GEOG 373

Applied Climatology

Spring 2021

Classes: Tues/Wed, 12:30 – 1:20 online

Labs: (Section B01): Wed 14:30 – 16:20 online
(Section B02): Thu 14:30 – 16:20 online

Professor: David Atkinson
Office: SSM B120
email: datkinso@uvic.ca

Lab Instructor: Adam Wicks
TA office hours: to be announced

Atkinson office hours: Tues 13:00-14:30 and Wed 13:00 – 14:00,
or by appointment (email or call 7332)

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. This 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 the process of its analysis is necessary. Furthermore, this can be a very detailed process and its inclusion in formal planning 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 questions about how climate affects certain sectors, and

b) engage a planning process as a "climatic analysis needs" specialist.

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. Explain strategies for handling these issues, their limitations, and implications to bear in mind when employing them during an analysis.
5. Analyze and/or present data using a variety of statistical and spatial tools.
6. Perform a directed data analysis that is conducted in the context of an application.
7. 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 10 (11).**

** 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. G*eographical Information and Climatology*. Wiley Press.

This is a translation of a text that has been popular in France. The translation is a little weak in places, rendering the flow a little stilted in spots. However I felt the exploration of the direct integration between applied climatology and the use of GIS tools to be very motivating and the book covers a lot of interesting ground that will be of benefit for you to have exposure to.

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 and case studies. 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.

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.

Tentative course outline

This is our objective but timings and topics may change as we see how rapidly we progress.

Wk	Date	**Lecture Subject**	Exam	Lab	Module
1	T Jan 12	Course intro and structure – concept map presentation		Install	**Process**
	W Jan 13	Process I: Radiation		Install	
2	T Jan 19	Process II: Pressure and winds		Jupyter	
	W Jan 20	Process III: Storms, advection concepts		Jupyter	
3	T Jan 26	Process IV: Local modifiers		Python 1	
	W Jan 27	Process overflow, idea of other factors beyond meteorology		Python 1	
4	T Feb 2	**Process module test**	Test 1	Python 1	**Information**
	W Feb 3	Information I: Data gathering		Python 1	
5	T Feb 9	Information II: Data analysis I – linear stats, error, extremes		Python 2	
	W Feb 10	Information III: Data analysis II – spatial- contouring, stats		Python 2	
6	T Feb 16	**Reading week: No classes**		Python 2	
	W Feb 17	**Reading week: No classes**		Python 2	
7	T Feb 23	Information IV: Scale concepts, station representativeness		Python 3	
	W Feb 24	Information V: Modeling		Python 3	
8	T Mar 2	**Information module test**	Test 2	Python 3	**Application**
	W Mar 3	Application I: Wild fire		Python 3	
9	T Mar 9	Application II: Urban II		Python 4	
	W Mar 10	Application II: Urban II		Python 4	
10	T Mar 16	Application III: Indigenous/Northern		Python 4	
	W Mar 17	Application III: Indigenous/Northern		Python 4	
11	T Mar 23	Application IV: Transportation		Python 5	
	W Mar 24	Application V: Agriculture		Python 5	
12	T Mar 30	Application VI: Hydrology I		Python 5	
	W Mar 31	Application VI: Hydrology II		Python 5	
13	T Apr 6	Application VII: Human/Engineering			
	W Apr 7	Exam structure, Review topics of your choice			Review

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.
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/Plan%20Your%20Geography%20Degree/index.php

Undergraduate Advisor: Dr. Cam Owens (camo@uvic.ca)
Graduate Advisor: Dr. Denise Cloutier (dcloutier@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.