

University of Victoria - Department of Geography

COURSE DESCRIPTION – Fall 2015

**GEOG272: Introduction to Climatology and Hydrology**

**Instructor:** Dr. David Atkinson [datkinso@uvic.ca](mailto:datkinso@uvic.ca) 250-721-7332 office

**Office hours:** T,W 2:30 – 3:30 (my office: David Turpin Bldg. B120)

**Lectures:** T, W 12:30 – 13:20 (CRN: 11801) Coronet Bldg. A121

**Labs:** W 8:30 – 10:20 (B01) – SSM/David Turpin Bldg. B303 (CRN: 11802)

W 16:30 – 18:20 (B02) – SSM/David Turpin Bldg. B303 (CRN: 11803)

Th 14:30 – 16:20 (B03) – SSM/David Turpin Bldg. B303 (CRN: 11804)

F 8:30 – 10:20 (B04) – SSM/David Turpin Bldg. B303 (CRN: 11805)

**Lab instructors:** Weixun (Wayne) Lu (W2,Th), Norman Shippee (W1,F)

**Introduction:**

Weather, climate, and the movement of water have important impacts on our lives and activities. The weather is an ever-present factor in Canadian lives, and extreme events can have catastrophic consequences the effects of which are felt for years after the disaster. Periodic severe flooding in the Prairies, powerful storms of the North Pacific, the Gulf of Mexico hurricanes in 2005, and the climate anomalies associated with El Niño are prime examples of these impacts. The climate of a region determines, in part, the types of vegetation present, the nature of the soils and landforms, potential agricultural activity, the form of our cities, and simply how we live our lives. As well as being influenced by it, human activities can influence the atmosphere – I think we are all aware of climate change at some level. The flow of the atmosphere and ocean over the earth's surface means that events in one part of the globe can have consequences far from the source; think of concerns with emissions from the Fukushima Daiichi Power Station crossing the Pacific after the 2011 earthquake.

This course is a general introduction to climatology and hydrology, with an emphasis on the essential controls of weather and climate, broad patterns and dynamics of the global climate, basic hydrology with a focus on its expression in weather, elements of basic meteorology including an overview of online weather services, a detailed consideration of atmospheric moisture, and an introduction to groundwater and fluvial hydrology. *There is a mandatory text.* Readings from the text 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 climate, weather, and the flow of water necessary to:

- a) improve your day-to-day lives, including learning how to more fully utilizing the products made available from the forecast centers of Environment Canada and the US National Weather Service, and
- b) allow you to be a more effective citizen by fully engaging in and appreciating the global environmental change debate.

**Specific Objectives:**

1. Describe the vertical structure, composition, and broad patterns of the earth's atmosphere and climate system and account for these patterns in terms of thermodynamics and geographic controls.
2. Explore how to apply the laws of physics to analyze this system, and study the methodology of modern climatology.
3. Examine methods to gather and analyze climatic data, including improving your use of spreadsheet software.
4. Learn how to use Canadian and US federal weather forecast products.
5. Learn about the role of water in the atmosphere and begin exploration of how water moves in the ground and over land, setting the stage for more detailed work in hydrology.
6. This course has a laboratory component that will emphasize essential physical and chemical concepts as they relate to consideration of atmospheric phenomena using methods of direct physical experimentation. We will also conduct some analyses of climate data during the lab sessions, to introduce ideas of data reduction and data set description, both fundamental practices in atmospheric sciences of any stripe.

**General Course Subjects:**

1. Atmospheric composition
2. Radiation pathways, energy balance
3. Atmospheric pressure and motion
4. Air masses, fronts
5. Vertical thermodynamic structure
6. Water in the atmosphere, clouds
7. Storms
8. Fluvial hydrology, flood return frequency analysis
9. Groundwater hydrology

**Textbooks:**

The textbook for this course is:

**Ross, Sheila. 2013. *Weather and Climate*. Oxford University Press. 510p**

There are several potential texts that could be used for this course; I picked this particular book because of the availability of additional material and the effort they have put into making the material accessible. This is a new book by a Canadian author that focuses explicitly on the Canadian context, unlike other texts. Also – it is a fair bit less expensive than other offerings I have used in the past. There is no one textbook that covers climate and hydrology together. This book gives us most of what we need, however, and additional reading material on terrestrial aspects of hydrology will be assigned as needed.

I strongly urge you to read the text for supplemental material. Lectures are designed to follow the layout of the text. We will cover a lot of the material in the book and some lab material will be drawn

from the question sections in the text. On the Moodle page I will list all upcoming sections to read. I have also suggested chapter review questions to look at. Again, these are not taken up.

**\*\*Note\*\*** I will draw upon these questions when it comes time to preparing the mid-term and the final exams, so make use of them.

**Computer use:** In the laboratories, we will be doing a number of 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. Your lab instructor is your first point of contact for the labs. The labs will give you practice in using standard software for the analysis of climatic data and in making observations to build and support ideas about how things work. 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.

**Moodle:** This course is hosted on the UVic Moodle system. <http://moodle.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 ahead of classes for which they are required.

In addition, there are many sites on the Internet with satellite images, current maps and other data and information. I will post some links on the webpage that you can explore. You may want to find these and study the weather during this semester. You will notice that your appreciation and understanding of the maps will greatly increase over the course of the semester.

**Evaluation:** The course grade will be based on the following:

		Date (or date due)	Weight	Subject
1	Quizzes	Listed below	15 %	Up to previous quiz (~1-2 wks)
2	Mid-Term Test	Listed below	15 %	First term, lecture only
4	Final Exam	Will be posted	30 %	First + second term, lecture only
5	Labs	Detailed breakdown to follow	40 %	Varied

**Exam and quizzes:**

We will have 7 quizzes, each based on the lecture sections *and readings* up to the previous quiz. Quizzes will be administered at the beginning of the class on the date indicated and will consist of 10 multiple-choice questions each. Each quiz will be 15 minutes in duration. Quizzes are weighted at 2.5 % each, with the lowest quiz score automatically being dropped. There is one mid-term test. The final exam will be comprehensive but weighted 2:1 on the second half of the term. Final will be 3 hours in duration. Further details will be discussed in class.

### Tentative course outline

Exam dates and due dates for assignments are fixed, but the subject matter we cover depends on many factors, and may vary.

Wk	Date	UNIT	Lecture Subject (with chapter from Ross – not all of every chapter)	Exam
1	T Sep 8	<b>Meteorology</b>	Course intro, questionnaire (ch 1 – general overview)	
	W Sep 9		Atmospheric Science family of disciplines; Atm composition, history	
2	T Sep 15		Atm vertical structure, basic weather (ch 2)	
	W Sep 16		Atmospheric behavior (ch 3)	Quiz 1
3	T Sep 22		Energy, heat, thermodynamics (ch 4)	
	W Sep 23		Global temperature+radiation , local annual, diurnal patterns (ch 5)	
4	T Sep 29		Energy balance (ch 6)	Quiz 2
	W Sep 30		Energy balance (ch 6)	
5	T Oct 6		Wind (ch 11)	
	W Oct 7		Global atm. circulation, major wind systems, westerlies, jets (ch 12)	Quiz 3
6	T Oct 13		Air masses, fronts (ch 13)	
	W Oct 14		<b>Mid term exam</b>	<b>Test</b>
7	T Oct 20		<b>Hydrology</b>	Moisture – hydrological cycle, saturation, evap, measurement (ch 7)
	W Oct 21	Hydrostatic stability, thermodynamic diagram (ch 8)		
8	T Oct 27	Hydrostatic stability, thermodynamic diagram (ch 8)		Quiz 4
	W Oct 28	Clouds, Fog (ch 9)		
9	T Nov 3	Precipitation (ch 10)		
	W Nov 4	Oceans, currents		Quiz 5
10	T Nov 10	Reading Break		
	W Nov 11	Reading Break		
11	T Nov 17	River Flow		
	W Nov 18	Groundwater flow		
12	T Nov 24	Flood event return frequency analysis		Quiz 6
	W Nov 25	Storms – atm dynamics + moisture – ETC (ch 14)		
13	T Dec 1	Tropical features – hurricanes; ENSO and “teleconnectivity” (ch 16)		Quiz 7
	W Dec 2	Canadian, US Weather service web pages and tools (ch 15)		

**Undergraduate Grading\*\***

<i>Passing Grades</i>	<i>Description</i>
A+ A A-	<b>Exceptional, outstanding and excellent</b> 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-	<b>Very good, good and solid</b> 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	<b>Satisfactory, or minimally satisfactory.</b> These grades indicate a satisfactory performance and knowledge of the subject matter.
D	<b>Marginal</b> Performance. A student receiving this grade demonstrated a superficial grasp of the subject matter.
COM	<b>Complete</b> (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 2015-2016 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](mailto:pwakef@geog.uvic.ca))

**Graduate Advisor:** Dr. Ian Walker ([ijwalker@uvic.ca](mailto:ijwalker@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.*

**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.