Syllabus: EART 121 *The Atmosphere* Winter 2015

Instructor: Patrick Chuang

Office	Earth and Marine Sciences, A254
Email	pchuang@ucsc.edu
Phone	831.459.1501
Office hours	Mon 11.30 to 13.30h

TA: Mikael Witte

Office	Earth and Marine Sciences, C348
Email	mkwitte@ucsc.edu
Office hours	Thurs, 2:30 PM to 4:30 PM

Course Information

Class Website: available at eCommons

Class Meeting Times: MWF 14.00 to 15.10 in Earth and Marine Sciences Room D250

Discussion Section: Tues 10.00 to 11.00, also in Earth and Marine Sciences Room D250

Section Policy: Attendance in the section is mandatory. If you miss more than one without a valid reason, you will lose 1% off your final grade per section missed.

Supplemental material: Will be provided through the course website. I will provide the supplementary material as required. Unless otherwise noted, all handouts are to be considered part of the core material.

Missed Classes: If you miss a class, you should get the notes from a fellow student. My own notes just wouldn't make any sense to you.

Exams: Midterm exam will be scheduled at a later date. The final exam is set by UCSC policy for Thurs Mar 19 from 08.00h to 11.00h.

Course Outline

In this course, we will learn about the atmospheric phenomena that are important to our everyday lives – clouds, precipitation, storms, hurricanes, lightning, tornadoes, ozone hole, greenhouse effect, air pollution – now and in the future. To do so, we will first examine some of the more fundamental concepts that are common among many of these phenomena, such as atmospheric moisture, temperature, winds, and sunlight, after which we will examine elements of weather and climate. Topics to be covered include:

- Basics of the atmosphere and the sun

- Greenhouse effect, carbon cycle, aerosol effects on climate, climate change
- Water, clouds, and precipitation
- Winds, atmospheric circulation and weather patterns
- Air masses, fronts, and cyclones
- Severe weather: tornadoes, hurricanes, lightning, and thunder
- Atmospheric chemistry, stratospheric ozone depletion, urban air pollution

Evaluation

** Homework: 40% ** Midterm quiz: 20% ** Final exam: 40% **

Homework sets: These will be comprised mainly of quantitative problems. There will be approximately 8 problem sets during the quarter. **Homework sets will be due at 5 PM on Fridays**. Unless previous arrangements are made, homework sets turned in by 5 PM on Monday are worth 50%; homework sets will not be accepted after that. You can hand them in to me during class or in the box outside my office. **Late homeworks must be handed to me directly**.

Exams: Exams will be made up of short answer questions (approx. 2/3 of points) and quantitative questions (approx. 1/3 of points). A list of potential short answer questions will be provided ahead of time.

Extra credit: ** There will be no extra credit offered to any individuals. No exceptions. ** I may give out extra credit work, but if I do, it will be available to all students in the class.

Grades

Grading will not necessarily be "on a curve." There is no expectation of what the average grade should be, nor what the grade distribution should look like. If everyone were to demonstrate outstanding understanding of all the material, then everyone deserves a grade of A (and I would be very happy to give each one of them)! I therefore encourage you to discuss the course material with each other to get the most out of the class.

I will ***guarantee*** the following letter grades: if you get a 90% or above, you will get an A or better; 80% = B or better; 70% = C or better. The scale could slide downwards, e.g.. an A is actually 86% or better, but what I am saying is that it won't slide upwards.

Historical grades: Historically in this class, the minimum grade for an A is somewhere between 83 to 88%; for a B is about 70 to 75%; for a C is about 45 to 50%. These are simply guidelines, however, and these are always subject to change.

Adjustment of letter grade: One can receive an upward adjustment of letter grade for a number of reasons (e.g. very strong improvement during the quarter, notable participation during class, exceptional effort). In almost all cases such an adjustment will be one letter grade fraction (e.g. B to B+), except under very exceptional cases, when two letter grade fractions will be awarded. Under no circumstances will a reduction in letter grade be given, and these adjustments are made after the normal grades are assigned and therefore affect no one else's letter grade.

Course Tenets

(1) There is no required course textbook. I haven't yet found a good textbook for this course. There are lots of texts that cover this material in the Science and Engineering Library. I also have a bunch of textbooks that you can look at in my office that you can actually borrow for short stretches - just drop by.

(2) University is about learning skills. Learning facts to accompany these skills is also necessary, but not the most important part. To learn facts, you can go to the library and read a book. It would be easier and a lot cheaper. A university-level course is both harder and more expensive because learning skills is much more challenging. However, learning a new skill also requires significant effort from the student, and this is your responsibility in this course – to make the most of this opportunity by investing the time, energy, and most importantly, thought, necessary to master something new.

(3) You will use calculus. I have found that EART 121 students generally have a good handle on how to solve problems that require algebra. However, you have all taken (and passed) calculus but many of you haven't really found much use for it. We will try to exercise these skills in this class.

Problem Set Tenets

Be sure to check out the Ten Commandments for doing the problem sets.

1. Work together! Many studies show that working in small groups is one of the best ways to learn. Note the verb "working", which connotes being actively involved in the process. Sitting around watching your friends work isn't the same thing!

Note: While working together on homeworks is strongly encouraged, **verbatim copying of one person's homework by another is NOT appropriate**. Thus, word answers should be written *in your own words* even if the conceptual idea is the same as somebody else's. We realize that for quantitative problems, working together may lead to identical solutions, but you should do your best to make sure each person is contributing and understands the solution. You might also notice that there's probably no way to enforce this. However, students who don't learn to do these problems on the homeworks (each homework is worth about 5% of your overall grade) will be at a strong disadvantage on the midterm and final exams, where some portion of the grade (roughly one-third) will be solving quantitative problems, which translates to about 20% of your overall grade. Thus, the time to learn the quantitative concepts is on the problem sets, not right before the final exam!

2. Think physically. Sometimes it's easy to get lost in the mechanics of the math, but you should always have in mind that you are solving a physical problem. This is especially important when you solve a problem – make sure that this solution makes sense to you given what you know about the world around you.