



COURSE OUTLINE
ADVANCED TOPICS IN GEOGRAPHIC INFORMATION SCIENCE

Instructor: Dr. Chris Bone
Office Hours: Mondays 1:00pm – 2:00pm DTB A237
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Teaching Assistant: Leah Fulton
Office Hour: Tuesdays 1:30pm-2:30pm DTB A246A
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*** Please note that we respond to emails during 8:00am to 5:00pm Mondays to Fridays**

COURSE DESCRIPTION

This advanced course introduces students to the concept of geospatial digital twins. Building on foundational GIS knowledge, students will explore innovative techniques that allow for the creation and management of dynamic digital representations of physical spaces. Through hands-on projects, students will utilize diverse datasets to construct geospatial digital twins for analyzing transportation systems, sustainability initiatives, and infrastructure management. Key topics include the application of advanced network analysis, automation of workflows using Python, 3D spatial data modelling, and real-time data collection through IoT tools such as Survey123. In addition, students will design interactive visualizations that effectively communicate complex key topics outlined above. By the end of the course, students will be adept at integrating GIS data, tools, and technology to create digital twin models, preparing them for impactful careers in urban planning, environmental management, and digital innovation.

KEY THEMES: geospatial technologies, digital twins, Internet of Things (IoT), network modelling 3D modelling.

REQUIRED TEXTS

Links to all readings will be provided in Brightspace

LEARNING OUTCOMES

- Create and manage complex geodatabases to organize 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 IoT 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.

WEEKLY CALENDAR

WEEK	DATE	Lecture	Lab
1	January 6	Course Introduction	No Lab
2	January 13	Guest Lecture: Campus Planning	Project Team Formation
3	January 20	Geodatabases for GIS Projects	Lab 1: Building a Geodatabase
4	January 27	Network Analysis	Lab 2: Building GIS Networks
5	February 3	Geospatial Automation	Lab 3: Automation with ArcPy
6	February 10	Project Pitches	Lab 3 Work Session
7	February 17	Reading Break – No Lecture	Reading Break – No Lab
8	February 24	GIS and Internet of Things	Lab 4: GIS Web Services
9	March 3	GIS and Visualization	Lab 4 Work Session
10	March 10	Final Project Planning	Final Project Work Session
11	March 17	Guest Lecture: GIS for Campus	Final Project Work Session
12	March 24	Guest Lecture: Geospatial Jobs	Presentation Practice
13	March 31	Course Wrap-up	Project Presentations

January 22
February 28

Last day for adding courses that begin in the first term
Last day for withdrawing from course without penalty of failure

DELIVERABLES AND EVALUATION

Assignment	Due Date	Percentage
Digital Portfolio (Individual submission)	January 14th at 11:59pm	5%
Team Contract	January 21st at 11:59pm	5%
Lab 1: Geodatabase Design	January 28th at 11:59pm	10%
Lab 2: Network Analysis	February 5th at 11:59pm	10%
Project Pitch	February 10th at 2:00pm	5%
Lab 3: Automating Workflows in ArcPy	February 18 th at 11:59pm	10%
Lab 4: Integration of IoT Technology	March 4 th at 11:59pm	10%
Final Project	Tuesday April 1 st at 11:59pm	25%
Project Presentation	Tuesday April 1 st at 11:59pm	10%
Quizzes x 4	As stated on calendar	10%

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

GRADING SYSTEM

As per the Academic Calendar:

Grade	Grade point value	Grade scale	Description
A+	9	90-100%	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.
A	8	85-89%	
A-	7	80-84%	
B+	6	77-79%	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.
B	5	73-76%	
B-	4	70-72%	
C+	3	65-69%	Satisfactory, or minimally satisfactory. These grades indicate a satisfactory performance and knowledge of the subject matter.
C	2	60-64%	
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

Please visit your BrightSpace site to access the website for Geog 428.

POLICY ON LATE ASSIGNMENTS

Assignments will be accepted one day (24 hours) past the due date accompanied with a 10% late penalty. Assignments will not be accepted after this time, but students will still be able to obtain a grade if they participate in the peer assessment portion of the assignment.

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/calendar2019-09/undergrad/info/regulations/academic-integrity.html

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 <https://www.uvic.ca/services/cal/>). The RCSD 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 PREVENTION AND RESPONSE AT UVIC

UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting uvic.ca/svp. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:

Where: Sexualized violence resource office in EQHR; Sedgewick C119
Phone: 250.721.8021
Email: svpcoordinator@uvic.ca
Web: uvic.ca/svp

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

NOTE:

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.

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

We acknowledge and respect the lək'wəṇən peoples on whose traditional territory the university stands and the Songhees, Esquimalt, and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.