CALIFORNIA STATE UNIVERSITY, LONG BEACH

Geography 130-01 and -02, Introduction to Climatology

Spring 2010, MW 11 a.m. - 12:15 p.m. (lecture), F 11 a.m. - 12:40 p.m. (laboratory)

Instructor Information:

Instructor: Dr. Christine M. Rodrigue
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Course Description:

Introduction to Earth's atmosphere, weather processes, global climate patterns, drivers of climate change and their interactions with the biotic and abiotic environment. Analysis of how human activities affect weather and climate processes and the patterns of global climate impacts. (3 hours lecture, demonstration activity, 2 hours laboratory and field activity)

Course Objectives:

- After successful completion of this course, you will have achieved the following:
- Developed understanding of the scientific method and practiced its application
- Become familiar with geographers' world view, including an ability to analyze spatial data, a focus on Planet Earth as the home of humanity, a sensitivity to the human-environment interaction, and a tendency to integrate information on a regional basis
- Develop your proficiency in scientific communication skills, including effective map construction, graph and table design, written summaries of your analyses and results, and oral presentation of your analyses and results
- Develop your competence in applying quantitative reasoning skills to the analysis of meteorological, climatological, and ecocynamic systems. This will include application of basic arithmetic and algebra, use of basic statistical concepts, the recognition of common mathematical structures in weather and climate data, formulating testable hypotheses, testing them, and drawing logical conclusions from their results.
- Develop basic understanding of weather, climate, climate change, and ecodynamic responses to climate change. Some of the things you will be able to do include:
    - Describe the composition and structure of Earth's atmosphere
    - Explain how heat and water flow within the Earth system
    - Interpret everyday and extreme weather events
    - Understand the difference between weather and climate
    - Be able to describe and explain the distribution of different climate types and associated vegetation types around the world
    - Understand the climate history of the earth, how it has been reconstructed by science, and what drives long-term climate change
    - Understand scientific concern about global warming and the human rôle in climate heating, as well as uncertainties in predicting its magnitude and effects
    - Understand how these uncertainties are used in policy debates about managing human contributions to global warming
    - Be familiar with how remote sensing, GIS, and several different palæoclimate proxies are used to collect data about our changing climate and ecodynamic responses to it

Required Course Materials:

- Anderson and Strahler. 2008. *Visualizing Weather and Climate.* Wiley.
- Henson. 2008. *The Rough Guide to Climate Change: The Symptoms, the Science, the Solutions,* 2nd ed. Rough Guides.
- **An e-mail account** (a CSULB account is free to you and you can access it conveniently at http://webmail.csulb.edu, but you can set up MyCSULB to redirect e-mail sent to that account over to another account you read more regularly)
- **Access to the Internet** (whether from home or on campus), so that you can check your e-mail and the course homepage (http://www.csulb.edu/~rodrigue/geog130/) regularly (the page is accessible through BeachBoard, too.

Recommended materials:

- Lobban and Schefter. 1992. *Successful Lab Reports: A Manual for Science Students.* Cambridge University Press.
- Math.com: The World of Math Online. All sorts of resources available at http://www.math.com.
- McCaskill. 2008. *Grammar, Punctuation, and Capitalization: A Handbook for Technical Writers and Editors.* NASA Langley Research Center. Available at: http://www.sti.nasa.gov/sp7084/contents.html.

Outline of Topics:

Physical meteorology basics (Anderson and Strahler: Ch. 1-4)

- Earth in space, electromagnetic spectrum, solar radiation, and Earth radiation
- Vertical structure of pressure, temperature, atmospheric chemistry, and ionization
- Gas laws, hydrostatic equation, water phase diagram, stability and instability
- Thermodynamics, adiabatic processes, lapse rates, molecular and turbulent diffusion, surface-atmosphere interactions, clouds, fogs, precipitation

Dynamical meteorology basics (Anderson and Strahler: Ch. 5-10, 15)

- Potential and kinetic energy, momentum, vorticity, conservation laws
- Forces on air in motion
- Waves: Rossby and frontal
- Synoptic, mesoscale, and local meteorology basics
- Reading surface and upper air charts
- Pressure variations: cyclones and anticyclones
- Air mass and front analysis
- Storm types by latitude:
- Weather processes, patterns, and forecasting
- Mesoscale and local scale systems (monsoonal and local circulation systems)

Climatology (Anderson and Strahler: Ch. 11-12)

- Distinction between weather and climate and understanding of scale
- Global energy budget
- General circulation systems and models
- Ocean circulation systems, sea surface temperatures, and continentality
- Climate classification

Ecodynamics (Bonan article, Lenihan article)

- Vegetation systems as indicators of climate and microclimatic conditions
- Biosphere-atmosphere interactions: gas exchanges, heat flux, water transfers

- Phenology, land cover change, invasive species, succession, and climate change

Climate change (Anderson and Strahler: Ch. 13-14, 16)

- Holocene climate and environmental change and palæoclimatic reconstruction
- Biogeochemical cycles and anthropomorphic alterations of these
- Urban heat island, air quality, and pollution
- Frequency and magnitude relationships (*e.g.,* for floods, droughts, hurricanes)
- Predicting climate trends and impacts over the next 100 – 1,000 years
- GIS and remote sensing applications
- Scientific uncertainty and the political manipulation of uncertainty

Grading:

Your grade is based on your progress through the course objectives, as shown through several assessment opportunities: *weekly quizzes, weekly labs, a formal lab research report, a book report,* and *a final.* Each of these is worth 20 percent of your overall grade. I will sporadically take note of your participation: If there is a tie between or among you right at a place where I'd like to break the grades, I'll give the person with the best participation record the higher of the two grades.

The quizzes are comprised of "objective" questions and problems (Scantron Form 882). They include material from classroom and lab activities and from the lectures and textbook. The final is comprehensive and will be made up of questions that appeared on the quizzes.

The book report will be about 3-5 pages (double-spaced) in length, very carefully edited (your writing mechanics will be assessed, counting for about a third of your points, and my writing standards are available at http://www.csulb.edu/~rodrigue/writmech.html. This report will be a summary of the five most important “take-away” points you found in the *Rough Guide to Climate Change* book and why, specifically, you think these are the most important points. Participation includes class attendance; turning in the complete set of labs, tests, reports, and journals; and willingness to contribute helpfully to classroom discussion and lab activities.

The lab-based research report will be your own analysis of one data set selected from an approved list, including its statistical characterization and graphical representation, mapping, trends, and whether there are significant associations among the variables included. This is to be framed in terms of why the data set is important in terms of the scientific concepts presented in class, what your hypotheses are, what your results were, and a discussion of what your results mean for your hypotheses. This will take from 3-5 pages of carefully edited, double-spaced text, not counting tables, graphs, and maps.

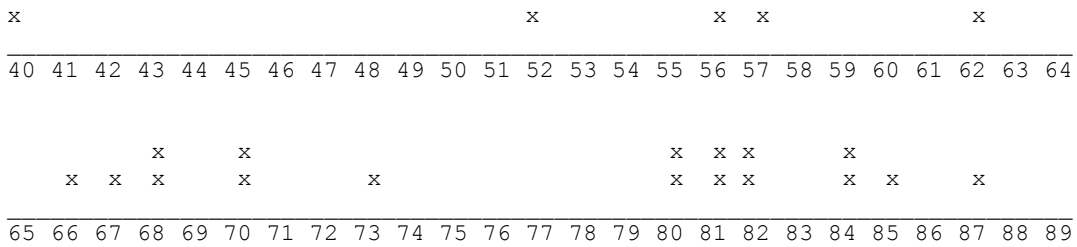
I grade on a curve, such that the course GPA is typically about 2.00. Usually, about 40-50 percent of the students receive the "C" grade, with about 10 percent earning the "A" (or "F" and "WU" grades). I modify this distribution, depending on the quality of a class' performance, compared to previous sections of this course and similar courses I've taught.

What this means is that, when I turn back assignments and tests, I give you your raw score out of the total possible and let you see how you're doing in relation to your peers. I will eventually convert each raw score into its percentage value to your overall grade. **What counts is the steady accumulation of these weighted points, not the letter grade of any one item.**

At the end of the semester, I add up all the percentage points for each student and then curve the class at that point. I often don't give letter grades for each item when I hand them back, because letter grades are misleading. Remember: It's the points at the end that are curved into overall grades.

"Curving" is often mysterious to students. It's based on the statistical tendency for any kind of measurement to cover a wide range from high to low, but with the bulk of the measurements covering a tighter range closer to the middle. The reason I use it for grading is that it strikes a nice balance between your abilities as students and my abilities as an instructor: Are my questions too hard (or too easy)? Are you slacking or working really hard? Are you space-cases? Am I simply unable to set up a good learning environment for you? Who knows? So, I split the difference and curve the grades.

To give you a sense of how grades are curved, here is an actual class score distribution from a course I taught in S/07. The average score was 71.6 out of 100.0, and the median or middle score was 71.7, so the C's were centered there. You can see where the breaks were. There were 4 A's (84-87); 6 B's (80-82); 8 C's (62-73); 3 D's (52-57); and 1 F (40). The standard deviation was 12.5 (which defines "normal," "average"), so the C's wound up being roughly + or - 1 standard deviation away from the mean. This particular upper-division class had quite a few really hard-working students, so I set the curve up to give a higher GPA (2.4, rather than 2.0) in recognition of this group of 8 outstanding students without taking it out of the more typical students (4 D's and F's, rather than 8). Now, what would have happened if I didn't curve it and used the 90/80/70/60 rule for dishing out grades? There would have been no A's, 10 B's, only 3 C's, 5 D's and 4 F's, even though I thought the top 4 students were really first-rate students and even though I thought that the folks with scores in the 50s had actually been learning "enough." Maybe my tests were too tough or badly written or something. So, that's why I grade on the curve, and I wanted you to see how it works.



Makeup Policy:

There are 13 quizzes and 13 weekly lab assignments. *I will only count your **10 best** on each*. There are, therefore, *no makeups on either of these because there's no need.* If you wish, you can use up to 3 quizzes or labs to take time to deal with a compelling conflict in schedule. These can include work-related absences, illness, or religious obligations and observances, and they will not impact your grade.

In terms of the reports, I will not penalize you for being a day late for these reasons: I need **PRIOR** notification of these absences, however, so that your attendance and participation will not be penalized. If an unanticipated and serious emergency comes up that precludes such advance notification, I will not penalize you if you bring documentation. All other makeup requests are subject to denial or serious penalty.

Accessibility:

It is the student's responsibility to inform me at the beginning of the semester about any disability that may require special accommodation, such as taking quizzes or the final under the supervision of Disabled Student Services. I am fully committed to making physical geography accessible to all and providing accommodations that will help everyone have the same chance at success. I need to know about the issue at the beginning of the semester, though, so that we can work out a mutually reasonable and satisfying accommodation. For more information on campus support services for disabled students, please check out http://www.csulb.edu/divisions/students2/dss.

Electronics:

Cell phones must be turned off while in this class: They are hugely distracting. If your phone goes off in class, I will note it and, if it happens more than once and if you wind up with a score at the boundary between two grades, I'll give you the lower grade.

If you have a serious need to have it on in class (*e.g.,* your significant other is about to have a baby, you have a child in daycare, your parents are gravely ill), let me know ahead of time, sit near the door, keep the phone on vibrate, and then leave the room to take the call. Make sure those with an emergency need to get hold of you know that it will take you a little longer to answer. With prior approval, I won't "ding" you.

With respect to personal computers, it's okay to use them to take notes. If you are surfing the web, e-mailing, texting, or listening to music on your i-Pod or similar and creating a distraction to your neighbors, however, you may be subject to the tiebreaker rule above. Your own distraction will guarantee a lower grade, even separate from tiebreaking points!

Withdrawal Policy:

It is the student's responsibility to withdraw from classes. Instructors have no obligation to withdraw students who do not attend classes and, because of the bureaucratic difficulty involved, generally don't. This often catches transfer students by surprise, because community colleges require instructors to drop non-attending students and provide easy and routine mechanisms for them to do so. If you've been "spoiled" by that system, please be aware that it doesn't work that way here and pay attention to deadlines.

The deadline to withdraw from a class without a "W" showing up on your transcript is 8 February. You can withdraw until 10 p.m. that night through My CSULB. You can withdraw later, until 24 April, but you'll have a "W" show up on your transcript (too many of those look bad) and will lose all or some of your fees. From then through 15 May, you can only withdraw for a documented serious and compelling emergency, with the approval of the dean's office, which expects that you are dropping *all* of your classes because of the seriousness of the emergency. Note: "I'm not doing well in this class, so I have to drop it" is not regarded as a serious and compelling emergency. Here are the various deadlines: http://www.csulb.edu/depts/enrollment/dates/registration_spring.html

Cheating and Plagiarism Policy:

Written work that you hand in is assumed to be your own original work unless your source material is documented appropriately. Using the ideas or words of another person, even a peer, or a web site, as if it were your own, without citing, is plagiarism. Simply changing the

wording around so that it's not a direct quotation is still plagiarism, if you don't give credit to the source of the ideas. If you use the exact wording of your source, you are entitled to enclose the statement in quotation marks or (with longer quotations) indent and single space it and then cite the source and page. **When in doubt, cite.** Cheating and plagiarism are very serious academic offenses: They represent intellectual theft. Students should read the section on cheating and plagiarism in the CSULB catalogue, which can be accessed at

http://www.csulb.edu/divisions/aa/catalog/2009-2010/academic_information/cheating_plagiarism.html.

Furthermore, students should be aware that faculty members have a range of academic actions available to them in cases of cheating and plagiarism. I do check each paper through various search engines. At a minimum, I will fail a student cheating or plagiarizing on a *particular* assignment, but only if I think that there was some misunderstanding about what these offenses are; if I feel that the decision to cheat or plagiarize was intentional, I will *fail a student in the course.* I also may then refer the student to Judicial Affairs for possible probation, suspension, or dismissal. Be safe and follow best practice in citation: It's not much work, and it makes you look like a professional.

When in doubt, **please** ask me if you think you're getting into a grey area. To learn a little more about plagiarism, take a look at this workshop on ethics in science that several faculty put together: The second section is about plagiarism.

http://www.csulb.edu/geography/gdep/ethics.html.