

University of Victoria - Department of Geography

COURSE DESCRIPTION – Fall 2018

**GEOG272: Introduction to Climatology and Hydrology**

**Instructor:** Dr. Johannes Feddema [feddema@uvic.ca](mailto:feddema@uvic.ca) Tel: 250-721-7325

**Office hours:** T 14:00 – 15:00 (David Turpin Bldg. B203c)

**Lectures:** T, W 12:30 – 13:20 (CRN: 11800) David Turpin Building A102

**Labs:**

W	8:30 – 10:20	(B01) – David Turpin Bldg. B307 (CRN: 11801) - Chris Krasowski
W	16:30 – 18:20	(B02) – David Turpin Bldg. B307 (CRN: 11802) - Chris Krasowski
Th	14:30 – 16:20	(B03) – David Turpin Bldg. B307 (CRN: 11803) - Adam Gabro
F	12:30 – 14:20	(B04) – David Turpin Bldg. B307 (CRN: 11804) - Bennit Mueller

**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 2017, and the climate anomalies associated with El Niño and the PDO 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, fires in BC and all of western North America and their downwind impacts.

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:

- Provide you with the background information to better understand the structure and energy and water processes in the atmosphere – potentially in preparation for further study
- 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
- 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 and general handling of numbers.
4. Learn about more advanced 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 in later courses.
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
10. Climate Change

**Textbook and Readings:**

The textbook for this course is:

**Sheila Loudon Ross. 2013. *Weather and Climate: an Introduction*. Oxford University Press. 510p, ISBN 978-0-19-544587-9**

This is a Canadian edition, so it has some more examples from closer to home. I will post materials on Course Spaces as needed to provide supplemental readings. 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 in class and lab from the text. Readings and other information will be listed on the CourseSpaces page to help ensure you understand relevant materials. This syllabus and course outline also lists suggested chapter readings for each section of the course.

**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. **Labs are not designed to march in step with lecture material – they are their own course component.**

**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 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 %	Lecture materials (Meteorology)
3	Participation	N/A	5%	Throughout the course
4	Final Exam	Will be posted	30 %	Lecture materials (all)
5	Labs	Detailed breakdown to follow in sections	35 %	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. 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 and it will contain some elements from your labs. 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	Exam
1	T Sep 5		No Class	
	W Sep 6	Meteorology	Course intro	
2	T Sep 11		Atm composition, history (Ch1&2 )	
	W Sep 12		Atm vertical structure, basic weather (Ch3)	
3	T Sep 18		Energy, Radiation (Ch4&5)	Quiz 1
	W Sep 19		Solar constant, earth-sun geometry (Ch 5&6)	
4	T Sep 25		Energy balance, radiation/temperature (Ch 5&6)	
	W Sep 26		Global temperature, local annual, diurnal patterns (Ch 6)	Quiz 2
5	T Oct 2		Pressure (Ch 7)	
	W Oct 3		Wind (Ch 11, 12)	
6	T Oct 9		Global atmospheric circulation, major wind systems, westerlies, jets (Ch 12)	Quiz 3
	W Oct 10	Air masses, fronts (Ch 13)		
7	T Oct 16	Hydrology	Moisture – hydrological cycle, saturation, evap, measurement (Ch 7)	
	W Oct 17		Clouds, Fog (Ch 8&9) & review	Quiz 4
8	T Oct 23		<b>Midterm exam</b>	<b>Test</b>
	W Oct 24		Hydrostatic stability, thermodynamic diagram (Ch 8&9)	
9	T Oct 30		Precipitation (Ch 10)	
	W Oct 31		Hydrology: Drainage area, time of concentration (CourseSpaces readings)	
10	T Nov 6		Hydrology: rainfall, hydrograph (CourseSpaces readings)	Quiz 5
	W Nov 7		Hydrology: hydrograph, subbasin flow, routing (CourseSpaces readings)	
11	T Nov 13		Reading Break – No Class	
	W Nov 14		Reading Break – No Class	
12	T Nov 20	Storms (ch 14)		
	W Nov 21	Canadian, US Weather service web pages and tools	Quiz 6	
13	T Nov 27	Global climates (Ch 16)		
	W Nov 28	Climate Change (Ch 17)		
13	T Dec 4	Climate forecasting (Ch 17)	Quiz 7	
	W Dec 5	Exam structure, Review topics of your choice		

**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))

**Other considerations:****PLAGIARISM**

Academic dishonesty (plagiarism, cheating) is a very serious matter in any academic institution and is dealt with severely at the University of Victoria. *The responsibility of the institution:* Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage through cheating on essays, exams, and projects. *The responsibility of the student:* Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor.

Infractions will be dealt with in accordance with University policy. Commonly, the penalty for any form of cheating/plagiarism is a grade of F on the tests or laboratory assignments, or a final grade of F in the course. However, depending on the severity of the case other penalties may include a record on the student's transcript or expulsion.

Please familiarize yourself with the University policy on academic integrity found in the Undergraduate Calendar at the following website. Please contact me if you have any questions.

**UVIC plagiarism policy:** <http://www.uvic.ca/learningandteaching/students/resources/expectations/>

**Policy on Academic Integrity:** <http://web.uvic.ca/calendar2015-01/FACS/UnIn/UARe/PoAcI.html>

### **Accessibility**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a documented 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.

### **Positivity and Safety**

The University of Victoria is committed to promoting, providing and protecting a positive and safe learning and working environment for all its members. To ensure that all class members feel welcomed and equally able to contribute to class discussions, we will all endeavour to be respectful in our language, our examples, and the manner in which we conduct our discussions and group work. If you have any concerns about the climate of the class, please contact me

### **Course Experience Survey (CES)**

We 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.