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**COURSE OUTLINE**  
**Dynamics of the Cryosphere**

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**Lecture: Clearihue (CLE) C113, Tuesdays 2:30pm to 5:20pm**

**Office Hours: Wednesdays 13:00-14:00 or by appointment**

**Office Location: DTB B122**

**Contact: randy@uvic.ca**

**We acknowledge and respect the ləkʷəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.**

**COURSE DESCRIPTION**

Snow and ice dominate the Canadian landscape. There is virtually no area in Canada which escapes the influence of snow and ice. We skate on frozen ponds, ski down snow laden mountains, drive through snow blizzards and watch how ice jams in rivers cause rivers to swell and floods to occur. The duration and the thickness of snow and ice increase rapidly northwards, and glaciers are found in mountainous areas and in large parts of the Arctic region. Given that snow and ice impact heavily on the Canadian way of life, this course seeks to understand the dynamics of snow and ice in physical, climatological, and hydrological contexts. This course will examine snow properties, snow cover distribution, glacier hydrology, melt runoff, and ice in its many forms (lake ice, river ice, sea ice, and ground ice). The application of remote sensing and other remote observing systems to understanding the cryosphere will be examined. This course will also examine the implications of climate change on the cryosphere in Canada and beyond.

**KEY THEMES:**

- Components of the cryosphere
- State of the cryosphere and climate change
- Material properties of water, ice, and snow
- Energy exchanges
- Snow, freshwater ice, and water availability
- Glaciers and Ice Sheets
- Melt runoff and floods
- Sea ice
- Permafrost
- Climate interactions and climate change

There will also be 2-3 guest speakers at different points throughout the term. They will provide unique and interesting perspectives on cryosphere research, with linkages to industry applications where applicable.

## RECOMMENDED TEXT(S)

None. Readings will be provided.

## EVALUATION

Exercises (3 at 10% each)	30%
Project Proposal	5%
Topic Review Paper	15%
Project Update (oral and written)	10%
Final Project Presentation	5%
Final Project Report	35%

## EXERCISES

Three *hands-on* exercises will be given during the course. Further details, including evaluation criteria, will be provided in the class.

## TOPIC REVIEW PAPER

Each student is required to conduct a critical review of one peer-reviewed, published, journal article that addresses some aspect of the cryosphere (e.g. techniques or applications). The review will comprise a written component, assessing the article within the context of the literature. It will also comprise a presentation component, where the critical review is presented to the class and followed by a discussion led by the reviewer. You are encouraged to use Power Point or other preferred media to communicate your review and lead your discussion. Students should consider choosing a journal article and related references which align with their chosen (or anticipated) term project topics. Further details and evaluation criteria will be provided in class.

## TERM PROJECT

A group term project (3-4 people) will address an interesting aspect of the cryosphere. Groups are expected to develop a proposal in early in the term, and to design a scientific experiment which spans the length of the term. Students will have to consider logistical constraints, available data, software and manpower in the design of the project. Guidance and feedback will be provided by the course instructor.

The choice of your topic for your project is up to you and your group but a **one page proposal from each group is due by email on September 30, 2024**. The final class meeting will be used for term project presentations, to be given in a conference style format. The final term project report is due after the last day of classes for the term.

Required format, evaluation criteria, and suggested topics will be provided in class.

Sample topics, from which focused projects may be derived, will also be discussed in class.

## GRADING SYSTEM

As per the Academic Calendar:

Grade	Grade point value	Grade scale	Description
<b>A+</b> <b>A</b> <b>A-</b>	9 8 7	90-100% 85-89% 80-84%	<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>B</b> <b>B-</b>	6 5 4	77-79% 73-76% 70-72%	<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.
<b>C+</b> <b>C</b>	3 2	65-69% 60-64%	<b>Satisfactory, or minimally satisfactory.</b> These grades indicate a satisfactory performance and knowledge of the subject matter.
<b>D</b>	1	50-59%	<b>Marginal</b> Performance. A student receiving this grade demonstrated a superficial grasp of the subject matter.
<b>F</b>	0	0-49%	<b>Unsatisfactory</b> performance. Wrote final examination and completed course requirements; no supplemental.
<b>N</b>	0	0-49%	Did not write examination or complete course requirements by the end of term or session; no supplemental.

## GEOGRAPHY DEPARTMENT INFO

- Geography Department website: [uvic.ca/socialsciences/geography/](http://uvic.ca/socialsciences/geography/)
- Geography Department Chair: [geogchair@uvic.ca](mailto:geogchair@uvic.ca)
- Geography Undergraduate Advising: [geogadvising@uvic.ca](mailto:geogadvising@uvic.ca)

## BRIGHTSPACE

Lectures materials, assigned readings, and general course communications will be via Brightspace. You are required to come prepared for each lecture. This means you should have read and considered the recommended readings.

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## POLICY ON LATE ASSIGNMENTS

Late lab assignments are subject to significant penalties: Late lab assignments are subject to significant penalties: 5% for each 12 hour period following the due date and time. Exceptions are not permitted except for circumstances involving medical or compassionate reasons. Written verification as proof may be requested at the discretion of the instructor.

## ACADEMIC INTEGRITY

It is every student's responsibility to be aware of the university's policies on academic integrity, including policies on **cheating, plagiarism, unauthorized use of an editor, multiple submission, and aiding others to cheat.**

**Policy on Academic Integrity:** [web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html](http://web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html)

If you have any questions or doubts, talk to me, your course instructor. For more information, see [uvic.ca/learningandteaching/cac/index.php](http://uvic.ca/learningandteaching/cac/index.php).

The instructor reserves the right to use plagiarism detection software programs to detect plagiarism in written assignments.

## **ACCESSIBILITY**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a documented disability or health consideration that may require accommodations, please feel free to approach me and/or the Centre for Accessible Learning (CAL) as soon as possible ([uvic.ca/services/cal/](http://uvic.ca/services/cal/)). The CAL staff is available by appointment to assess specific needs, provide referrals, and arrange appropriate accommodations. 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.

## **SEXUALIZED VIOLENCE PREVENTION AND RESPONSE AT UVIC**

If you have been directly or indirectly impacted by sexualized violence, reach out to the SVRO for information, advice, resolution options (restorative and disciplinary) as well as support options and referrals. The SVRO is both survivor-centred and trauma-informed in their approach.

[eghr01@uvic.ca](mailto:eghr01@uvic.ca)  
Sedgewick C Wing  
[www.uvic.ca/svp](http://www.uvic.ca/svp)

## **EQUITY AND HUMAN RIGHTS (EQHR)**

UVic Equity and Human Rights is a resource for students, staff and faculty who have experienced discrimination and harassment and are looking for informal and formal resolution options as well as advice, coaching and/or education. We are available for confidential consultations so that you can ask questions and learn your options.

[eghr01@uvic.ca](mailto:eghr01@uvic.ca)  
Sedgewick C Wing  
[www.uvic.ca/equity](http://www.uvic.ca/equity)

## **RESOURCES FOR INTERNATIONAL STUDENTS**

The University of Victoria offers a number of resources to support international students as they pursue their studies. UVic's [International Centre for Students](#) is the primary office supporting international students on campus at the university-wide level and provides various supportive program through the [UVic Global Community Initiative](#), including a Mentorship Program and Conversation Partner Program. For academic advising-related questions, students in the Geography Department are also encouraged to meet with the Geography Undergraduate Advisor ([geogadvising@uvic.ca](mailto:geogadvising@uvic.ca)) as well as an academic advisor in the [Academic Advising Centre](#) early in their studies to help map out a plan to declare a major and

complete university program requirements. Other resources include the [Centre for Academic Communication](#) and the [Math and Stats Assistance Centre](#). International students are also encouraged to contact the International Student Liaison in Geography (Prof. CindyAnn Rose-Redwood, [cindyann@uvic.ca](mailto:cindyann@uvic.ca)), who can assist in making connections with other international and domestic students in the Geography Department and share opportunities for getting involved in departmental activities more broadly.

### **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 online 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.

### **WEEKLY CALENDAR**

<b>WEEK</b>	<b>CLASS DATES</b>	<b>Lecture Information [other information]</b>
<b>1</b>	<b>T 10 Sep</b>	<b>Course Introduction, Topic 1</b>
<b>2</b>	<b>T 17 Sep</b>	<b>Topic 2, Group Project scoping, Hands-on exercise work</b>
<b>3</b>	<b>T 24 Sep</b>	<b>Topic 3, Group Project Proposal work, Hands-on exercise work</b>
<b>4</b>	<b>T 01 Oct</b>	<b>Topic 3, Group Project work, Hands-on exercise work</b>
<b>5</b>	<b>T 08 Oct</b>	<b>Topic 4, Group Project work, Hands-on exercise work</b>
<b>6</b>	<b>T 15 Oct</b>	<b>Topic Review Paper discussion</b>
<b>7</b>	<b>T 22 Oct</b>	<b>Topic 4, Group Project Work, Hands-on exercise work</b>
<b>8</b>	<b>T 29 Oct</b>	<b>Topic 5, Group Project updates [Last day for withdrawing from first term courses without penalty of failure]</b>
<b>9</b>	<b>T 05 Nov</b>	<b>Group Project work, Hands-on exercise work</b>
<b>10</b>	<b>T 12 Nov</b>	<b>No class – reading break</b>
<b>11</b>	<b>T 19 Nov</b>	<b>Topic 6, Group Project work, Hands-on exercise work</b>
<b>12</b>	<b>T 26 Nov</b>	<b>Group Project work</b>
<b>13</b>	<b>T 03 Dec</b>	<b>Project Presentations</b>

### **DISCLAIMER**

The above schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances.

### **NOTE:**

A note to remind you to take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not

alone.

Counselling Services - *Counselling Services can help you make the most of your university experience. They offer free professional, confidential, inclusive support to currently registered UVic students.* [uvic.ca/services/counselling/](http://uvic.ca/services/counselling/)

Health Services - *University Health Services (UHS) provides a full service primary health clinic for students, and coordinates healthy student and campus initiatives.* [uvic.ca/services/health/](http://uvic.ca/services/health/)

Centre for Accessible Learning - *The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations* [uvic.ca/services/cal/](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.*

Elders' Voices - *The Office of Indigenous Academic and Community Engagement (IACE) has the privilege of assembling a group of Elders from local communities to guide students, staff, faculty and administration in Indigenous ways of knowing and being.* [uvic.ca/services/indigenous/students/programming/elders/index.php](http://uvic.ca/services/indigenous/students/programming/elders/index.php)