

GEOG/EOS 230

Introduction to Environmental Data Analysis

Spring 2024

We acknowledge and respect the lək'wəḡən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and WSÁNEĆ 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.

Classes: Monday, Thursday, 10:30 – 11:50
Format: face to face in MacLaurin Building D010

Tutorials: (Section T01): Mon 12:30 – 14:20 DTB A253
(Section T02): Wed 08:30 – 10:20 DTB A253

Instructors: David Atkinson

Atkinson office: DTB B203
email: datkinso@uvic.ca

Lab Instructor (TA): Vida Khalilian
TA office hours: to be announced

Atkinson office hours: Tues 13:00-14:00 and Wed 13:00 – 14:00,
or by appointment (email me)

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.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. Different ways to present summaries.
4. Considerations for time series and spatial data.
5. Begin learning and using the Python language.

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 cleanly 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.

**** Labs are due before the start of the next new lab. For example for section T01 (T02), lab "Python 1" would be due before your "Python 2" Lab 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, the majority of it should already be finished. -20% per day late. Attend to the work in a timely manner and *talk to the Instructor or the TA if you have problems*.

(Not) Online Learning: This course is hosted on the UVic Brightspace system. <http://bright.uvic.ca/> You will find the course and lab zoom link and all course materials at your 230 Brightspace site.

Computer use: In the laboratories, we will be doing exercises using the 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. 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:

		Date (or date due)	Weight	Subject
1	Midterm test	Listed below	15 %	First two sections (processes and data)
2	Final Exam	Will be posted	30 %	Third section (applications) ALL LABS COVERED
3	Presentation	Last two classes	10%	You decide
3	Tutorials	Detailed breakdown to follow	45 %	Varied

Tests and Exam:

There is one test during term and one final in the final exam period (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 labs. It will be 3 hours in duration. Further details will be discussed in class. The requirements for the labs will be presented in lab handouts as the term progresses. You will never be tested on coding or knowing specific bits of python code.

Presentation

The class will split into groups of two. Each group will identify an interesting dataset from climate-change.canada.ca , read in the data, prep some summary plots/tables, do some background research on what you have read in, and prepare a 10 minute powerpoint presentation for the end of class. We will run a small conference built around your presentations. You will be provided with guidance.

Course outline

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

Lect #	Wk	Date	Lecture Subject	Tutorial	Due dates
1	1	M Jan 08	Class overview, Intro to analysis, computers	none	
2	1	Th Jan 11	OS, FS, representation, ascii	none	
3	2	M Jan 15	Data types: human readable + markup	1	
4	2	Th Jan 18	Data types: commercial, machine read	1	
5	3	M Jan 22	Computer languages and scripts	1	
6	3	Th Jan 25	Pre-ingest assessment, notepad++	1	
7	4	M Jan 29	Initial data ingest, Exploratory analysis, dates	2	T 1
8	4	Th Feb 01	Data cleaning	2	
9	5	M Feb 05	Data presentation: tables and Plot types	2	
10	5	Th Feb 08	Stats - descriptive	2	
11	6	M Feb 12	Stats - probability	3	T 2
12	6	Th Feb 15	Stats - hypothesis testing	3	
-		M Feb 19	Reading break		
-		Th Feb 22	Reading break		
-	7	M Feb 26	midterm	3	midterm
13	7	Th Feb 29	Other statistical approaches - clustering	3	
14	8	M Mar 04	Time series data, dates	4	T 3
15	8	Th Mar 07	Time series data, plotting considerations	4	
16	9	M Mar 11	Regression	4	
17	9	Th Mar 14	confidence intervals	4	
18	10	M Mar 18	Spatial data- types	5	T 4
19	10	Th Mar 21	contouring and visualizing	5	
20	11	M Mar 25	spatial stats	5	
21	11	Th Mar 28	mapping concepts	5	
-	12	M Apr 01	Easter: University closed	none	T 5
22	12	Th Apr 04	Presentations	none	
23	13	M Apr 08	Presentations		
-	13	Th Apr 11	classes are finished	-	-

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

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 [2022/2023 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 UVSS (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**

<i>Passing Grades</i>	<i>Description</i>
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.
COM	Complete (pass). Used only for 0-unit courses and those credit courses designated by the Senate. Such courses are identified in the course listings.

** As stated in the 2009-2010 Calendar

A+	A	A-	B+	B	B-	C+	C	D	F
90-100%	85-89%	80-84%	77-79%	73-76%	70-72%	65-69%	60-64%	50-59%	49% or Less

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

Geography planning guide:

<https://www.uvic.ca/socialsciences/geography/undergraduate/advising/program-planning/index.php>

Undergraduate Advisor: Dr. Shannon Fargey (fargey@uvic.ca)

Graduate Advisor: Dr. Randy Scharien (randy@uvic.ca)

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the UVic Center for Accessible Learning (CAL) as soon as possible. The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations <http://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.

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