UNIVERSITY OF CALGARY

GEOG 682 L01 Fundamentals of Geographic Information Systems
GFC Hours 3-2
Fall 2022 classes: September 6th – December 7th, 2022

Section	Days	Time	Location
L01	TBA	Asynchronous	Web-based
B01	TBA	Asynchronous	Web-based

Instructor: Dr. Darren Bender	Office: ES 338
Telephone: 403.220.6398	Email: dbender@ucalgary.ca
Email communication will be through your UCalgary email address.	Office hours: Thursdays, 13:00 – 14:00

Official Course Description
Theoretical topics include cognition of geographic phenomena, digital representations of geographic features, coordinate systems and map projections, spatial data models, and problems of scale and uncertainty. Applications include data acquisition, geographic database design and spatial data management, basic spatial operations, surface analysis, and network analysis. Examples from physical and cultural landscapes and industry-standard geographic information systems software are used.

Prerequisites
Admission to the Graduate Certificate in Geospatial Information Technology or consent of the Department.

Graduate students who wish to take this course but are not enrolled in the Graduate Certificate in Geospatial Information Technology program should contact the Department of Geography to determine if space is available.

Course Objectives
This course is an accelerated introduction to GIS and GISci, with an emphasis on theory and conceptual knowledge that is transferable across software systems. It is intended for graduate students with little or no background in the field of geographic information systems (GIS) or geographic information science (GISci), and it is designed for students whose background may be outside the field of geography. Students will undertake a variety of practical exercises, working with real geographic datasets and the ArcGIS desktop/online software environments, which provide hands-on experience gathering, processing, manipulating, analyzing, visualizing, and interpreting geospatial data within a GIS. At the end of this course, students will be able to apply GISci tools and GIS software for spatial problem-solving at an intermediate level.

Course Format
GEOG 682 Fundamentals of GIS is offered as an entirely online course. Lecture materials will be pre-recorded and provided to students each week, along with supporting electronic (web-based resources), such as course notes, lecture slides, and self-test evaluations. There are no required online meetings for this course, and students will have the opportunity to work through weekly materials and assignments entirely at their own pace. However, online meetings may be scheduled by the instructor during the term to host question-and-answer sessions, facilitate class discussion, or assist with assignments. Attendance at these online sessions is not mandatory, and sessions will be recorded so that all students can access information provided in these meetings.

Supplementary Fees
Not applicable.

Course Learning Outcomes

The Department of Geography is committed to student knowledge and skill development. The table below lists the key learning outcomes for this course, the program-learning outcomes to which they contribute, and the expected level of achievement.

Course Learning Outcomes	PLO(s)	Level(s)
Explain the two dominant models of geographic representation (discrete entities and continuous fields) and describe their relationship to the common spatial data models used in geography (raster and vector datasets).	3, 6	2
Describe the fundamental components of a vector dataset, including why topology is useful for data validation, analysis, and editing.	6	3
Describe the fundamental structure of a raster dataset, including multi-band and multi-dimensional data structures.	6	3
Recognize common coordinate systems and map projections, and appropriately transform geographic data between different coordinate systems and projections.	6	2
Acquire spatial data from public and institutional sources, distinguishing datasets captured from primary and secondary sources.	3	2
Assemble related spatial datasets and create and maintain geographic databases to manage these data in a geographic information system (GIS).	3	2
Identify sources of uncertainty in geographic data, trace their propagation through various forms of spatial analysis, assess and visualize their impacts on analytical outputs, and interpret results recognizing the effects of uncertainty	6	1
Recognize and describe the role of relational database management systems in GIS.	6	1
Competently employ the ArcGIS Desktop® software package to manage, analyze, and visualize geographic data.	4, 6, 7	2
Apply principles of Geographic Information Science (GISci) to select and utilize various GIS analysis techniques related to query, measurement, and transformations.	4, 6, 7	2
Apply principles of map design to create cartographic products that effectively communicate the results of GIS operations.	6, 7	2
Describe legal and ethical considerations about the use and dissemination of spatial information and GIS products.	3, 7, 8	1

*PLOs = Program Learning Outcomes: 1 = reflect and communicate diverse human-environment perspectives, 2 = identify and explain human-environment processes, 3 = implement sampling, data collection, analyses and communication methods, 4 = analyze spatial and temporal aspects of human-environment systems, 5 = employ knowledge, arguments, and methodologies for solving human-environment problems, 6 = evaluate geospatial data and manipulate it to create cartographic products, 7 = communicate geographic concepts using oral, written, graphic, and cartographic modes, and 8 = demonstrate literacy skills.

**Levels: 1 = Introductory, 2 = Intermediate, and 3 = Advanced.

Learning Resources (Textbooks)

One of the following textbooks is recommended for this course:

- Chang, K. 2019. *Introduction to Geographic Information Systems*, 9th Edition. McGraw Hill: New York, NY. 466 pp. (recommended version)
- Chang, K. 2016. *Introduction to Geographic Information Systems*, 8th Edition. McGraw Hill: New York, NY. 448 pp.

Required readings from other sources may be assigned – notifications will be posted online, and additional readings will not require purchase.

Learning Technologies and Requirements

To successfully engage in their learning experiences at the University of Calgary, students taking online, remote and

blended courses are <u>required</u> to have reliable access to the following technology:
- A computer with a supported operating system (Windows 8, 10, or 11), as well as the latest security and malware updates
- A current and updated web browser
- Webcam (built-in or external)
- Microphone and speaker (built-in or external) or headset with microphone
- Broadband internet connection

Requisite Computer Skills

Students undertaking this course are expected to possess basic computer skills, particularly with the Microsoft Windows operating system (e.g., students should be able to navigate the contents of a drive, create folders, copy files, create and unpack .zip archives, etc.). Students must also possess basic proficiency with standard office productivity software, such as Microsoft Word, Excel, and PowerPoint. Students who do not possess these skills and proficiencies should contact the instructor prior to the start of the course to obtain suggestions for online training opportunities that should be completed before undertaking the course.

Assessment Methods

The following online evaluation components will be used to determine the overall grade in this course.

Component 1 – Examinations & In-class assignments:

Term test #1 (begins 20 Oct. @ 08:00, ends 21 Oct. @ 08:00)	15%
Term test #2 (begins 1 Dec. @ 08:00, ends 2 Dec. @ 08:00)	15%
In-class assignments (complete weekly worksheets, quizzes, etc.)	5%
End of term oral test (individually scheduled for 12 – 14 Dec.)	15%

Component 2 – Lab assignments & participation:

GIS lab assignments (11 assignments @ 4% each)	44%
Online participation and engagement	6%

Note: To successfully pass this course, students must earn a passing grade for both Component 1 – Examinations & In–class assignments and Component 2 – Lab assignments & participation above, and they must also earn a passing grade overall (see Grading System below).

Further details about each component, such as lecture topics, assignment topics and deadlines, participation expectations, etc., will be provided in the online course materials. Two online term tests will be scheduled during the term, and it is mandatory that you complete these tests on the scheduled date and time. Each test will be open-book test and must be completed anytime within the 24-hour period (expected completion time is 50 minutes). The end-of-term oral test will be a one-on-one comprehensive examination of all course materials with your instructor, and it will be completed during the exam period at the end of the term (the exact date and time will be individually arranged in consultation with your instructor). Oral tests will be conducted online using Microsoft Teams video calls.

Grading System

The following grading system will be used:

97 – 100	A+	80 – 84	B	60 – 64	C-		
93 – 96	A	75 – 79	B-	55 – 59	D+		
90 – 93	A-	70 – 74	C+	50 – 54	D		
85 – 89	B+	65 – 69	C	0 – 49	F		

Note: All grades of "C+" or lower are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements.

Flexible Grade Option (CG Grade)
https://www.ucalgary.ca/pubs/calendar/current/f-1-3.html

Late Assignments and Missed Evaluations
Late assignments will be assessed a penalty of 1% per hour or portion thereof past the assigned deadline, unless prior accommodations have been made with the instructor. If you anticipate that you will not meet a deadline for an assignment, contact your instructor at least 24 hours prior the deadline to discuss whether an accommodation can be granted. No accommodations will be provided if the deadline has passed.

It is mandatory that students complete the two midterm tests on the scheduled date and time. Missed term tests will automatically receive a grade of zero (0).

In the event that a student misses a midterm or any course work due to illness, a statutory declaration or other form of supporting documentation may be requested (see: https://www.ucalgary.ca/pubs/calendar/current/m-1.html). Please refer to https://www.ucalgary.ca/registrar/registration/appeals/student-faq for frequently asked questions concerning the provision of a statutory declaration.

Exams & Deferrals
Details regarding university expectations and regulations regarding examinations and deferrals of evaluation materials can be found at: https://www.ucalgary.ca/registrar/exams.

Online Learning Resources
This course will use the Microsoft Teams for Education online learning management system to deliver all course materials and online interaction (e.g., video calls, text-based chat, posting of lecture materials, recorded videos, assignment submission, online gradebook, etc.). To use Microsoft Teams, students are required to use their UCalgary Office365 accounts (login at https://office365.ucalgary.ca). Enrolled students will receive an invitation to the course Microsoft Teams workspace during the first week of the term.

A Microsoft Teams software client capable of video calls will be required for some course components (see **Assessment Methods** above). For information on obtaining and installing Microsoft Teams, see: https://docs.microsoft.com/en-us/microsoftteams/get-clients.

Note that Microsoft Teams will replace Desire2Learn (D2L) for the delivery of online content in this course. As such, D2L will not be used in this course.

Student Licences for ArcGIS Pro Software
The exercises and assignments in this course will use Esri's ArcGIS Pro version 2.9 software, and students may obtain a licence to install ArcGIS Pro 2.9 on their personal computers. ArcGIS Pro runs on the Windows operating system only, and system requirements for the software can be found on the software vendor's website here: https://pro.arcgis.com/en/pro-app/2.9/get-started/arcgis-pro-system-requirements.htm.

For students who are unable to run ArcGIS Pro 2.9 on their home computers, shared access to a campus computer via a remote connection will be available. For remote access, students will require a Windows- or Mac-based computer and a reliable broadband connection. Details on how to schedule time on a shared computer using a remote desktop session will be provided in the online course materials.

Referencing Standard
For all written evaluation materials submitted in this class, students may choose any recognized method for referencing

the work of others, such as the Chicago Manual of Style (https://www.chicagomanualofstyle.org/home.html) or the American Psychological Association (APA) style guide (https://apastyle.apa.org/).

Use of internet and electronic devices in class

Students will use Windows-based computers heavily during the lecture periods in this course, especially Python and ArcGIS Pro software. Students are welcomed to bring personal laptops and other electronic devices into the classroom, provided they do not disturb or distract other students or the instructor (e.g., please remember to turn off cell phone ringers/notifications while in class).

Other Administrative Policies and Procedures

1. All materials presented in this course are examinable, including online course materials, information presented orally by the instructor during the meeting periods, assigned readings, materials presented in the weekly lab assignments, etc.

2. You will be required to complete several lab assignments during this course. Each assignment will be given a specific deadline online, but typically it will be due the following Tuesday at 11:59 pm. Late submissions will be penalized (see Late Assignments and Missed Evaluations above).

3. All assignments must be submitted online using the Microsoft Teams platform. Other forms of submissions (e.g., email submissions) will not be accepted.

4. **Plagiarism is a serious academic offence that will be vigilantly monitored and reported in this course.** Essentially, plagiarism can arise whenever a student submits material for evaluation that was not entirely their own work (e.g., copied from another student, "borrowed" from another source without proper citation, based on ideas that were not your own) and the source of that work was not appropriately acknowledged. All students in this course are required to review and become familiar with university policies and regulations regarding plagiarism and academic misconduct in the University Calendar.

Important Dates

The last day to drop this course and receive a tuition fee refund is **Thursday, September 15th, 2022**. The last day to add or swap a course for Fall 2022 is **Friday, September 16th, 2022**. The last day to withdraw from this course is **Wednesday, December 7th, 2022**. Please note that the University is closed on Friday, September 30th; Monday, October 10th; and Friday, November 11th, 2022.

> For additional detailed course information posted by the instructor, visit the course Desire2Learn page online at https://d2l.ucalgary.ca/d2l/home.

Supplementary Information

Guidelines for Online Video Sessions

Microsoft Teams will be used for video conferencing that will allow us to meet each week for a "live" video meeting, so that we can have meet each other virtually and discuss relevant course topics as a learning community. Attendance at these meetings is optional, and each session will be recorded so that everyone can view the discussions. It is required that all students view each weekly session if they do not participate online.

The use of video conferencing programs relies on participants to act ethically, honestly and with integrity; and in accordance with the principles of fairness, good faith, and respect (as per the Code of Conduct). When entering video conferencing sessions, you play a role in helping create an effective, safe and respectful learning environment.

Please be mindful of how your behavior in these sessions may affect others. Participants are required to us names officially associated with their UCID (legal or preferred names listed in the Student Centre) when engaging in these activities.

Instructors/moderators can remove those whose names do not appear on class rosters. Non-compliance may be investigated under relevant University of Calgary conduct policies (e.g., Student Non Academic Misconduct Policy). If participants have difficulties complying with this requirement, they should contact the instructor of the class explaining why, so the instructor may consider whether to grant an exception, and on what terms. For more information on how to get the most out of your video sessions visit: https://elearn.ucalgary.ca/guidelines-for-zoom/.

The instructor may record online videoconferencing sessions for the purposes of supporting student learning in this class – such as making the recording available for review of the session or for students who miss a session. Students will be advised before the instructor initiates a recording of a session. These recordings will be used to support student learning only and will not be shared or used for any other purpose.

Resources and Writing support
Please note writing support resources provided by the Student Success Centre https://ucalgary.ca/ssc/resources/writing-support and the library https://libguides.ucalgary.ca/guides/

University of Calgary Academic Integrity Policy
Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. The University Calendar includes a statement on the principles of conduct expected of all members of the university community (including students, faculty, administrators, any category of staff, practicum supervisors, and volunteers), whether on or off university property. This statement applies in all situations where members of the university community are acting in their university capacities. All members of the university community have a responsibility to familiarize themselves with the principles of conduct statement, which is available at: www.ucalgary.ca/pubs/calendar/current/k.html.

Plagiarism, Cheating, and Student Misconduct
The University of Calgary is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect.

Academic dishonesty is not an acceptable activity at the University of Calgary, and students are **strongly advised** to read the Student Misconduct section in the University Calendar at: www.ucalgary.ca/pubs/calendar/current/k-3.html. Often, students are unaware of what constitutes academic dishonesty or plagiarism. The most common are (1) presenting another student's work as your own, (2) presenting an author's work or ideas as your own without adequate citation, and (3) using work completed for another course. Such activities will not be tolerated in this course, and students suspected of academic misconduct will be dealt with according to the procedures outlined in the calendar at: https://www.ucalgary.ca/legal-services/university-policies-procedures/student-academic-misconduct-procedure

For students wishing to know more about what constitutes plagiarism and how to properly cite the work of others, the Department of Geography recommends that they attend Academic Integrity workshops offered through the Student Success Centre: https://www.ucalgary.ca/student-services/student-success/learning/academic-integrity

Instructor Intellectual Property
Information on Instructor Intellectual Property can be found at https://www.ucalgary.ca/legal-services/university-policies-procedures/intellectual-property-policy

Freedom of Information and Protection of Privacy
Freedom of Information and Protection of Privacy (FOIP) legislation in Alberta disallows the practice of having students retrieve assignments from a public place, such as outside an instructor's office, the department office, etc. Term assignments will be returned to students individually, during class or during the instructor's office hours; if students are unable to pick up their assignments from the instructor, they must provide the instructor with a stamped, self-addressed envelope to be used for the return of the assignment.

Posting of Grades and Picking-up of Assignments
Graded assignments will be returned electronically on the Microsoft Teams platform. All submissions for this course must be done online using Microsoft Teams client. No other form of submission will be accepted (e.g., email submission).

Academic Accommodations

It is the student's responsibility to request academic accommodations, according to the university policies and procedures listed in the University Calendar.

The student accommodation policy can be found at: https://www.ucalgary.ca/pubs/calendar/current/b-6-1.html

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: https://www.ucalgary.ca/legal-services/university-policies-procedures/accommodation-students-disabilities-procedure

Students needing an accommodation based on a protected ground other than disability should communicate this need, preferably in writing to their instructor or the Department Head (email: freeman@ucalgary.ca).

Media Recording

Please refer to the following statement on media recording of students: https://elearn.ucalgary.ca/wp-content/uploads/2020/05/Media-Recording-in-Learning-Environments-OSP_FINAL.pdf

Course evaluations and student feedback

Student feedback will be sought at the end of the course through the standard University Student Ratings of Instruction (USRI) and Faculty course evaluation forms.

Accessibility

Course materials, lecture periods, and lab periods will present both visual and oral information that is required to understand the content of this course.

Copyright Legislation

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright https://www.ucalgary.ca/legal-services/university-policies-procedures/acceptable-use-material-protected-copyright-policy and requirements of the copyright act (https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplines under the Non-Academic Misconduct Act.

Wellness and Mental Health Resources

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness, and academic success and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support, or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, https://www.ucalgary.ca/wellnesscentre/services/mental-health-services) and the Campus Mental Health Strategy website (http://www.ucalgary.ca/mentalhealth/).

Students requiring assistance are encouraged to email the **Student at Risk line** if they or others appear to need wellness assistance: sar@ucalgary.ca For more immediate response, please call: 403-210-9355 and select option #2.

Sexual Violence Policy

The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. Please see the policy available at https://www.ucalgary.ca/legal-services/university-policies-procedures/sexual-and-gender-based-violence-policy

Contact Information for Student and Faculty Representation

- Student Union VP Academic 403-220-3911, suvpaca@ucalgary.ca
- Students Union Representatives for the Faculty of Arts – 403-220-3913, arts1@su.ucalgary.ca, arts2@su.ucalgary.ca, arts3@su.ucalgary.ca, arts4@su.ucalgary.ca
- Student Ombuds Office information can be found at: www.ucalgary.ca/ombuds/

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Emergency Evacuation/Assembly Points

Assembly points for emergencies have been identified across campus. Assembly points are designed to establish a location for information updates from the emergency responders to the evacuees; from the evacuated population to the emergency responders. For more information, see the University of Calgary's Emergency Management website: https://www.ucalgary.ca/risk/emergency-management

Campus Safewalk

Campus Security, in partnership with the Students' Union, provides the Safewalk service, 24 hours a day, to any location on Campus, including the LRT station, parking lots, bus zones, and university residences. Contact Campus Security at 220-5333 or use a help phone, and Safewalkers or a Campus Security officer will accompany you to your campus destination.

*The **Department of Geography** condemns the longstanding and continued injustices against those marginalized by racism, sexism, homophobia, transphobia, classism, xenophobia, able-bodied normativity, mental health profiling, and other forms of prejudice. We are pained by the fact that injustices are unevenly borne.* https://arts.ucalgary.ca/news/anti-racism-statement

Territorial Acknowledgement

The Department of Geography would also like to acknowledge the traditional territories of the people of the Treaty 7 region in southern Alberta. The City of Calgary is also home to Métis Nation of Alberta,
Region III. https://www.ucalgary.ca/indigenous/cultural-protocol.