

**EARTH AND SPACE SCIENCES**

**Autumn 2015**

**431 PRINCIPLES OF GLACIOLOGY**

4 Credits, SLN 14562

**505 THE CRYOSPHERE**

4 Credits, SLN 14577

M-W-F, 1:30 - 2:50 pm. **Room:** JHN 022

Mon.-Wed.: Lectures, Fri: Lab/Discussion

**Class web page:** <http://courses.washington.edu/ess431/>

**Instructors:** Christianson, Conway, Hallet, Koutnik, Light, Poinar, Roe, Waddington

**Coordinating Instructor:**

Ed Waddington

Room 715 ATG Building

edw at uw.edu

(206) 543-4585

**ESS 505 Instructor**

Knut Christianson

Room 218 ATG Building

knut at uw.edu

**T.A.**

David Lilien

dal22 at uw.edu

**Office Hours:** Ed, Knut – drop in, or by arrangement David – TBD based on student schedules.

This course is taught by a group of UW faculty and senior grad students who all have active research interests in *Glaciology*, defined in a broad sense as *ice in the environment*. The course covers ice in clouds, frozen ground and permafrost, seasonal snow, sea ice, and glaciers and polar ice sheets. Instructors relate the various forms of ice to other processes such as climate change, avalanches, and landform evolution. The course achieves the advanced standards expected of a 400 level course by challenging students to critically understand concepts such as conservation laws and how to deduce behaviors of macroscopic systems from knowledge of microscopic properties, rather than by introducing advanced mathematical or physical complexity.

The **format** of this course is two 80-minute lectures each week, and a Lab/Discussion section on Fridays, at which instructors and your TA may elaborate on lecture materials, invite discussion, and/or assign problems to solve in class to enhance lecture materials.

- Homework problems will be assigned approximately weekly, based on lecture material. You are encouraged to work together on solving the problems, but you are also expected to write and turn on your own answers. In addition to carrying out and showing calculations, you will be expected to describe in prose the procedures that you are following. For ideas on writing answers effectively, please see the notes on the class web site, at [http://courses.washington.edu/ess431/Notes/writing\\_a\\_test.pdf](http://courses.washington.edu/ess431/Notes/writing_a_test.pdf)  
Your answers to your homework will be graded.
- There will be reading assignments before each class, and a short set of questions based on that reading, with your answers due before the class starts. These answers will be C/NC.
- There will be a mid-term test in class on November 3, and a final exam 2:30-4:20 on December 9.
- ESS 505 Graduate students in the ESS 505 section also complete an independent term project culminating in a written paper.

**Text:** *The Cryosphere* by S.J. Marshall  
**Optional books:** *Glacial Geologic Processes* by D.J. Drewry  
*Physics of Glaciers* by K. Cuffey and W.S.B. Paterson  
*Glaciers of North America* by S. Ferguson  
*Avalanche Handbook* by D. McClung & P. Schaerer

**Grades in ESS 431** will be based on

- (a) problems assigned by instructors during the quarter (25% of total grade)
- (b) a mid-term exam (30%)
- (c) a final exam (30%)
- (d) class participation, including questions on reading assignments (15%)

**Grades in ESS 505** will be based on

- (a) problems assigned by instructors during the quarter (25% of total grade)
- (b) a mid-term exam (25%)
- (c) a final exam (25%)
- (d) a term paper (10%)
- (e) class participation, including questions on reading assignments (15%)

The exams will include questions written by the instructor team.

The 431 course is designed for seniors with some math and science background, such as Physics 121/122. It should be well-suited for ESS Majors who have fulfilled their physics requirements, and for Atmospheric Sciences students pursuing the Climate track.

Other undergraduates can do well in the class if they are comfortable with basic physics ideas such as heat conduction, vapor pressure, and forces. Please talk with me if you do not have the PHYS 121/122 prerequisites.

Graduate students take ESS505 because of an interest in ice in their research, or to fulfill the breadth requirement in the ESS graduate program.

For all students, this course is a way to discover the range of UW faculty research interests in Glaciology.

We plan a field trip to Easton Glacier on Mt. Baker on Saturday October 10. There will be a writing assignment associated with the field trip. If you are unable to go on the trip, it will be possible to do an alternative assignment; however, if you can possibly go on the field trip, this should be your preferred option.

### **Disability-Related Needs**

To request academic accommodations due to a disability, please contact Disability Resources for Students (DRS)

011 Mary Gates Hall

[uwdrs@uw.edu](mailto:uwdrs@uw.edu)

206-543-8924 (Voice), 206-543-8925 (TTY), 206-616-8379 (FAX).

If you have a letter from DRS, please present the letter to the coordinating instructor so that he can discuss with you the accommodations that you might need in this class.

### **Plagiarism and academic misconduct**

At the university level, submitting scholarly work created by others as your own work without proper attribution is considered to be academic misconduct. This can include written text, graphics or images, exam answers, or even ideas. Plagiarism, cheating, and other forms of misconduct are serious violations of the University of Washington Student Code (WAC 478-120). You are expected to know and follow the UW policies on cheating and plagiarism. For more information, please see the College of the Environment Academic Misconduct Policy.

<http://coenv.washington.edu/intranet/academics/academic-policies/academic-misconduct/>

### **Other courses about ice and glaciers**

If you feel that you are not ready to take ESS 431, but you have an interest in glaciers and ice, you can also consider two other courses:

#### **ESS 203, Glaciers and Global Change**

Instructor: Ed Waddington, Earth and Space Sciences.

This course is designed for students without a science background who are interested in glaciers, how glaciers flow, how they advance and retreat as climate changes, and how information about past climates is recorded within the layers of polar glaciers and ice sheets.

ESS203 qualifies as a *Natural World* (NW) course, and as an *Individuals and Society* (I&S) course, with optional *Writing credit* (W).

#### **ESS 302, Great Ice Age**

Instructor: Terry Swanson, Earth and Space Sciences

This course is designed for students with at least one basic geology class in their background. It focuses on geological changes and the continental-scale ice sheets associated with the Pleistocene Ice Ages of the past two million years. ESS302 is also a *Natural World* (NW) course.