



GEOG 2232 Introduction to Geomatics and Geographic Information Systems

Department of Geography and the Environment

Fall 2023

Instructor Information

Instructor: Dr. Muditha Heenkenda

Office Location: RC 2006E

Telephone: 807 709 8010 ext. 8746

E-mail: muditha.heenkenda@lakeheadu.ca

Office Hours: MW 11.30 am-2.30 pm and 3.30-4.30 pm

Lab Instructor Information

Instructor: Mr. Jason Freeburn

Office Location: RC 2004

Telephone: 807 709 8010 ext. 7890

E-mail: jason.freeburn@lakeheadu.ca

Office Hours: TBA

Teaching Assistant (TA) Information

TA: Samiul Alam

Office Location: BB 0029N

E-mail: malam20@lakeheadu.ca

Office Hours: TBA

Course Identification

Course Number: GEOG 2232

Course Name: Introduction to Geomatics and Geographic Information Systems

Course Location: RC 2003 & ATAC 3009

Class Times: Lec. M/W 10.30am-11.30am; Lab Thursday 8.30am-11.30am

Prerequisites: None

Course Description/Overview - Introduction to Geomatics and Geographic Information Systems (GIS) is an introduction to applied mapping and GIS theory and applications. Emphasis will be placed on understanding how geospatial features are represented and captured as data and how these data can be managed, analyzed and presented using state-of-the-art GIS tools. The course will also be focused on introducing basic uses of remotely sensed imagery, Global Satellite Navigation Systems and mobile mapping techniques. Hands-on expertise will be developed with state-of-the-art software—ESRI's ArcGIS Pro. In parallel to International GIS Day, students will organize Lakehead GIS Day, showcase their achievements, and promote real-world GIS applications.

Course Learning Objectives

Upon successful completion of this course, students will be able to:

- identify and compare different GIS data models and convert between vector data models as needed;
- create, import, manage, explore, analyze and display geospatial data using ESRI's ArcGIS Pro software;
- create maps and reports which communicate thematic information, applying basic cartographic principles to improve map layouts;
- compare coordinate system and datum used in geographic data, set and convert spatial reference systems, and correctly utilize project-on-the-fly to represent your data on a map layout;
- interpret basic remote sensing imagery data to answer questions related to natural resource management, including an assessment of accuracy and error;
- apply GIS theory and concepts to answer spatial questions; and
- describe the essential components and architecture of a commonly used commercial GIS software.

Course Resources

Course Website:

- D2L site will be activated at the beginning of the semester. D2L site is the centralized location to share all course materials, including lecture slides, labs, data, quizzes, discussion forums and exams.

Required Course Text(s)

- **Required:** Chang, Kang-tsung. 2019. Introduction to Geographic Information Systems (9th edition). McGraw Hill Education.

Available for a 6 month rental period:

<https://www.mheducation.com/highered/product/introduction-geographic-information-systems-chang/M9781259929649.html>

Hardware requirements:

Lab exercises are based on ESRI ArcGIS Pro software package that requires specific hardware. ATAC 3009 lab is equipped with the necessary hardware and software.

Using ArcGIS Online organizational credentials, students can install the software on their personal computers to work on outside lab hours. Hardware requirements:

<https://pro.arcgis.com/en/pro-app/latest/get-started/arcgis-pro-system-requirements.htm>

Course Schedule/Outline

Date (week of)	Monday	Wednesday	Lab (Thursday)	Reading
Sept 4	No lectures (Labour Day)	Course Introduction & Introduction to GIS	<u>Lab 1</u> : Exploring various web mapping applications and geospatial data sources Create a data management plan for the course	Chapter 1
11	Intro to GIS Theory, terms and concepts Web mapping	Introduction to GIS data models Vector data model	<u>Lab 2</u> : GIS file management, introduction to ArcMap Pro and ArcCatalog	Chapters 1 & 3
18	Introduction to Remote Sensing – aerial photographs, satellite images	Raster data model, raster data catalogues	<u>Lab 3</u> : Working with raster data	Chapter 4
25	Introduction to Cartography, basic map elements, create a simple map	Spatial reference systems	<u>Lab 4</u> : Datums, map projections and coordinate systems	Chapter 2
Oct 2	Midterm test 1 review	Midterm test 1	Introduction to the GIS Day project	
09	Fall Study Break			
16	Cartography – typography/ Vector and raster data display – qualitative and quantitative	Georeferencing raster images	<u>Lab 5</u> : Qualitative and quantitative data display methods and map making	Chapters 6 & 9
23	GIS Data capture and working with tabular data	Data exploration – joins and relates	<u>Lab 6</u> : Georeference an image, add vector data and create a map	Chapter 5
30	Data exploration – select by attributes, select by location etc.	Midterm test 2 review GIS Day poster	<u>Lab 7</u> : Working with GIS/GPS data – onscreen digitizing, editing, map making	Chapters 8 & 10
Nov 6	Spatial data quality and spatial analysis	Midterm test 2 GIS Day poster	<u>Lab 8</u> : Joins and relates, attribute queries, summary tables	
13	GIS Day poster	GIS Day	<u>Lab 9</u> : Spatial data analysis (GIS case study)	Chapter 7
20	Spatial analysis tools – overlay, buffer, intersect	Raster data analysis – simple operations (extract, resample)	<u>Lab 10</u> : Raster data analysis	Chapters 11 & 5
27	Introduction to GPS– GIS/GPS integration	Mobile data acquisition & integration to GIS	<u>Lab 11</u> : Configuring mobile apps, data capturing, downloading and map making	Chapter 5
Dec 4	Final exam review	No classes (the last day of instructions is Monday, Dec 4 2023)		

Note that this document is subject to change pending unforeseen circumstances.

Assignments and Evaluations

Item	Date(s)	Value
In-class Assignment(s)	Every week before the next lab	45%
Mid-Term Tests (2)	Test 1: Oct 4, 2023 Test 2: Nov 8, 2023	20%
GIS Day poster	Nov 15, 2023	15%
Final Examination	TBA	15%
GIS Data/file management	Dec 4, 2023	5%
Total		100%

Late Assignments

Late Assignments receive a deduction of 10% per day unless an extension is agreed to with the instructor prior to the due date. After class assignments are graded and returned, late assignments receive a zero grade but **must be** satisfactorily submitted to complete the course.

Course Policies

- Attendance is expected for each lecture and lab unless communicated with the instructor ahead of time.
- Participation is expected in all class discussions and collaborative efforts (GIS Day).
- For the behavioural standards please refer to the [Code of Student Behaviour and Disciplinary Procedures](#), also known as The Code.
- Exams (a) absences from illness, compassionate reasons or representing the university off-campus, supported by written documentation, will be accepted as sufficient evidence to allow a rewrite of a missed test.

(b) If you miss an exam for any reason other than those deemed acceptable in the Lakehead University calendar, then you will be given the opportunity of an essay-based makeup exam that is significantly longer and more difficult.

Regulations – General Information from the [Academic Calendar](#)

“It is the responsibility of each student registered at Lakehead University to be familiar with, and comply with all the terms, requirements, regulations, policies and conditions in the Lakehead University Academic Calendar. This includes, but is not limited to, Academic Program Requirements, Academic Schedule of Dates, University and Faculty/School Policies and Regulations and the Fees and Refund Policies and Schedules.”

Collaboration/Plagiarism

Plagiarism is defined in [University Regulation IX](#) with additional examples in Article I, Section 1 of The Code. Sanctions associated with Academic Misconduct are defined in Article II of The Code and Enforcement Procedures are outlined in Article III of The Code.

Students wishing to learn more about Academic Misconduct are encouraged to read the [University and relevant Faculty Regulations](#) and The Code (noted above) and access other resources on the [Teaching Commons](#) website.

University Policies – all University Policies can be found [here](#). Pay particular attention to those found under the Category of “Regulations” and “Student-Related”. If you have a question, please let me know by email or in-class. If you have a question, it is likely that at least a few others in the class are wondering the same thing.

Supports for Students – there are many resources available to support our students. These include but are not limited to:

- [Health and Wellness](#)
- [Student Success Centre](#)
- [Student Accessibility Centre](#)
- [Library](#)
- [Academic Support Zone](#) (Writing and Math Tutoring Centre)

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please contact Student Accessibility Services <http://studentaccessibility.lakeheadu.ca> (SC0003, 343-8047 or sas@lakeheadu.ca)

Additional Information

- Please communicate with your lab instructor about using ATAC 3009 out of lab hours
- Each lab assignment is attached to a lab report rubric on the D2L site.