



GEOG/EOS 230
Introduction to Environmental Data Analysis
Spring 2025

We acknowledge and respect the ləkʷəŋən 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.

If you are not on these lands, give a thought to where you are now and those who have lived there in long years past, and still live there now, and how they achieve balance with their environment.

Lecture: Monday, Thursday 10:00 – 11:20 am

Format: Face-to-face in Hickman Building 110

Tutorial Section T01: Mondays 12:30 – 2:20 pm David Turpin Building A253

Tutorial Section T02: Wednesdays 8:30 – 10:20 am David Turpin Building A253

Instructors: Adam Wicks and David Atkinson

Office hours: Thursdays 9:00 - 10:00 am DTB B204 or by appointment

Email: awicks@uvic.ca

Lab Instructor(s): Osamu Kabayama

Office hours: To be announced

Email: okabayama@uvic.ca

Introduction:

This course provides students with the fundamental skills and knowledge required to analyze environmental data. Students will learn statistical methods, data visualization techniques, and gain hands-on experience using the python programming languages for environmental data analysis. The course will cover various types of environmental data, including climate data, pollution data, hydrological data and ecological data. We will work in the context of modern data distribution portals, with climate-change.canada.ca forming the primary source of information.

Course Mission:

This course seeks to equip you with an understanding of how to bring data into a computer and reduce it to a form suitable to answer questions.

Learning Objectives:

1. How to recognize different data types and recognize what options are available for examining the data.
2. How to prepare data for ingest and then how to examine it after performing the initial read.
3. Learn about different ways to present summaries of large data sets.
4. Gain basic familiarity with data possessing a temporal or spatial structure.
5. Begin learning and using the Python language.
6. Intro to basic aggregate stats and spatial stats in the context of Python (i.e. this isn't meant to be a stats course).
7. Gain familiarity with a widely used, cloud-based “repository” system used by developers to share and showcase code: Github.

Tutorials:

This course has a computer tutorial component that will emphasize the ingest and analysis of data using a programming language called Python. Data will be gathered primarily from the Government of Canada's climate change data portal: <https://climate-change.canada.ca/climate-library> Analyses will be directed to support conclusions/decisions concerning applied climate scenarios and problems that are presented. They are an essential part of the course and attendance is required. There will be reports due: see below for detailed schedule. All reports must be neatly typed, and figures must be clearly and correctly presented. You will be provided with an example and rubric for each tutorial writeup. There is a lot of tutorial material on Python that I strongly urge you to spend time at the beginning of term working through to gain proficiency with this system. Preparing synthesis reports is a major skill needed in today's job market. Analysis and presentation of data is a necessary skill in all fields.

** Tutorials are due before the start of the next new Tutorial. For example, Tutorial “Python 1” would be due the day before your “Python 2” Tutorial begins.

** You have a lot of time for these tutorials. There are only five of them – you have two full weeks for each one, so plan your time wisely because last minute pleas for extensions will not be entertained. Even if something serious comes up in the day or two before lab is due, most of it should already be finished. Late penalty is 20% per day late. Attend to the work in a timely manner and speak to the Instructor or the TA if you have problems.

Computer use:

In the tutorials, we will be doing exercises using a computer using the Python programming language. You should be familiar with basic computer skills such as file maintenance and word processing. We will be using google collaborator, so you don't need to install anything on your own computer, but it will require a google account. We will show you how to do this in the first week. It is assumed you don't know anything about programming.

Evaluation:

The course grade will be based on the following:

Assessment	Date (or date due)	Weight	Subject
Midterm Test	listed below	15 %	Initial sections: computers, data ingest, basic stats
Final Exam	will be posted	30 %	Final sections: time series, spatial, mapping and ALL TUTORIALS
Tutorials	detailed breakdown to follow	45 %	Varied
Term Assignment	last day of classes (April 4)	10 %	Varied

Components:**Exams:**

There is one test during term and one final in the final exam period (the schedule for that is not in the instructors' control). The midterm covers everything to that point but no lab material. The final exam is *not* cumulative and will cover the latter part of the course and it will include some materials from tutorials. It will be 3 hours in duration. Further details will be discussed in class.

Tutorials:

The requirements for the tutorials will be presented in tutorial handouts as the term progresses.

Term Assignment:

Students will identify an interesting dataset from a provided list, read in the data, prep some summary plots/tables, do some background research on the data you read in, prepare a python notebook with full markdown on the steps and methods used. Notebooks will be shared with the class and you are asked to comment on two of your peers assignments. You will be provided guidance on how to this should look.

Course Outline:

This is our objective, but topics may be shuffled a bit as we progress. Midterm date is firm.

**** Note that both the tutorial section and the theory section need to be passed to pass the course.**

Lect #	Wk	Date	Lecture Subject	Tutorial	Due
1	1	M Jan 06	Class overview, intro to analysis, computers		
2	1	Th Jan 09	OS, FS, representation, ascii		
3	2	M Jan 13	Data types: human readable + markup	1	
4	2	Th Jan 16	Data types: commercial, machine read	1	
5	3	M Jan 20	Computer languages and scripts	1	
6	3	Th Jan 23	Data pre-ingest assessment, notepad++	1	
7	4	M Jan 27	Initial data ingest, exploratory analysis, dates	2	T1
8	4	Th Jan 30	Data cleaning	2	
9	5	M Feb 03	Data presentation: tables and plot types	2	
10	5	Th Feb 06	Stats – descriptive	2	
11	6	M Feb 10	Stats – probability	3	T2
12	6	Th Feb 13	Stats – hypothesis testing	3	
		M Feb 17	Reading break / Family Day		
		Th Feb 20	Reading break		
	7	M Feb 24	Midterm	3	Midterm
13	7	Th Feb 27	Other statistical approaches – clustering	3	
14	8	M Mar 03	Time series data, dates	4	T3
15	8	Th Mar 06	Time series data, plotting considerations	4	
16	9	M Mar 10	Regression	4	
17	9	Th Mar 13	Confidence intervals	4	
18	10	M Mar 17	Spatial data types	5	T4
19	10	Th Mar 20	Contouring and visualizing	5	
20	11	M Mar 24	Spatial stats	5	
21	11	Th Mar 27	Basic cartographic concepts	5	
22	12	M Mar 31	Mapping - matplotlib		T5
23	12	Th April 03	Mapping for online display – plotly, dash		
		F April 04	Last day of classes		

Other information:

Dates, including drop dates: <https://www.uvic.ca/calendar/dates/>

Information about [Academic Concessions](#)

[Academic Accommodations](#) (Center Accessible Learning)

[Academic Integrity](#), including plagiarism. Plagiarism won't be tolerated.

The full [2025 Undergraduate Calendar](#)

Students are required to abide by all academic regulations set as set out in the University calendar, including standards of academic integrity. Violations of academic integrity (e.g. cheating and plagiarism) are considered serious and may result in significant penalties.

The University of Victoria is committed to promoting critical academic discourse while providing a respectful and supportive learning environment. All members of the university community have the right to this experience and the responsibility to help create such an environment. The University will not tolerate racism, sexualized violence, or any form of discrimination, bullying or harassment.

Please be advised that, by logging into UVic's learning systems or interacting with online resources, and course-related communication platforms, you are engaging in a university activity.

All interactions within this environment are subject to the university expectations and policies. Any concerns about student conduct may be reviewed and responded to in accordance with the appropriate university policy.

To report concerns about online student conduct: onlineconduct@uvic.ca

A note to remind you to take care of yourself. Diminished mental health can interfere with optimal academic performance. Do your best to engage in self-care and maintain a healthy lifestyle this semester. 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. The source of symptoms might be related to your course work; if so, please speak with me. However, problems with other parts of your life can also contribute to decreased academic performance. The UVic Student Wellness Centre provides cost-free and confidential mental health services to help you manage personal challenges that impact your emotional or academic well-being.

The UVS S (UVic Students' Society) is a social justice based non-profit run by students, for students and is entirely separate from UVic. As an undergrad student, you are already a member! We work on issues affecting students such as affordability, public transit, sexualized violence, sustainability, student employment, and much more. We fund clubs and course unions and have several advocacy groups. We also have a Food Bank and Free Store, a Peer Support Centre, and run your health and dental plan. We are here to support you, so please reach out to us at uvss.ca!

And Check out [SOGS](#), the GEOGRAPHY student undergraduate society!

Undergraduate Grading:

Passing Grades	Description
A+ A A-	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-	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	Satisfactory, or minimally satisfactory. These grades indicate a satisfactory performance and knowledge of the subject matter.
D+ D	Marginal performance. A student receiving this grade demonstrated a superficial grasp of the subject matter.
F	Unsatisfactory performance. Wrote final examination and completed course requirements; no supplemental.
N	Did not write examination or complete course requirements by the end of term or session; no supplemental.

A+	A	A-	B+	B	B-	C+	C	D	F	N
9	8	7	6	5	4	3	2	1	0	0
90-100%	85-89%	80-84%	77-79%	73-76%	70-72%	65-69%	60-64%	50-59%	49% or Less	49% or Less

** As stated in the 2009-2010 Calendar

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.

Geography Department Info:

Geography Departmental web site: <https://www.uvic.ca/socialsciences/geography/>

Geography planning guide: [Plan Your Geography Program](#)

Geography Department Chair: geogchair@uvic.ca

Geography Undergraduate Advising: geogadvising@uvic.ca

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-centered 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.

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