

UNIVERSITY OF WYOMING

GEOL 4888, 3 credits, **Glaciology and the Cryosphere**

Spring Term      8:10 am - 9:25 am      TR      Earth Sciences Building 1038

**Instructor contact information:** Neil Humphrey, Rm 320 Geology, the best way of contacting me is by email, [neil@uwyo.edu](mailto:neil@uwyo.edu)

**Office hours and/or open door policy:** You can set up an appointment, if I am available, any time in the afternoons. I try to be in my office for drop-ins tues 11-12am or wed 2-4pm, but it is best to make an appointment.

**Course prerequisites,** a first course in calculus and in physics such as MATH 2205, PHYS 1210 (1310) is required or permission of the instructor.

**Course Description:** Dynamics of frozen water. Covers behavior of ice masses, in the form of glaciers or ice-sheets, and geomorphic aspects of glacial erosion and deposition. Includes forcing and feedbacks between cryosphere and global climate. We will briefly touch on the broader Cryosphere, particularly as related to permafrost and sea-ice.

**Student Learning Outcomes:** The course will improve the students' knowledge of the following topics (in approximately this order):

- Water and the ice/water phase transition
- Mono- and poly-crystalline ice, including aspects of the strength and rheology of ice
- (a digression on the aspects of stress and strain that are used in Glaciology)
- Formation of ice from snowfall
- Introduction to glaciers and ice deformation, straining and crevassing
- Ice sliding and internal deformation
- Ice sheets, Antarctica and Greenland, and continental glaciations
- Mountain glaciers, and snow and ice in the mountains
- Glacier hydrology and basal sliding
- Glacial erosion
- Landscape evolution under glaciers, glacial landforms
- Ice cores and climate change, past and present.
- Coupling between the Cryosphere and Climate

If we have time there are several other topics I want to discuss:

- Rock glaciers
- Periglacial processes, permafrost
- Glacial modeling

Other topics that could be covered could include:

- Sea ice, particularly ice/climate interactions
- River ice, both from its effect on sediment transport and its effect on Hydrology
- Snow processes, avalanching and hydrology
- Geophysical methods in Glaciology (Radar, Seismic, GPR etc.)
- Ice in the solar system

The actual content of this course will depend heavily on the interests of the students.

**Required texts, readings, and special tools or materials:** This is a lecture course and your notes will be a prime source and reference. However I do recommend a text which is very good:

**Recommended text:** Physics of Glaciers, Cuffey and Paterson, 4th edition. This lists for \$200 (which is why I didn't order thru the bookstore!), you can get it online for about \$80, or ebook for about ½ that. It is so expensive, that I will put 2 copies on reserve in the Geology Library. Make sure you get the 4th edition, although the 3rd edition will have most of the readings.

There will be a lot of readings from this book, so if you can get your own copy that would be best. Any other readings I will put on reserve in the library.

**General requirements and expectations for the course:** Since the course rests heavily on in-class notes, attendance is required. I reserve the right to reduce your grade by 1 grade for every 2 un-excused absences.

**Required examinations, assignments, activities, and projects.** There will be a midterm, a final and a term paper. I may ask you to present your paper to the class on the last day of class, but we can discuss this possibility as a group in class. I will also give you about 5 homework assignments, most during the first ½ of the term

**Final Examination or Final Project Date:** Set by the Office of the Registrar, you can look it up on-line.

**Grading Scale and Grading Policies:** The grade for this course will be based mainly on a final, midterm, a final paper and a few homework sets (each of these 4 items worth approx. 30%,20%,30%,20%). Late homeworks will be accepted until I hand out the marked returns as long as you ask me!

**Attendance and Absence policies.** As noted above, attendance is required unless excused. Note University policies on excused absences as outlined in UW Regulation 2-108 (Student Attendance Policy).

**Classroom Behavior Policy:** At all times, treat your presence in the classroom and your enrollment in this course as you would a job. Act professionally, arrive on time, pay attention, complete your work in a timely and professional manner, and treat all deadlines seriously. You will be respectful towards you classmates and instructor. Spirited debate and disagreement are to be expected in any classroom and all views will be heard fully, but at all times we will behave civilly and with respect towards one another. Personal attacks, offensive language, name-calling, and dismissive gestures are not warranted in a learning atmosphere. As the instructor, I have the right to dismiss you from the classroom, study sessions, electronic forums, and other areas where disruptive behavior occurs.

Electronic devices such as mobile phones should be (left at home, set to silent, turned off). Laptops are allowed for note-taking purposes as long as there is no audible key-click noise. No video or audio recording during class is allowed to protect the privacy of your fellow students."

**Classroom Statement on Diversity:** "The University of Wyoming values an educational environment that is diverse, equitable, and inclusive. The diversity that students and faculty bring to class, including age, country of origin, culture, disability, economic class, ethnicity, gender identity, immigration status,

linguistic, political affiliation, race, religion, sexual orientation, veteran status, worldview, and other social and cultural diversity is valued, respected, and considered a resource for learning. “

**Disability Support:** The University of Wyoming is committed to providing equitable access to learning opportunities for all students. If you have a disability, including but not limited to physical, learning, sensory or psychological disabilities, and would like to request accommodations in this course due to your disability, , please register with and provide documentation of your disability as soon as possible to Disability Support Services (DSS), Room 128 Knight Hall. You may also contact DSS at (307) 766-3073 or [udss@uwyo.edu](mailto:udss@uwyo.edu). It is in the student’s best interest to request accommodations within the first week of classes, understanding that accommodations are not retroactive. Visit the DSS website for more information at: [www.uwyo.edu/udss](http://www.uwyo.edu/udss)

**Academic Dishonesty Policies:** Academic dishonesty will not be tolerated in this class. Cases of academic dishonesty will be treated in accordance with UW Regulation 2-114. The penalties for academic dishonesty can include, at my discretion, an “F” on an exam, an “F” on the class component exercise, and/or an “F” in the entire course. Academic dishonesty means anything that represents someone else’s ideas as your own without attribution. It is intellectual theft – stealing - and includes (but is not limited to) unapproved assistance on examinations, plagiarism (use of any amount of another person’s writings, blog posts, publications, and other materials without attributing that material to that person with citations), or fabrication of referenced information. Facilitation of another person’s academic dishonesty is also considered academic dishonesty and will be treated identically.

**Duty to Report:** UW faculty are committed to supporting students and upholding the University’s non-discrimination policy. Under Title IX, discrimination based upon sex and gender is prohibited. If you experience an incident of sex- or gender-based discrimination, we encourage you to report it. While you may talk to a faculty member, understand that as a "Responsible Employee" of the University, the faculty member MUST report information you share about the incident to the university’s Title IX Coordinator (you may choose whether you or anyone involved is identified by name). If you would like to speak with someone who may be able to afford you privacy or confidentiality, there are people who can meet with you. Faculty can help direct you or you may find info about UW policy and resources at <http://www.uwyo.edu/reportit>

You do not have to go through the experience alone. Assistance and resources are available, and you are not required to make a formal complaint or participate in an investigation to access them.

Substantive changes to syllabus: All deadlines, requirements, and course structure is subject to change if deemed necessary by the instructor. Students will be notified verbally in class, on our WyoCourses page announcement, and via email of these changes. This syllabus is a guide. Circumstances may alter the reading and/or test schedules. You are required to check WyoCourses and your email at least once a week.

#### **Student Resources:**

Example: CAMPUS RESOURCES

DISABILITY SUPPORT SERVICES: [udss@uwyo.edu](mailto:udss@uwyo.edu), 766-3073, 128 Knight Hall, [www.uwyo.edu/udss](http://www.uwyo.edu/udss)

COUNSELING CENTER: [uccstaff@uwyo.edu](mailto:uccstaff@uwyo.edu), 766-2187, 766-8989 (After hours), 341 Knight Hall, [www.uwyo.edu/ucc](http://www.uwyo.edu/ucc)

ACADEMIC AFFAIRS: 766-4286, 312 Old Main, [www.uwyo.edu/acadaffairs](http://www.uwyo.edu/acadaffairs)

DEAN OF STUDENTS OFFICE: [dos@uwyo.edu](mailto:dos@uwyo.edu), 766-3296, 128 Knight Hall, [www.uwyo.edu/dos](http://www.uwyo.edu/dos)

UW POLICE DEPARTMENT: [uwpd@uwyo.edu](mailto:uwpd@uwyo.edu), 766-5179, 1426 E Flint St, [www.uwyo.edu/uwpd](http://www.uwyo.edu/uwpd)

STUDENT CODE OF CONDUCT WEBSITE: [www.uwyo.edu/dos/conduct](http://www.uwyo.edu/dos/conduct)