University
of Victoria

COURSE OUTLINE
GEOG428: Advanced Topics in Geographical Information Systems

Lecture: Mondays 2:30-4:20pm, MAC D110
Instructor: Leah Fulton, leahfulton@uvic.ca
Office Hours: Wednesdays 10am-12pm or *by appointment.*
Office Location: DTB B204

Lab B01: M: 10am-12:50pm DTB A249, **Lab B02**: W: 2:30-5:20pm DTB A251
Teaching Assistant: Sean Loeffler, seanloeffler@uvic.ca
Office Hours: Wednesdays 12pm-1pm.
Office Location: DTB B206

Please note that I respond to emails during 8:00am to 5:00pm Mondays to Fridays

I acknowledge and respect the lə�k̓ʷəŋən peoples on whose traditional territory the university stands and the Songhees, Xwsepsum (Esquimalt) and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.

COURSE DESCRIPTION

This advanced GIS course introduces students to the concept of geospatial digital twins, emphasizing their application in real-world environments. Building on foundational GIS knowledge, students will explore innovative techniques through hands-on projects using the University of Victoria Campus as a living lab. Students will utilize diverse datasets to analyze sustainable transportation initiatives that align with the UVic Campus Plan, and UVic Climate and Sustainability Action Plan 2030. Key topics include the application of network analysis, automation of geospatial workflows using Python, 3D spatial data modelling, and real-time data collection. Students will design interactive visualizations and decision-support tools that effectively communicate key topics outlined above. In addition, students will earn practice in developing professional development skills through networking, communication, and project management. By the end of the course, students will be adept at integrating GIS data, tools, and technology to create digital twin models, advanced geospatial analysis, and prepare them for impactful careers in urban planning, environmental management, and geospatial innovation.

KEY THEMES: Geographic Information Systems, Urban Mobilities, Campus Planning, Digital Twins, network modelling, 3D modelling.

REQUIRED TEXT(S)

There is no required textbook for this course; however, online learning resources will be provided on Brightspace throughout the course.

RECOMMENDED TEXT(S)

Links to all readings will be provided in Brightspace

LEARNING OUTCOMES

- Gain a greater understanding of campus planning, and the impact of GIS in policy and management.
- Create and manage complex geodatabases and analyze diverse GIS datasets.
- Perform advanced network analysis to solve transportation, accessibility, and routing challenges.
- Automate spatial analysis and geoprocessing tasks using ArcPy.
- Collect, integrate, and analyze real-time field data using tools like Survey123.
- Design and analyze 3D GIS models for campus planning, transportation systems, and infrastructure management.
- Share GIS content online and publish interactive 3D visualizations to support decision-making.

EVALUATION

LinkedIn Profile, and Resume	January 11th, at 11:59pm	5%
Team Contract	January 25th, at 11:59pm	5%
Project Proposal and Pitch	February 8th, 11:59pm	10%
Lab Assignments (4)	As stated on calendar	10% each (40% total)
Online Quizzes (4)	As stated on calendar	2.5% each (10% total)
Final Presentation	March 30th, 11:59pm	10%
Final Project and Team Report	April 5th, 11:59pm	20%

<u>NOTE: Students will not be given an opportunity to submit any additional work for extra grades.</u>

GRADING SYSTEM
As per the Academic Calendar:

Grade	Grade point value	Grade scale	Description
A+ A A-	9 8 7	90-100% 85-89% 80-84%	**Exceptional**, **outstanding** and **excellent** performance. Normally achieved by a minority of students. These grades indicate a student who is self-initiating, exceeds expectation and has an insightful grasp of the subject matter.
B+ B B-	6 5 4	77-79% 73-76% 70-72%	**Very good**, **good** and **solid** performance. Normally achieved by the largest number of students. These grades indicate a good grasp of the subject matter or excellent grasp in one area balanced with satisfactory grasp in the other area.
C+ C	3 2	65-69% 60-64%	**Satisfactory**, or **minimally satisfactory**. These grades indicate a satisfactory performance and knowledge of the subject matter.
D	1	50-59%	**Marginal** Performance. A student receiving this grade demonstrated a superficial grasp of the subject matter.

F	0	0-49%	**Unsatisfactory** performance. Wrote final examination and completed course requirements; no supplemental.
N	0	0-49%	Did not write examination or complete course requirements by the end of term or session; no supplemental.

GEOGRAPHY DEPARTMENT INFO

- Geography Department website: uvic.ca/socialsciences/geography/
- Geography Department Chair: geogchair@uvic.ca
- Geography Undergraduate Advising: geogadvising@uvic.ca

BRIGHTSPACE

Brightspace is a learning management system (LMS) that will serve as the main avenue of communication throughout this course. Please monitor the page on a regular basis for course announcement. Should you have any difficulties logging in, or password-related problems, please contact the Computer Help Desk Email: helpdesk@uvic.ca.

POLICY ON LATE ASSIGNMENTS

Assignments are to be submitted by the submission deadline (see weekly calendar). Students who require additional time are granted a two-day no-penalty extension with instructor approval. Assignments submitted outside this no-penalty extension incur a **10% deduction per day**, up to three days, unless prior arrangements are made. For assignment submissions that depend on collective effort, failure to meet agreed deadlines will affect all group members.

POLICY ON ATTENDANCE

This course involves extensive group work within the classroom, along with collaborative opportunities with graduate students and external partners. It is designed to emulate a professional working environment where communication and reliability are essential. Students are expected to attend labs, participate actively, and communicate any absences to their group members and instructor.

ACADEMIC INTEGRITY

It is every student's responsibility to be aware of the university's policies on academic integrity, including policies on **cheating, plagiarism**, **unauthorized use of an editor**, **multiple submission**, and **aiding others to cheat**.

Policy on Academic Integrity: web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html

Throughout this course, you will be encouraged to use ChatGPT or other AI software's as tools and should be used transparently. Generative AI tools are known to generate writing with numerous factual errors, low levels of sophistication, and inaccurate citations. Faculty and staff are aware of this technology, and encourage discussion on the limitations and potentials of these tools. When ChatGPT is used inappropriately, it can therefore violate academic integrity policies, of which students can face an

academic offence. Please use this technology as a way to inform your work, not replace your work.

If you have any questions or doubts, talk to me, your course instructor. For more information, see uvic.ca/learningandteaching/cac/index.php.

ACCESSIBILITY

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a documented disability or health consideration that may require accommodations, please feel free to approach me and/or the Centre for Accessible Learning (CAL) as soon as possible (uvic.ca/services/cal/). The CAL staff is available by appointment to assess specific needs, provide referrals, and arrange appropriate accommodations. The sooner you let us know your needs, the quicker we can assist you in achieving your learning goals in this course.

POSITIVITY AND SAFETY

The University of Victoria is committed to promoting, providing and protecting a positive and safe learning and working environment for all its members.

SEXUALIZED VIOLENCE RESOURCE OFFICE (SVRO)

If you have been directly or indirectly impacted by sexualized violence, reach out to the SVRO for information, advice, resolution options (restorative and disciplinary) as well as support options and referrals. The SVRO is both survivor-centred and trauma-informed in their approach.
eqhr01@uvic.ca
Sedgewick C Wing
www.uvic.ca/svp

EQUITY AND HUMAN RIGHTS (EQHR)

UVic Equity and Human Rights is a resource for students, staff and faculty who have experienced discrimination and harassment and are looking for informal and formal resolution options as well as advice, coaching and/or education. We are available for confidential consultations so that you can ask questions and learn your options.
eqhr01@uvic.ca
Sedgewick C Wing
www.uvic.ca/equity

RESOURCES FOR INTERNATIONAL STUDENTS

The University of Victoria offers a number of resources to support international students as they pursue their studies. UVic's International Centre for Students is the primary office supporting international students on campus at the university-wide level and provides various supportive program through the UVic Global Community Initiative, including a Mentorship Program and Conversation Partner Program. For academic advising-related questions, students in the Geography Department are also encouraged to meet with the Geography Undergraduate Advisor (geogadvising@uvic.ca) as well as an academic advisor in the Academic Advising Centre early in their studies to help map out a plan to declare a major and complete university program requirements. Other resources include the Centre for Academic Communication and the Math and Stats Assistance Centre. International students are also encouraged to contact the International Student Liaison in Geography (Prof. CindyAnn Rose-Redwood, cindyann@uvic.ca), who can assist in making connections with other international and domestic

students in the Geography Department and share opportunities for getting involved in departmental activities more broadly.

COURSE EXPERIENCE SURVEY (CES)

I value your feedback on this course. Towards the end of term, as in all other courses at UVic, you will have the opportunity to complete an anonymous survey regarding your learning experience (CES). The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. The survey is accessed online and can be done on your laptop, tablet, or mobile device. I will remind you and provide you with more detailed information nearer the time but please be thinking about this important activity during the course.

DISCLAIMER

The above schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances.

HEALTH AND WELLBEING

A note to remind you to take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not alone. Should your mental health and wellbeing be compromised in such a way that affects your ability to perform in the classroom, please contact the instructor, and utilize the on-campus resources that are outlined below.

Counselling Services - *Counselling Services can help you make the most of your university experience. They offer free professional, confidential, inclusive support to currently registered UVic students.* uvic.ca/services/counselling/

Health Services - *University Health Services (UHS) provides a full service primary health clinic for students, and coordinates healthy student and campus initiatives.* uvic.ca/services/health/

Centre for Accessible Learning - *The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations* uvic.ca/services/cal/. *The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.*

Elders' Voices - *The Office of Indigenous Academic and Community Engagement (IACE) has the privilege of assembling a group of Elders from local communities to guide students, staff, faculty and administration in Indigenous ways of knowing and being.* uvic.ca/services/indigenous/students/programming/elders/index.php

WEEK	DATES	DESCRIPTION	LABS	DELIVERABLE
1	Jan. 5th – Jan. 11th	Introduction to the course, Campus as a Living Lab	No Lab	LinkedIn Profile
2	Jan. 12th – Jan. 18th	Campus Planning and Transportation Demand Management (TDM) *Guest Lecture: Alannah Rodgers, Juliet Van Vliet, Office of Campus Planning and Sustainability*	Project Team Formation	Quiz 1
		January 18th - Last day for 100% reduction of second term fees for standard courses.		
3	Jan. 19th – Jan. 25th	Data Foundations for Campus Planning	Building a Geodatabase	Team Contract
		January 21st - Last day for adding courses that begin in the second term.		
4	Jan. 26th – Feb. 1st	Equity, Accessibility, and Connectivity	GIS Networks	Lab 1, Quiz 2 due Feb 1st at 11:59pm
		January 31st - Last day for paying second term fees without penalty.		
5	Feb. 2nd – Feb. 8th	Automation and Efficiency in Mobility Analysis	Automation with ArcPy	Proposal and Project Pitch
		February 8th - Last day for 50% reduction of tuition fees for standard courses.		
6	Feb. 9th – Feb. 15th	Project Pitches and Feedback *Invited Guests: Coastal Climate Solutions Leaders (CCSL)*	Work Session	Lab 2, Quiz 3 due Feb 15th at 11:59pm
7	Feb. 16th – Feb. 22nd	Reading break		
8	Feb. 23rd – Mar. 1st	Smart Cities, IoT, and Real-time Mobility Data	GIS Web Services	Lab 3 due March 1st at 11:59pm
		February 28th - Last day for withdrawing from full year and second term courses without penalty of failure.		
9	Mar. 2nd – Mar. 8th	Visualizing Movement and Communicating Mobility Stories	Data Visualization	Quiz 4
10	Mar. 9th – Mar. 15th	Translating Spatial Evidence into Policy. *Guest Lecture: Timothy Hewitt, Senior Transportation Planner, City of Victoria.*	Work Session	Lab 4 due March 15th at 11:59pm
11	Mar. 16th – Mar. 22nd	Panel: Geospatial Jobs Guests include: GeoBC, ElectionsBC, Esri	Work Session	
12	Mar. 23rd – Mar. 29th	Practice Presentations	Work Session	
13	Mar. 30th – April 5th	End of Term Celebrations		Final Project, Team Report, Final Presentation