

GEOGRAPHY FINAL COURSE OUTLINE: FALL 2023

GEOGRAPHY 682 FUNDAMENTALS OF GEOGRAPHIC INFORMATION SYSTEMS & SCIENCE

Section	Days	Time	Location
LEC 01 (blended learning)	Thursdays Online lectures	12:30 - 13:45 Web based	ES407
LAB B01	Mondays	10:00 - 11:50	ES407

Instructor: Dr. Darren Bender	Office: ES 338
Telephone: 403.220.6398	Email: darren.bender@ucalgary.ca
Office hours: Tuesdays 12:30 – 13:30, online via Microsoft Teams	

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.

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 concepts and GIS tools for spatial problem-solving at an intermediate level.

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 Format

GEOG 682 Fundamentals of GIS is offered as hybrid or “blended learning” course that has both an online component (lecture materials) and an in-person component (computer labs and weekly instructor meetings). Lecture materials are 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. Students will have the opportunity to work through weekly materials and assignments at their own pace. Additionally, the class will meet in-person in the Thursday lecture period each week to discuss their progress with the instructor, participate in question-and-answer sessions and class discussion, and seek assistance with assignments.

Online learning materials will be made available on the first day of lectures using the Microsoft Teams for Education learning management system (D2L will not be used for this course). If you have enrolled in the

course but cannot access the online materials on Microsoft Teams after the first day of lectures, please contact your instructor to gain access.

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)
Distinguish 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, or blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system (Windows 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 at the start of the course to obtain suggestions for online training opportunities that can be completed before undertaking course assignments.

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 (17 October @ 12:30 – 13:45)	15%
Term test #2 (5 December @ 12:30 – 13:45)	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 (top 10 assignments @ 4% each)	40%
Online participation and engagement	10%

To earn a passing grade in this course, students must students must achieve each of the following:

- Satisfactorily complete all lab assignments. Normally, a grade of at least 70% (before late penalties) indicates satisfactory completion.
- Earn a combined average of at least 70% on both written term tests.
- Earn at least 70% on the end-of-term oral exam.
- Earn at least a B- grade overall in the course. (Note that grades of "C+" or lower are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements.)

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 in-person 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 closed-book test and must be completed within the allotted time (75 minutes; 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).

Grading System

The following grading system will be used:

98 – 100	A+	80 – 84	B	60 – 64	C-
94 – 97	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.

Late Assignments and Missed Evaluations

Late assignments will be assessed a penalty of **2% per hour** or portion thereof past the assigned deadline unless prior accommodations have been made with the instructor or TA. If you anticipate that you will not meet a deadline for an assignment, contact your instructor or TA at least 24 hours prior the deadline to discuss whether an accommodation can be granted. **No accommodations can be provided if the deadline has passed.**

Note that assignment solutions are typically reviewed by the instructor in class shortly after the assignment deadline. Thus, no late submissions will be accepted beyond the meeting date and time when the assignment solution was discussed.

It is mandatory that students complete the two midterm tests on the scheduled date and time. Missed tests will automatically receive a grade of zero (0) unless the student has arranged accommodations with the instructor prior to the test date.

Documentation for Missed Tests or Course Assessments

In the event that a student misses a test, assignment, or any other coursework due to illness or other extenuating circumstances, supporting documentation such as a statutory declaration may be requested (see the university policy at <https://www.ucalgary.ca/pubs/calendar/current/m-1.html>, and refer to <https://www.ucalgary.ca/registrar/registration/appeals/student-faq> for frequently asked questions concerning the provision of a statutory declaration). If approved by your instructor, missed lab assignments, quizzes and tests may be reweighted with the remaining assessments. However, missed labs will still need to be satisfactorily completed to pass the course (see Assessment Methods above for details).

Note: A physician's note will never be requested by your instructor, so please do not visit your doctor for documentation of illness for this course.

Other Course 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 lecture 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) cannot be accepted.
4. Students are welcome to work together with other students to discuss and brainstorm solutions, but all student submissions must be independent and unique. Strong similarities in student solutions may be considered **plagiarism, which 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.

Use of internet and electronic devices in class

Students will use Windows-based computers heavily during the lecture periods in this course, especially the Python and ArcGIS Pro software packages. Students are also welcome 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).

Use of AI Tools, such as ChatGPT

Artificial intelligence tools, such as ChatGPT, may have the capability of interpreting course assignments and generating adequate solutions. As such, it may be tempting to use these tools to circumvent the learning process and the preparation of assignments in this course. Students are expected to independently learn and prepare course materials for themselves and not rely on AI technologies.

Supplementary Fees

Not applicable.

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

SUPPLEMENTAL INFORMATION

Principles of Conduct

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>

Instructor Intellectual Property

Information on Instructor Intellectual Property can be found at <https://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.

Human subjects

Students will not participate as subjects or researchers on human subjects in this course.

Posting of Grades and Picking-up of Assignments

Graded assignments will be returned by the instructor or teaching assistant personally during scheduled lecture or laboratory periods, unless they are made available electronically through the course D2L webpage. Grades and assignments will not be available at the Department of Geography's main office.

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://ucalgary.ca/legal-services/university-policies-procedures/student-accommodation-policy>

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://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).

Documentation for Absences or Missed Course Assessments

Students who are absent from class assessments (tests, participation activities, or other assignments) should inform the instructor as soon as possible. Instructors may request that evidence in the form of documentation be provided. If the reason provided for the absence is acceptable, instructors may decide that any arrangements made can take forms other than make-up tests or assignments. For example, the weight of a missed grade may be added to another assignment or test. For information on possible forms of documentation, including statutory declarations, please see <https://www.ucalgary.ca/pubs/calendar/current/m-1.html>.

Copyright Legislation

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright <https://ucalgary.ca/legal-services/university-policies-procedures/acceptable-use-material-protected-copyright-policy> and requirements of the copyright act at (<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 disciplined 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 (<https://www.ucalgary.ca/mentalhealth/>).

Contact Information for Student and Faculty Representation

- Student Union VP Academic 403-220-3911, suwpaca@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/

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.