GEOG 373

Applied Climatology

Spring 2015

Classes: Tues/Wed, 11:30 – 12:20 in Cornett Building B143

Labs: (Section A01): Mon 12:00 – 13:50 Clearihue A010
(Section A02): Wed 14:30 – 16:20 Clearihue A010
(Section A03): Thur 14:30 – 16:20 Clearihue A010

Professor: David Atkinson
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Lab Instructors:
TA office hours: to be announced
Chris Krasowski – section A01
Norman Shippee – section A02

Atkinson office hours: Tues 13:30-14:30 and Thurs 10:00-11:00,
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 analysed 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 state of the art analyses and tools to answer sophisticated questions about how climate affects certain sectors (e.g. wildland fire primarily), 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. List 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, and recognize key limitations of "standard" statistical techniques.
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 in two typical environments: spreadsheet and geographic information system (SAGA GIS). Data analyses will be directed to support conclusions/decisions concerning applied climate scenarios and problems that are presented. Following this will be a major, multi-week lab component that will use a state-of-the-art wildland fire prediction system, the Prometheus model system. This Canadian-developed system is in current use in all provinces/territories and in several other countries around the world – it will be good experience for you to gain exposure to this sort of tailored "mission specific" tool.

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. You should be familiar with basic computer skills such as file maintenance, printing and word processing.

Laboratories: The labs 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. The labs will give you practice in using standard software (Excel) for the analysis of climatic data and in making observations to build and support ideas about how things work. You will also be learning a GIS package called SAGA. I strongly urge you to spend time at the beginning of term working through their tutorials to gain proficiency with this package. 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.

Coursespaces: This course is hosted on the UVic CourseSpaces system. http://coursespaces.uvic.ca/ I will post various course-related materials or news items here from time to time; make sure you keep a regular eye on the site. Readings will be posted here.

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 6	Course intro and structure – concept map presentation		No lab	**Process**
	W Jan 7	Process I: Radiation		No lab	
2	T Jan 13	Process II: Pressure and winds		SAGA 1	
	W Jan 14	Process III: Storms, advection concepts		SAGA 1	
3	T Jan 20	Process IV: Local modifiers		SAGA 2	
	W Jan 21	Process overflow, idea of other factors beyond meteorology		SAGA 2	
4	T Jan 27	**Process module test**	Test 1	No new lab	**Information**
	W Jan 28	Information I: Data gathering		No new lab	
5	T Feb 3	Information II: Data analysis I – linear stats, error, extremes		Excel 1	
	W Feb 4	Information III: Data analysis II – spatial- contouring, stats		Excel 1	
6	T Feb 10	**Reading week – no class**		No new lab	
	W Feb 11	**Reading week – no class**		No new lab	
7	T Feb 17	Information IV: Scale concepts, station representativeness		Excel 2	
	W Feb 18	Information V: Modeling		Excel 2	
8	T Feb 24	**Information module test**	Test 2	CWFM	**Application**
	W Feb 25	Application I: Wild fire		CWRM	
9	T Mar 3	Application I: Wild fire		CWFM	
	W Mar 4	Application II: Urban II		CWRM	
10	T Mar 10	Application II: Urban II		CWFM	
	W Mar 11	Application III: Transportation		CWRM	
11	T Mar 17	Application IV: Agriculture		CWRM	
	W Mar 18	Application V: Hydrology I		CWRM	
12	T Mar 24	Application V: Hydrology II		CWRM	
	W Mar 25	Application VI: Human		CWRM	
13	T Mar 31	Application overflow			
	W Apr 1	Exam structure, Review topics of your choice			Review

CWFM = Canadian Wildland Fire Model (Prometheus)

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.

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: http://geography.uvic.ca/
GEOGPLAN planning guide: http://www.geog.uvic.ca/moodle/ [*Login as a guest*]
Undergraduate Advisor: Dr. Phil Wakefield (pwakef@geog.uvic.ca)
Graduate Advisor: Dr. Reuben Rose-Redwood (redwood@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 Resource Centre for Students with a Disability (RCSD) as soon as possible. The RCSD staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations http://rcsd.uvic.ca/. *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.