Atm. S. 101 Spring 2003

Weather

This course will help you understand our weather (especially here in the Pacific Northwest), forecasting, the physics of the atmosphere, climate (including El Niño/La Niña), and human impacts on the atmosphere. The emphasis will be on understanding how and why things happen, rather than on memorizing formulas or terms.

WWW page: **http://www.atmos.washington.edu/2003Q2/101/**

Instructor:

Prof. Chris Bretherton

Office: 710 ATG, (Atmospheric Science-Geophysics Building, 7th floor)

Office hours: Friday 9:30-10:20

Phone: 685-7414

Teaching Assistants

Steve Hudson (hudson@atmos.washington.edu)

Linda Steinberger (llou@atmos.washington.edu)

Chris Woods (woods@atmos.washington.edu)

TA Office: 420 ATG (Atmospheric Science-Geophysics Building, 4th floor)

Office hours: Monday 1:30-3:00 (Hudson)
Tuesday 3:30-5:00 (Woods)
Wednesday 3:30-5:00 (Steinberger)

TA Office Phone: 543-6627 (only during office hours; come in person for priority treatment).

Schedule:

Lectures: 10:30-11:20 MTuWTh, Bagley 131.

(Weather discussions will be held in the last part of class every Mo and Th.)

Quiz Sections:

AA	Fr 10:30-11:20	BLM 204	Hudson
AB	Fr 10:30-11:20	MGH 228	Steinberger
AC	Fr 10:30-11:20	MGH 234	Woods
AD	Fr 1:30-2:20	MGH 389	Hudson
AE	Th 11:30-12:20	MGH 389	Woods
AF	Th 1:30-2:20	MGH 242	Steinberger
AG	Th 2:30-3:20	LOW 102	Steinberger

Required Text (available at the University Bookstore)

Essentials of Meteorology (EOM), 3rd Ed. by C. Donald Ahrens (2001, Brooks-Cole Publishing Company)

You are expected to do the assigned readings in the syllabus, and materials from the readings are fair game for homeworks and exams.

Class overheads are downloadable from class web page as color pdf files with degraded image quality (to keep file size reasonable).

Exams will be a mixture of multiple choice and short answer and closed book. For each exam, you may bring a single sheet (both sides) of handwritten notes to help you. The final exam will cover the entire course.

Students who cannot attend an exam must make arrangements for a makeup with TAs or Prof. Bretherton at least one week prior to the scheduled examination date. Exam dates are:

Midterm 1:	Thursday 24 Apr
Midterm 2:	Thursday 22 May
Final Exam	Monday 9 Jun, 8:30-10:20

Homework will be handed out and posted on the class web page on Thursdays, due at quiz section the next week. A student may hand in one late homework assignment during the quarter without penalty. After that, late homework will count 25% off. No late homework will be accepted after the Tuesday lecture following the due date. The previous week's graded homework will be handed out at the quiz sections; solutions will be posted on the class web page. Your lowest homework score will be dropped. Homeworks will typically consist of five questions. Three of the homework problems will be selected at random by the TA's and each will be graded on a scale of 0-5.

Forecast contest: We will hold an easy, fun, web-based forecasting contest for the next day's high temperature starting mid-quarter. Details will be posted on the class web page. Participation will count for half of your contest score, skill for the other half.

Quiz Sections led by TAs will complement the lectures. They may include a laboratory demonstration or worksheet, and also provide you an opportunity for informal discussion of the lecture material and of graded homework assignments. **Attendance will be taken at quiz sections** and counts for 5% of the overall course grade. Full attendance credit will be given if at most one quiz section is missed.

Grading is on a curve, with a mean of 3.0, and combines effort, participation, and achievement:

Quiz section attendance	5%
Homework	25%
Midterm I	20%
Midterm II	20%
Forecast contest	5%
Final Exam	25%

Other Worthwhile Reading for Understanding Our Weather (on reserve in Odegaard)

Jack Williams, 1992: *The Weather Book*, Random House.

Jeff Renner, 1992: *Northwest Mountain Weather*, The Mountaineers.

Atm Sci 101 Syllabus, Spring 2003

#	Date	Lecture Topic	Reading from EOM	
1	Mar 31	Composition and structure of our atmosphere	Ch 1,	pp. 1-12
2	Apr 1	Weather vs. climate, temperature		pp. 13-23
3	2	Heat transfer and radiation	Ch 2,	pp. 25-34
4	3	The greenhouse effect. Climate of Seattle area.		pp. 34-42
5	7	The seasons. Global temperature variations		pp. 42-51
6	8	Air masses. Daily temperature variations	pp. 53-73, 197-208	
7	9	Air pressure, adiabatic expansion, lapse rate	31, 110-113, 139-144	
8	10	Pressure gradient force. Pressure maps.	Ch 6	pp. 145-149
9	14	Coriolis effect and geostrophic balance	Ch 6	pp. 150-163
10	15	Local circulations I: turbulence, wind shear, mtn waves	Ch 7	pp. 165-168
11	16	Local circulations II: thermal circulations		pp. 168-178
12	17	Formation of jet streams; the general circulation		pp. 178-187
13	21	Winds and ocean currents, El Nino		pp. 187-195
14	22	Year-to-year wintertime variability in midlatitudes		
15	23	Extratropical cyclones and fronts	Ch 8,	pp. 208-217
	24	MIDTERM 1 (closed book and note-thru 17 Apr lecture)		
16	28	Upper atmospheric cyclone structure		pp. 218-225
17	29	Humidity	Ch 4,	pp. 75-85
18	30	Condensation and fog		pp. 86-92
19	May 1	Types of cloud (+ 30 min cloud slide show)		pp. 93-107
20	5	Conditional instability and cumulus clouds	Ch 5,	pp. 109-118
21	6	Formation of rain and snow		pp. 115-125
22	7	Other types of precipitation, cloud seeding, radar		pp. 126-135
23	8	Precipitation patterns, floods, droughts	pp. 341-345, 395	
24	12	How are weather forecasts made?	Ch 9	pp. 227-243
25	13	Forecast error and predictability of weather		
26	14	Thunderstorms and thunderstorm systems	Ch 10,	pp. 253-257
27	15	Cloud electrification, lightning and thunder (+ 35 min video)		pp. 267-272
28	19	Severe thunderstorms and tornadoes (+ 30 min video)		pp. 273-287
29	20	Hurricanes and tropical cyclones I (+ 20 min video)	Ch 11	pp. 289-297
30	21	Hurricanes and tropical cyclones II		pp. 298-311
	22	MIDTERM 2 (closed book and note-thru 15 May lecture)		
	26	NO CLASS - Memorial Day		
31	27	Sky color, mirages	Ch 15,	pp. 399-410
32	28	Rainbows, halos, coronas		pp. 411-420
33	29	Air pollution	Ch 12,	pp. 313-337
34	June 2	Ozone hole	Ch 12,	pp. 321-324
35	3	Paleoclimate and climate variability	Ch 13,	pp. 371-387
36	4	Manmade climate change		pp. 387-397
37	5	Likely impacts of greenhouse warming in Pacific NW		
	June 9	FINAL EXAM, 8:30-10:20, Bagley 113		