Introduction to Glacier Dynamics

Spring – Summer, 2007

Instructor: **Cornelis (Kees) J. van der Veen**

Office: **203 Lindley Hall (University of Kansas)**

Phone: **(785) 864-7725**

E-mail **cjvdv@ku.edu**

General Course Description and Objectives

The objective of this course is to provide students with the skills necessary to develop theoretical and numerical models for glacier flow, and to use observations to study glacier dynamics. Emphasis will be on a quantitative approach to glacier dynamics.

For KU and other universities on the semester system (16 weeks), this class counts for 3 credit hours; for universities on the quarter system (10 weeks), this class counts for 5 credit hours.

Prerequisites

Introductory Algebra and some familiarity with Partial Differential Equations; experience with computer programming (preferably Fortran or Matlab) is considered a plus.

Course format

This class will be offered through videoconferencing to the University of Stockholm and to CReSIS partner institutions. Lectures on Tuesday and Thursday from 9:00 to 11:00 am. (Central Daylight Savings Time) in the Mercury Room, Nichols Hall, University of Kansas. *Note the somewhat irregular meeting dates in the schedule below.* Lectures start on April 10 and will run through June 14, 2007. A week-long wrap-up session will be held at the University of Stockholm, June 25-29, 2007. A similar wrap-up for U.S. students (KU and partner institutions) will be organized in early August, 2007. In addition to attending the lectures and completing homework assignments, participating students are expected to complete assignments and prepare a final presentation and paper on a topic of their choice.

Textbook (required)

Van der Veen, C.J.: *Fundamentals of Glacier Dynamics*. Rotterdam: A.A. Balkema, 462 pp, 1999.

Since this textbook appears to be out of print, the instructor will try to provide students with this text in some form or another.

In addition, pertinent papers from the literature will be assigned for reading and class discussion.

Tentative schedule ***NOTE: May 2 and May 16 are Wednesdays***

Date	*Topic*	*Reading*
April 10	Ice deformation (1)	2.1-2.4
April 12	Ice deformation (2)	2.5-2.8
April 17	Mechanics of glacier flow (1)	3.1-3.3
April 19	Mechanics of glacier flow (2)	3.4, 3.7, 5.7-5.8
April 24	Basal sliding	4.1-4.8
April 26	Modeling glacier flow (1)	5.1-5.3
May 2	Modeling glacier flow (2)	5.4-5.6
May 3	Equilibrium profiles of glaciers	6.1-6.4
May 8	Glacier thermodynamics	7.1-7.4
May 10	Numerical ice-sheet models (1)	8.1-8.3
May 15	Numerical ice-sheet models (2)	8.6-8.8
May 16	Large-scale dynamics of ice sheets (1)	9.1-9.4
June 5	Mountain glaciers	10.2-10.3, 10.5
June 7	The Greenland Ice Sheet	11.1-11.4
June 12	The Antarctic Ice Sheet	12.1-12.4
June 14	TBD	
June 25 – June 29	*University of Stockholm – wrap up* (student presentations, completion of assigned projects, etc.)	

Final grade

Assigned projects:	60%
Student presentation and paper:	30%
Class participation and homework:	10%

Assigned projects

The objective of the assigned projects is to provide students the opportunity to apply the material covered in class to actual research questions. Details of these projects will be discussed and finalized in class, but possibilities include determining temporal changes in the stress field of the lower portion of Jakobshavn Isbræ prior to and following break-up of its floating tongue, or calculating the cross-sectional stress and velocity fields in the subglacial trench under Jakobshavn. While students will be turning their results in on an individual basis, collaborations during these assignments are encouraged.

Individual student projects

Each participating student is expected to prepare a presentation (~20 minutes) and summary paper (10-15 pages) on a topic selected by the student (related to the course material). This may consists of a literature review, or a small research project carried out by the student.

The obligatory fine print:

HANDICAPPED STUDENTS: The staff of Services for Students With Disabilities (SSD), 135 Strong, 785-864-2620 (v/tty), coordinates accommodations and services for KU courses. If you have a disability for which you may request accommodation in KU classes and have not contacted them, please do so as soon as possible. Please also see me privately in regard to this course.

INTELLECTUAL PROPERTY: Course materials prepared by the instructor, together with the content of all lectures and review sessions presented by the instructor are the property of the instructor. Video and audio recording of lectures and review sessions without the consent of the instructor is prohibited. On request, the instructor will usually grant permission for students to audio tape lectures, on the condition that these audio tapes are only used as a study aid by the individual making the recording. Unless explicit permission is obtained from the instructor, recordings of lectures and review sessions may not be modified and must not be transferred or transmitted to any other person, whether or not that individual is enrolled in the course.

CHEATING: Cheating in any manner will not be tolerated. Note that cheating includes handing in for credit work that is not your own. Any student discovered cheating will be given an F for the course and a letter explaining that the grade was given for academic misconduct will be sent to the student's school or college.