ATM 101X: Weather and Climate of Alaska
Spring 2010

Instructor:
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Office hours: Tues/Thurs TBA
And by appointment
Graduate Assistant:
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Akasofu 338 Q Tel: 474-5430 email: jtalbot@gi.alaska.edu

Lectures: Tuesday and Thursday 02:00P – 03:30P Reichardt 203
Labs: #45140 Tuesday 06:30P–09:30P Reichardt 242/101

ATM 101X 4 Credits
Weather and Climate of Alaska
Focus on the Alaska atmosphere as an important part of our environment. Includes fundamental laws of physics and chemistry, the behavior of atmospheres on rotating planets, clouds, precipitation and weather systems. Includes societal impacts of weather worldwide and investigations into global climate change. (Prerequisite: High school level mathematics.) (3+3) Offered Spring

Weather and climate have important impacts on our lives and activities. The weather influences our daily activities, a fact that is not lost on those of us living in Alaska, and extreme events can have catastrophic consequences whose effects are felt for years after the disaster. The severe storm in the Bering and Chukchi Seas in October 2004, Hurricane Mitch in central America in 1998, Hurricane Katrina in Louisiana in 2005, and the climate anomalies associated with El Niño are prime examples of these impacts.

The climate of a region determines, in part, the types of vegetation present, the nature of the soils and landforms, potential agricultural activity, the form of our cities, and simply how we live our lives. Human activities can influence the atmosphere, as well as being influenced by it. The flow of the atmosphere over the earth's surface means that climatic events in one part of the globe can have consequences far from the source. This global connectivity is a major theme of the course.

In class we will use the phenomena we see in our daily lives (e.g., variation of temperature over the day and the seasons) as a foundation for understanding the whole atmosphere and how it might evolve.
A student who successfully completes ATM101 should acquire;
1. an understanding of and familiarity with the fundamental scientific principles that underlie the behavior of the atmosphere
2. an understanding of and familiarity with the framework in which science explains weather and climate and how research on weather and climate is conducted
3. an understanding of and familiarity with the ways in which weather and climate research address contemporary societal questions and how this research is used in the development of public policy.
4. an understanding of and familiarity with the characteristics of weather and climate of Alaska and how that compares and contrasts with global weather processes.

Objectives:
1. Describe the geography of the earth's atmosphere (e.g., How does temperature vary with location and season on the earth?).
2. Explore the behavior of the atmosphere using underlying scientific principles (e.g., Why do clouds form in the afternoon on sunny days?).
3. Explore how the atmosphere is observed (e.g., What instruments and techniques are used to record the conditions in the atmosphere).
4. Study of methods to analyze data (e.g., What records does the weather service keep, and how can we interpret them?).
5. Examine some of the controls on the weather and climate of Alaska (e.g., What is the effect of the Alaska Range on the climate of interior Alaska?)
6. Explore essential physical and chemical concepts as they relate to atmospheric phenomena in a hands-on fashion.
7. Conduct analyses of scientific data during the lab sessions, to introduce ideas of data reduction and data set description.

General Course Topics:
1. The composition and geography of the atmosphere
2. Behavior of gases
3. Energy and heat in the atmosphere
4. Water, moisture and clouds in the atmosphere
5. Observing the atmosphere
6. Winds
7. Air masses, fronts, and weather systems
8. Climate and climate change

and
9. Topics of student interest.

Textbook and reading:
The class text is,
I will assign readings from the text each week and I will expect you to complete them. The course will generally follow these readings, and you should keep up with them. I strongly urge you to read the text for supplemental material. More specific topics, such as microclimates or tornados, will not be covered due to simple lack of time. More advanced treatments of various major theoretical aspects visited in this course are provided in a series of fourth year courses offered by the Atmospheric Sciences department. I will make supplementary materials available as they are needed either as handouts or on reserve at the library.

Clearly we can not cover all possible materials in one semester. In the second half of the semester I will ask you as a class to pick some specific topics that you would like to see covered so that we can focus on topics of your interest.

A new book “The Climate of Alaska” by Martha Shulski and Gerd Wendler has just been published by the University of Alaska Press. It provides a great introduction and overview to the geography and climate of our state. It costs about $20 and is available at bookstores in town.

Grading:
Grades will be assigned on a +/- scale;
A+, A-, B+, B-, C+, C-, D+, D-, F.

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<tr>
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<th>Area</th>
<th>Weight</th>
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<tbody>
<tr>
<td>1</td>
<td>Quizzes</td>
<td>15 %</td>
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<tr>
<td>2</td>
<td>Test 1</td>
<td>15 %</td>
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<tr>
<td>3</td>
<td>Test 2</td>
<td>15 %</td>
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<tr>
<td>4</td>
<td>Final Exam</td>
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<td>5</td>
<td>Labs</td>
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<td>6</td>
<td>Participation</td>
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<tr>
<td>7</td>
<td>Assignment</td>
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Attendance:
Class attendance is mandatory (see catalog). Material not in the text may be introduced at random intervals and weekly quizzes (see below) are part of your grade. If you miss a class, extra copies of handouts are available in a tray outside the instructor's office.

Exam, tests, and quizzes:
We will have 12 quizzes. Each quiz is based on the previous week’s lecture sections, assigned reading, and suggested problems. Quizzes will be administered at the beginning of the class on Tuesdays and will consist of 10 multiple-choice questions each. Each quiz will be 15 minutes in duration. The first quiz will take place is a practice quiz. The lowest quiz is
dropped from your grade. One or two supplemental quizzes may be assigned as requested. There are two tests during the semester. The final exam will be comprehensive; it will be two hours in duration (10:15 am – 12:15 am May 7). Further details will be discussed in class. To study for the quizzes, tests, and final exam, you have available resources from the lectures, labs, and reserve material. There is overlap among these, but some topics are covered only in one or the other of these sections.

**Laboratories:**
We will have 10 laboratories. The labs are an essential part of the course and attendance is required. The requirements for the labs will be presented in the lab handout. All lab reports must be neatly typed and figures must be clearly and correctly presented. Reports are due at the beginning of the lab period on the due date. Late reports will not be accepted. Preparing reports is a major skill needed in today's job market. Analysis and presentation of data is a necessary skill in all fields. Labs reports are due at the beginning of the following weeks’ lab sections. The lowest lab is dropped from your grade.

**Assignment:**
There will be an extra credit assignment worth 5% toward the end of the semester. The assignment offers you the opportunity to demonstrate analytical skills for extra credit and improve your grade.

**Participation:**
Participation is graded on the basis of the body of work handed in by each student. For each piece of work missing 0.5% will be deducted up to a total of 10 pieces of work.

**Computer Use:**
We will be doing a number of exercises using the computers in the laboratory. The lab computers require a UAF login to the “LABS” domain. Please visit the Office of Information Technology (OIT, [http://www.alaska.edu/oit/](http://www.alaska.edu/oit/)) helpdesk in the Rasmuson Student Access Lab. In lab for data processing we will use a spreadsheet (Excel or OpenOffice is acceptable). The computer lab is located in Room 101 Reichardt (The Noyes Laboratory).

**Internet and Blackboard:**
I will maintain a Blackboard site for the class [http://classes.uaf.edu/](http://classes.uaf.edu/). I will use Blackboard to keep a current class schedule, make announcement, post solutions, and discussion of class materials. There are many sites on the Internet with satellite images, current maps and other data and information. You may want to find these and study the weather during this semester. A great place to start exploring is the National Weather Service (NWS) website for Alaska [http://www.arh.noaa.gov/](http://www.arh.noaa.gov/). The site has forecasts for a variety of users (see links on left of NWS page including the general public, [http://pafc.arh.noaa.gov/pubfcst.php](http://pafc.arh.noaa.gov/pubfcst.php) (Fairbanks is in Zone 222). The TV weather page at [http://pafc.arh.noaa.gov/tvwx.php](http://pafc.arh.noaa.gov/tvwx.php) is a great place to get an overview of the weather in the state.

**Students with Disabilities:**
The instructor will work with the UAF Center for Health and Counseling’s Disability Services Program ([http://www.uaf.edu/chc/disability.html](http://www.uaf.edu/chc/disability.html)) to accommodate students with disabilities.
## Course Outline and Schedule

Changes to the schedule will be announced in class, so please attend regularly.

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<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture Subject</th>
<th>Exam</th>
<th>Lab</th>
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<tbody>
<tr>
<td>1</td>
<td>T Jan 19</td>
<td>First Class: Introduction</td>
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<td>T Jan 21</td>
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<td>2</td>
<td>T Jan 26</td>
<td>Overview of the Atmosphere</td>
<td>Quiz 1*</td>
<td>Lab 1</td>
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<td></td>
<td>R Jan 28</td>
<td>Behavior of Gases from Lab 1</td>
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<td>3</td>
<td>T Feb 2</td>
<td>Energy – Temperature and Heat</td>
<td>Quiz 2</td>
<td>Lab 2</td>
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<td></td>
<td>R Feb 4</td>
<td>Climate questions from Lab 2</td>
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<td>4</td>
<td>T Feb 9</td>
<td>Energy – Light and Radiation</td>
<td>Quiz 3</td>
<td>Lab 3</td>
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<td></td>
<td>R Feb 11</td>
<td>Temperature – Seasonal and Daily Cycles</td>
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<td>5</td>
<td>T Feb 16</td>
<td>Temperature - Controls on Temperature</td>
<td>Quiz 4</td>
<td>Lab 4</td>
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<td></td>
<td>R Feb 18</td>
<td>Temperature - Measurements</td>
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<td>6</td>
<td>T Feb 23</td>
<td>Water in the Atmosphere - Basics</td>
<td>Quiz 5</td>
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<td>R Feb 25</td>
<td>Test 1</td>
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<td>7</td>
<td>T Mar 2</td>
<td>Water in the Atmosphere – Condensation and Clouds</td>
<td>Quiz 6</td>
<td>Lab 5</td>
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<td></td>
<td>R Mar 4</td>
<td>Atmospheric Stability – Vertical Movement of Air</td>
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<td></td>
<td>T Mar 9</td>
<td>Spring Break</td>
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<td>R Mar 11</td>
<td>Spring Break</td>
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<td>8</td>
<td>T Mar 16</td>
<td>Atmospheric Stability – Cloud Formation</td>
<td>Quiz 7</td>
<td>Lab 6</td>
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<td></td>
<td>R Mar 18</td>
<td>Water in the Atmosphere - Precipitation</td>
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<td>9</td>
<td>T Mar 23</td>
<td>Winds – Air Pressure and Temperature</td>
<td>Quiz 8</td>
<td>Lab 7</td>
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<td>R Mar 25</td>
<td>Winds 2 – Local Systems</td>
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<td>10</td>
<td>T Mar 30</td>
<td>Winds 3 – Global Systems</td>
<td>Quiz 9</td>
<td>Lab 8</td>
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<td>R Apr 1</td>
<td>Air Masses and Fronts</td>
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<td>11</td>
<td>T Apr 6</td>
<td>Weather Forecasting</td>
<td>Quiz 10</td>
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<td>R Apr 8</td>
<td>Test 2</td>
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<td>12</td>
<td>T Apr 13</td>
<td>Weather Forecasting – Guest Speaker</td>
<td>Test 2</td>
<td>Lab 9</td>
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<td>R Apr 15</td>
<td>Climate - Introduction</td>
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<td>T Apr 20</td>
<td>Climate - Alaska - Guest Speaker</td>
<td>Quiz 11</td>
<td>Lab 10</td>
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<td>R Apr 22</td>
<td>Climate – Climate Change – Guest Speaker</td>
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<td>14</td>
<td>T Apr 27</td>
<td>Student Selected Topics</td>
<td>Quiz 12</td>
<td>Assignment</td>
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<td>R Apr 29</td>
<td>Student Selected Topics</td>
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<td>15</td>
<td>T May 4</td>
<td>Student Selected Topics</td>
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<td></td>
<td>R May 6</td>
<td>Student Selected Topics</td>
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<td>16</td>
<td>T May 11</td>
<td>Final Exam 10:15 a.m. - 12:15 p.m.</td>
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ATM101
Important Dates Spring Semester 2010:

Late registration and fee payment end (last day to add classes)  
Friday, Jan 29

Last day for 100% refund of tuition and fees  
Friday, Jan 29

Last day for student-initiated and faculty-initiated drops (course does not appear on academic record)  
Friday, Feb. 5

Last day for 50% refund of tuition (tuition only, no fees refunded)  
Friday, Feb. 5

Last day to apply for spring 2010 graduation  
Monday, Feb. 15

Freshman progress reports due  
Friday, Feb. 26

Spring Break (no classes)  
Monday-Friday, Mar. 8-12

University offices closed  
Friday, Mar. 12

Last day for student-initiated & faculty-initiated withdrawals (W grade appears on academic record)  
Friday, Mar. 26

FINAL EXAM 10:15 am-12:15 pm  
THURSDAY, MAY 11

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