

University of Victoria - Department of Geography

COURSE DESCRIPTION – Fall 2014

GEOG272: Introduction to Climatology and Hydrology

Instructor: Dr. David Atkinson datkinso@uvic.ca 250-721-7332 office

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

Lectures: T, W 12:30 – 13:20 SSM/David Turpin Bldg. A102

Labs: W 8:30 – 10:20 (A01) – SSM/David Turpin Bldg. B303 (CRN: 11745)

W 16:30 – 18:20 (A02) – SSM/David Turpin Bldg. B307 (CRN: 11746)

Th 14:30 – 16:20 (A03) – SSM/David Turpin Bldg. B311 (CRN: 11747)

F 8:30 – 10:20 (A04) – SSM/David Turpin Bldg. B307 (CRN: 11748)

Lab instructors: Norman Shippee, Chris Krasowski

Introduction:

Weather, climate, and the movement of water in its cycle have important impacts on our lives and activities. The weather influences our daily activities 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. Hydrological concerns likewise touch us all – the Prairie rivers that gain some of their flow from diminishing Rockies glaciers, or the water shortages the east side of Van Isle can experience, such as 2012 and 2014. As well as being influenced by it, human activities can influence the atmosphere and hydrosphere – I think we are all aware of the climate change debate at some level, and consider hydro megaprojects. The flow of the atmosphere over the earth's surface means that climatic events in one part of the globe can have consequences far from the source; think of acid lakes in southern Quebec.

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 and its relationship to 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. Important aspects of modern climatology and hydrology include the study of global teleconnections, application of principles of dynamics and thermodynamics to the study of the global climate, an understanding of the importance of the interaction between the upper and lower atmosphere, and the analysis of extreme events and river flood stages.

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 analyze climatic data, including improving your use of a spreadsheet.
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. Water in the atmosphere, clouds
4. Vertical thermodynamic structure
5. Atmospheric pressure and motion
6. Air masses, fronts
7. Storms
8. Groundwater hydrology
9. Fluvial hydrology, flood return frequency analysis

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 I have used in previous years. There is no one textbook that covers climate and hydrology together in the detail that we need. This book gives us most of what we need, however, and additional reading material on terrestrial aspects of hydrology will be assigned as needed. You might be able to find used copies of this book.

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. Not everything you read in the text is explicitly touched on in the course. It is designed as supplement and support.

****BUT**** Note that I will draw upon the chapter review 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. The labs will give you practice in using standard software for the analysis of climatic data and in using technical equipment to make field observations to build and support ideas about physical processes affecting energy and moisture flow. 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.

CourseSpace: This course is hosted on the UVic CourseSpaces system (called Moodle previously). <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 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. Only 6 quiz marks are counted; the lowest quiz mark is automatically dropped, no questions asked. There is one mid-term test. **The final exam will be comprehensive**; it will be 3 hours in duration. Further details will be discussed in class. The requirements for the labs will be presented in the lab handout.

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 2	Meteorology	No Class		
	W Sep 3		Course intro, questionnaire (ch 1 – general overview)		
2	T Sep 9		Atmospheric Science family of disciplines; Atm composition, history		
	W Sep 10		Atm vertical structure, basic weather (ch 2)		
3	T Sep 16		Atmospheric behavior (ch 3)	Quiz 1	
	W Sep 17		Energy, heat, thermodynamics (ch 4)		
4	T Sep 23		Global temperature+radiation , local annual, diurnal patterns (ch 5)		
	W Sep 24		Energy balance (ch 6)	Quiz 2	
5	T Sep 30		Energy balance (ch 6)		
	W Oct 1		Wind (ch 11)		
6	T Oct 7		Global atm. circulation, major wind systems, westerlies, jets (ch 12)	Quiz 3	
	W Oct 8		Air masses, fronts (ch 13)		
7	T Oct 14		Hydrology	Mid term exam	Test
	W Oct 15			Moisture – hydrological cycle, saturation, evap, measurement (ch 7)	
8	T Oct 21			Hydrostatic stability, thermodynamic diagram (ch 8)	
	W Oct 22			Clouds, Fog (ch 9)	Quiz 4
9	T Oct 28	Precipitation (ch 10)			
	W Oct 29	Oceans, currents			
10	T Nov 4	River flow		Quiz 5	
	W Nov 5	Groundwater flow			
11	T Nov 11				
	W Nov 12	Reading Break – No Class			
12	T Nov 18	Flood event return frequency analysis		Quiz 6	
	W Nov 19	Storms – atm dynamics + moisture – ETC (ch 14)			
13	T Nov 25	Storms – atm dynamics + moisture – Meso-scale (ch 14)			
	W Nov 26	Tropical features – hurricanes; ENSO and “teleconnectivity” (ch 16)			
14	T Dec 2	Canadian, US Weather service web pages and tools (ch 15)	Quiz 7		
	W Dec 3	Exam structure, Review topics of your choice			

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	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. Ian Walker (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.