

GEOG 373

Applied Climatology

Spring 2023

We acknowledge and respect the lək̓ʷəŋən 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: Tuesday, Wednesday and Friday, 12:30 – 1:20
Format: face to face in MacLaurin Building D110

Labs: (Section B01): Wed 14:30 – 16:20 Business and Economics computer lab
(Section B02): Thu 14:30 – 16:20 Business and Economics computer lab

Professor: David Atkinson	Lab Instructor: Osamu Kabayama
Office: DTB B203	
email: datkinso@uvic.ca	TA office hours: to be announced
Atkinson office hours: Tues 13:00-14:30 and Wed 13:00 – 14:00, or by appointment (email me)	

Introduction:

“A study of the application of physical principles to practical problems in climatology and the reciprocal interaction between climate and human activities. Topics include: urban effects on climate; air pollution; human bioclimatology; agricultural climatology; and methods of microclimatic modification.” – from the on-line course description

Explicit consideration and inclusion of weather and climatic concepts into planning is essential in many sectors. One can imagine setting up a farm – the general climatic setting will entirely dictate the types of crops that can be grown. The general idea is so obvious it is almost below the level of active consideration – e.g., you are not going to grow pineapples in the Prairies – yet to get at the specifics a process of analysis is necessary. This can be a very detailed process that requires careful thought. To continue with the agriculture example, assuming someone has not already done the climatic analysis work for you, data to describe the area climate are required and must be secured. The type of data must be considered. The form the data are in – what type of data file, what is its structure – must be dealt with. Then the data must be analyzed for errors and then “reduced” to the form required to answer the

questions at hand. Non-meteorological factors must also be considered, for example, the orientation of a slope which will determine local precipitation and radiation departures from a regional average that you may calculate from some weather station several kilometers away.

This course takes the next step in the weather and climate overview that you received in GEOG272. Using concepts developed in that course, GEOG373 moves on to determine how they can be more directly applied to many questions in daily life. The mechanisms by which these sorts of analyses are conducted are also covered. *There is a mandatory text.* Readings from the text and elsewhere will be regularly assigned. The course will generally follow these readings, and you should keep up with them. In class we will emphasize certain topics.

Course Mission:

This course seeks to equip you with an understanding of how climate acts at the regional scale and how it interacts with other natural and human parameters/features to allow you to:

- a) utilize computer analyses and tools to answer to manipulate data to help you answer questions about how climate affects certain sectors, and
- b) think about various spheres of human and natural systems and understand how weather and climate act to influence.

Learning Objectives:

1. Identify the basic climate controls, large-scale and small-scale, that act upon a given location.
2. Explain how these climate controls work to create a local-scale climate.
3. Be aware of various quality-control issues to be alert for when working with data.
4. Analyze and/or present data using a sophisticated programming language (Python).
5. Gain familiarity with how climate intersects human activities in several sectors (eg transport, agriculture, hydrology).

Laboratories:

This course has a computer laboratory component that will emphasize the ingest and analysis of data using a programming language called Python. Data 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 lab reports must be neatly typed and figures must be cleanly and correctly presented. In particular, labs will give you practice dealing with data (brining it in, preparing it for analysis, and preparing summary plots/tables/statistics) using Python programming language. 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 B01 (B02), lab “Python 1” would be due before your “Python 2” Lab starts on Feb 8 (9).**

** You have a lot of time for these labs. Plan your time wisely because we won't entertain last minute pleas for extensions. Even if something serious comes up in the day or two before lab is due, the majority of it should already be finished. -10% per day late.

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 373 Brightspace site.

Textbooks:

Carrega, Pierre (ed.). 2010. *Geographical Information and Climatology*. Wiley Press.

This explores the integration between applied climatology and the use of GIS tools. It is quite motivating and the book covers a lot of interesting ground that will be of benefit to you.

Other readings from the textbook by Aguado and Burt that cover some of the physical process gaps in Carrega will be assigned and provided by me.

Please read the material from the text. Lecture material will generally follow the readings. All readings are testable.

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. It will be easiest if you install python locally 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	Test 1	Listed below	15 %	First section (processes)
2	Test 2	Listed below	15 %	Second section (information)
3	Final Exam	Will be posted	30 %	Third section (applications) ALL LABS COVERED
4	Labs	Detailed breakdown to follow	40 %	Varied

Tests and Exam:

There are two tests during term. Each test covers lecture material independent of other tests. The final exam will cover the final, larger unit (applications) and it will include materials from all 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 specific bits of python code.

Course outline

This is our objective but topics may be shuffled a bit as we progress. **Tests dates are firm.**

Wk	Date	Lecture Subject	Exam	Lab	Module
1	T Jan 10	Course intro and structure – concept map presentation		None	Process
	W Jan 11	Radiation		None	
	F Jan 13	Pressure and winds		None	
2	T Jan 17	Storms: Tropical Cyclone, MCS, tornado		Colab intro	
	W Jan 18	Storms: Extra-tropical Cyclones, advection		Colab intro	
	F Jan 20	Local modifiers: radiation, T modifiers		Colab intro	
3	T Jan 24	Local modifiers: winds, precip		Python 1	
	W Jan 25	other factors beyond meteorology		Python 1	
	F Jan 27	Process overflow		Python 1	
4	T Jan 31	Process module test	Test 1	Python 1	Information
	W Feb 1	Data gathering		Python 1	
	F Feb 3	The weather process, weather agencies		Python 1	
5	T Feb 7	Data analysis I – linear stats, error, extremes		Python 2	
	W Feb 8	Data analysis II – spatial- contouring, stats		Python 2	
	F Feb 10	Scale concepts		Python 2	
6	T Feb 14	station representativeness		Python 2	
	W Feb 15	Modeling: statistical and empirical models		Python 2	
	F Feb 17	Modeling: numerical and topoclimate models		Python 2	
7	T Feb 21	Reading week: No classes		No lab	
	W Feb 22	Reading week: No classes		No lab	
	F Feb 24	Reading week: No classes		No lab	
8	T Feb 28	Information module test	Test 2	Python 3	Application
	W Mar 1	Wild fire		Python 3	
	F Mar 3	Wild fire		Python 3	
9	T Mar 7	Urban		Python 3	
	W Mar 8	Urban		Python 3	
	F Mar 10	Engineering considerations		Python 3	
10	T Mar 14	Indigenous knowledge integration		Python 4	
	W Mar 15	Indigenous weather impacts		Python 4	
	F Mar 17	Northern context		Python 4	
11	T Mar 21	Transportation		Python 4	
	W Mar 22	Agriculture		Python 4	
	F Mar 24	Agriculture		Python 4	
12	T Mar 28	Guest Lecture: Daniel Brendle-Moczuk		Python 5	
	W Mar 29	Hydrology		Python 5	
	F Mar 31	Hydrology		Python 5	
13	T Apr 5	Human comfort		Python 5	Review
	W Apr 6	Exam structure, Review topics of your choice		Python 5	
					Python 5

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. Cam Owens (camo@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.