of ESRI ArcMap 10.X	-
2. Sept 10, 12, 14	Representing Geographic Data	Text C02, 03	W2 – Georeferencing, Positional Error	WS1
3. Sept 17, 19, 21	Elements of Location	Text C04	W3 – Digitizing & Advanced Map Making	WS2
4. Sept 24, 26, 28	Error & Uncertainty	Text C05	<WORKING> ^{b.}	WS3
5. Oct 1, 3, 5	Cartography & Geovisualization	Text C11, 12	W4 – Basic Database Design	LP1 ^{c.}
6. Oct 10, 12	**Thanksgiving** Midterm (Oct. 10)	-	W5 – Merging Data Through Joins	WS4
7. Oct 15, 17, 19	Data Collection & Databases	Text C08, 09	W6 – Constraint Mapping (Vector Overlay)	WS5
8. Oct 22, 24, 26	Basic Operations	Text C13	W7 – Constraint Mapping (Raster Overlay)	WS6
9. Oct 29, 31, 2	Overlay	Jensen & Jensen C06	<WORKING> ^{b.}	WS7
10. Nov 5, 7, 9	Spatial Modelling	Text C15	W8 – The Model Builder in ArcPro	LP2 ^{c.}
11. Nov 12, 14, 16	FALL READING WEEK			
12. Nov 19, 21, 23	Introduction to Remote Sensing	TBD	W9 – Remote Sensor Data in ArcPro	WS8
13. Nov 26, 28, 30	Global Navigation Satellite Systems	Shellito C04	W10 – The Online Environment	WS9
14. Dec 3, 4	Review, Wrap	-	<WORKING> ^{b.}	LP3 ^{c.}

^{a.} Workshop assessments are due at the beginning of your next regularly scheduled lab section.

^{b.} <WORKING> indicates that there is no structured exercise planned for the lab section. The lab is still open and meant to provide support for your independent lab projects. Students are strongly encouraged to use this time.

^{c.} Processing for lab projects requires planning and time for execution. More than three hours will be required to complete these lab projects as there are maps to produce and questions to answer. Start working early.

Course Policies

Course Completion

To successfully complete the course, **students must receive 50% of the total possible points or higher for both the theoretical and applied portions of the course.** Not meeting this minimum threshold will result in a grade of F for the course, even if an overall score of 50% or greater is achieved.

Course Variations

The course will be taught as close to the listed schedule as possible, however some deviation from this schedule may be required as the term progresses.

Course Culture

We aim to cultivate a culture of mutual respect and collective curiosity. We ask that all students arrive to class on time, turn off their cell phones, and do not engage with materials that are outside of the course during class time. Please also be courteous of your neighbours by not distracting them during class time.

Learning Management System (LMS)

Important information is posted to the LMS on a weekly basis. It is your responsibility to check the LMS and their email on a regular basis to ensure you are not missing any important materials, updates, announcements, etc.

Materials posted to the Learning Management System are for personal use only. Posting class materials to course sharing sites could be considered both a copyright issue as well as a breach of academic integrity. If any course materials do appear on any of these sites, instructional materials such as lecture slides will no longer be provided.

Email

Due to the volume of emails received during the semester, I am unable to guarantee immediate responses to email enquiries. Typically, students should expect an average of one business day for turnaround of responses to emailed questions.

Student Absence Declaration

This course has opted in to the student declaration of absence in lieu of sick notes. Please refer to <https://bit.ly/2NJS8jw> for specific details about the use of the Student Declaration of Absence. This mechanism is meant to substitute for sick notes from a doctor related to short absences (less than three days) and does not provide an automatic exemption from any missed assessments. Accommodating the absence whether be exemption or makeup assessment is at the discretion of the course instructor.

Missed classes

All the information related to the logistical and administrative components of this course will be communicated in the lectures. If you miss any part of a lecture, it is your responsibility to contact a fellow student and catch up on what you missed, regardless of whether the absence was justified or not.

If you are aware that you will be missing more than a single class, please inform the instructor in advance of the planned absence.

Missed In-Class Tests

Makeup tests are not provided under normal circumstances. If an in-class test is missed and accommodations are granted by the instructor, the student will be required to complete a short paper on a topic assigned by the instructor to earn replacement value. This paper will require supporting, peer-reviewed academic references, and be subject to evaluation by Dalhousie's chosen plagiarism detection system.

Electronics in the Classroom

Laptop computers, tablet devices are permitted for taking notes during lectures and interacting with class room exercises (e.g., Poll Everywhere™ or Socrative™). To minimize distraction to other students, use for non-classroom related activities such as social media is not acceptable during the class section.

Mobile devices such as cellphones are to be set to 'silent mode' during the lecture period. Receiving calls, text conversations, etc. are distracting to other students and the instructor and are not acceptable during class time. Please step outside if you need to receive or make an important call, text, etc.

Submission of Work

To reduce the carbon footprint related to class delivery, most work will be submitted and graded electronically in the Brightspace LMS to reduce paper use. All written work will be subject to evaluation using a plagiarism detection service (see Academic Integrity Policy for further detail).

Late penalties for written work without accommodation from the instructor are -20% per calendar day. Late penalties begin to accrue after the time of day deadline has been reached. For example, if an assignment is due on September 4th at 12:00 pm, submissions past that time (plus a brief "grace period") are subject to the first application of a -20% late penalty.

All students are responsible for ensuring the product they submit to the LMS is the one they intended to submit. There has been an emerging trend of "I submitted the wrong draft" as a justification for high similarity in originality detection, or as an effort to buy time to avoid late penalties from submitting after the scheduled due date. If a resubmission is permitted, that submission will be subject to a grade penalty unless there is timely notification from the student to the instructor that the wrong draft was submitted.

Unless otherwise noted by the instructor, independent work is required for each student. General discussion and peer tutoring are acceptable and encouraged; however, assessments with highly similar structure and flow of ideas is not acceptable and could be submitted to the faculty academic integrity officer for review.

Faculty of Science Course Syllabus (Section B)*ENVS / EARTH / GEOG 3500 & EARTH 5600**Geoscience Information Management (Fall 2018)***University Policies and Statements**

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness.

Statement: <http://www.dal.ca/cultureofrespect.html>

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).

Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)

https://www.dal.ca/academics/important_dates.html

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Missed or Late Academic Requirements due to Student Absence (policy)

https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html

Student Resources and Support

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/academic-advising.html>

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: <https://libraries.dal.ca/>

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Fair Dealing Guidelines <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

Other supports and services

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html

Student Advocacy: <https://dsu.ca/dsas>

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

Biosafety: <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

Radiation Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>