

**UNIVERSITY OF NEVADA, Department of Geography**

***Climate Change and Its Environmental Impacts (GEOG / ATMS 121, 4 credits)***

**FALL 2011 Syllabus**

**Professor: Franco Biondi, PhD**

**Course Description**

Climate change is becoming increasingly important in people's lives. Understanding the scientific basis of climate change and its environmental impacts should be part of every student's educational experience. We will review and discuss past, present, and likely future climate change, together with its influences on the landscape, with emphasis on water resources, species distributions, and wildfire regime. Information relevant to Nevada, and to ongoing research in the Great Basin region, will be highlighted. The textbook is an excellent source of background information, and additional class material will be presented during lectures and made available through the WebCampus online site.

Laboratory experiences will focus on climate data analysis, CO<sub>2</sub> fluxes and sinks, and global circulation modeling. We will also have discussion sessions on peer-reviewed scientific articles and on media reports of climate change and its impacts; see the attached Lab Syllabus for details. While this course is part of the core natural sciences curriculum (group A) at UNR, it is also part of an existing climate curriculum in Geography, which includes GEOG 221 (Strange and Dangerous Weather), GEOG 321 (Understanding Climate), GEOG 421/621 (Climatology), and GEOG 721 (Advanced Climatology).

**Core Curriculum**

The class satisfies the Core Curriculum Natural Sciences – Group A requirement, as follows:

1. Students will gain a practical understanding of the scientific method. Five substantial laboratory experiences are included in the class schedule. Laboratory sessions involve gathering and analyzing data, drawing conclusions, and making inferences (see lab syllabus).
2. The course stresses the analysis of data by means of appropriate mathematical techniques at or beyond the core mathematics level.
3. The class incorporates current scientific topics as well as classical examples relevant to today's world.
4. The course requires a critical review of current scientific literature (such as articles from journals) outside the textbook.
5. Each course emphasizes critical writing at all appropriate points, e.g. laboratory analysis reports, reviews of journal articles, papers and examinations.

***Pre-requisite:*** Completion of Core Math requirement OR SAT of 610 OR ACT of 27 OR corequisite.

***Corequisite:*** MATH 127 R or higher.

**Lecture Hours and Location:** Tue and Thu, 11:00 am - 12:15 pm in DMS 103.

(For laboratory information, please see the Lab Syllabus and Lab Calendar)

**Office Hours:** Tue 3:00-4:00 pm in MS 225 or by appointment. Please come and see me to talk about any questions you might have on the class. I am here for you.

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### Course Materials

- **Textbook (required):** Kump, L.R., J.F. Kasting, and R.G. Crane (2010). *The Earth System*, 3<sup>rd</sup> Edition, Prentice Hall, San Francisco. Available at the Campus Bookstore or from web-based sellers.
- Additional material during the semester will be posted on the class WebCampus site.

### Special Needs

Any student with a disability needing academic adjustments or accommodations is requested to contact the instructor or the Disability Resource Center (Thompson Building, Suite 101) as soon as possible to arrange for appropriate accommodations.

### Academic Success Services

Your student fees cover usage of the Math Center (784-443 or [www.unr.edu/mathcenter/](http://www.unr.edu/mathcenter/)), Tutoring Center (784-6801 or [www.unr.edu/tutoring/](http://www.unr.edu/tutoring/)), and University Writing Center (784-6030 or [www.unr.edu/writing\\_center](http://www.unr.edu/writing_center)). These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.

### Grading

By enrolling in this class, a student agrees to become familiar with the contents of the syllabus and requirements of the course, including the laboratory requirements, the grading system, dates for tests, frequency of quizzes, due dates, and consequences of missing tests or being late for an assignment.

Students will be graded according to their score on two Exams, ten Quizzes, five Laboratory sessions, and class Participation. All tests count, so make sure you take all of them. Both quizzes and exams will be open-book, open-notes, since they are intended as a check of your understanding, but keep in mind that advance knowledge of the class materials is usually needed to complete tests within the required time limit.

- *Exams* are a combination of multiple-choice, fill-in, true/false, and short essay/exercise questions. There is one midterm and one final exam, which will cover class materials presented after the midterm exam.
- *Quizzes* include 5 questions, and should take no longer than 5-10 minutes. Each Quiz covers material presented since the previous test (either midterm Exam or Quiz). The combined weight of all quizzes is equivalent to that of an exam. If you miss a Quiz without a valid justification, you will receive a 0, which will count towards your final grade.
- *Laboratory* grades will be based on written assignments, plus attendance and participation. Missing a lab session without a valid justification (see Rules of Conduct below) means losing all points for that lab. Save all laboratory materials to document your attendance.
- *Participation:* this involves attending lectures and labs in a professional way. Points will

be taken out for breaking the Rules of Conduct (see below).

- There is *no extra credit* work. There is ample opportunity to demonstrate your desire for a good grade through the regular assignments.

### Grading breakdown

Exams (2 x 100)	200
Quizzes (10 x 10)	100
Laboratory experiences (5 x 20)	100
Participation (50)	50
<b>TOTAL</b>	<b>450</b>

A mid-semester grade summary will be provided to each student. Final letter grades may have a plus or minus according to the following scheme:

A = 93% or higher; A- = 90-92.9%; B+ = 87-89.9 %; B = 83-86.9 %; B- = 80-82.9 %; C+ = 77-79.9 %; C = 73-76.9 %; C- = 70-72.9 %; D+ = 67-69.9 %; D = 63-66.9 %; D- = 60-62.9 %; F = < 60 %.

While this grading scale cannot be changed, the instructor reserves the right to increase letter grades based on class performance.

### How to succeed in this class:

- ✓ Read the assigned sections of the textbook both before and after class
- ✓ Ask questions
- ✓ Be aware of test dates, and prepare in advance
- ✓ Keep up with the material
- ✓ Maintain a professional demeanor and attitude
- ✓ COME TO LECTURES AND LABS!

### Rules of Conduct (*the tough stuff*):

- **Attendance.** Attendance is required to both lectures and labs. Keep in mind that your grade will improve if you come to class and take notes. Each lecture builds on the previous one, therefore it is important to keep up with the material. Also, talking with other students or reading materials not related to the course during a lecture or a lab disturbs the entire class, and will not be tolerated. If you need to know something, ask your instructor or teaching assistant.
- **Tardiness.** BE ON TIME. Coming late or leaving early is a sign of disrespect to everybody else in the classroom. If you have a schedule conflict, please come and talk to your instructor or teaching assistant – maybe we can work out a solution.
- **Digital Devices.** Digital devices are only admitted in class for very specific purposes. Therefore, you cannot (1) use a cell phone, (2) tap on your laptop (unless the instructor allows for that in relation to a given topic or activity), (3) listen to music (remove those earpieces before entering!).
- **Exams and Quizzes.** It is YOUR responsibility to be on time for tests, and to contact your instructors well before the test if you absolutely cannot attend. In most cases, it is

possible to take a test *before* its scheduled date, but it is not possible to make it up afterwards. Students who arrive after the first person has completed the test will automatically receive a zero on that exam or quiz. Make-up examinations will be given only with an MD's note requesting permission in the case of illness, or a death certificate in the case of a family death. Medical excuses are invalid if turned in after the exam/quiz has been graded.

- **Test tips.** When asked to explain or discuss in the homework, quizzes, and examinations, you should provide an answer in the form of sentences and paragraphs that detail what you are thinking. A list is not an explanation or discussion. Scientific writing needs to be very precise. Your instructors are not mind readers and cannot assume what you meant but did not express. If you are not doing well in class, contact your instructor as soon as possible. We will do everything possible to help you improve your grade, but waiting until mid-semester or later is typically too late.
- **Late Assignments.** Assignments are due when stated — late projects will be marked down at a rate of 10% of the grade per day. Unless otherwise noted, assignments are due by the beginning of class. Given the nature of the course and examination materials, there are no scheduled make-up exams.

**Academic Dishonesty.** Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include canceling a student's enrollment without a grade, giving an F for the assignment or for the course. For more details, see the UNR General Catalog.

### **Class web site**

The class web site is located on UNR's WebCampus system. In order to log onto the class web site you will need to:

1. Go to <https://webcampus.unr.edu/webct/entryPageIns.doweбct>
3. You will need to enter your Username and Password  
 \*\*\*\*\* *These are the same as your UNR NetID and Password* \*\*\*\*\*

(Your UNR NetID and Password need to be activated **before** trying to access the class web site).

After logging, you will be directed to a main page, which contains a link to all your WebCampus courses. For this class, the web site will be used to post updates to the syllabus, class materials, and your mid-semester and final letter grade. Please remember to hit the "Reload" button of your web browser to view the most recent changes.

## Skills required and/or developed for this course

This class requires and/or improves students' skills in the following areas:

- ✓ **Writing** (ability to write a complete, well constructed essay or paper using correct vocabulary, grammar, spelling, and punctuation)
- ✓ **Verbal Presentation** (ability to make oral presentations to a group in a clear, understandable, professional manner) – LABORATORY SESSIONS ONLY
- ✓ **Visual communication** (understand and interpret graphics, posters, and presentations that communicate ideas visually, through design, layout, color, and symbols)
- ✓ **Comprehensive Reading** (reading for the main ideas in a manuscript and the ability to articulate these ideas in written annotation)
- ✓ **Library research** (ability to use appropriate search methods to find books, articles, maps, photographs, digital data, and other educational materials)
- ✓ **Field and/or lab work** (answer questions through the collection and analysis of data collected in the field or in the lab) – LABORATORY SESSIONS ONLY
- ✓ **Computing** (basic file management, printing, email, web search, and use of basic software programs including word processing and spreadsheets) – LABORATORY SESSIONS ONLY
- ✓ **Quantitative analysis** (problem solving with numerical tools, data manipulation, and models)
- ✓ **Qualitative analysis** (interpreting information in the form of observations, text, and dialogue)
- ✓ **Accountability, efficiency, precision, and accuracy** (development of professional skills including punctuality, meeting deadlines, working efficiently alone and in groups, selecting appropriate methods for work and achieving accuracy in results)
- ✓ **Memorizing** (remembering facts, ideas or methods so they can be repeated in the same or equivalent form)
- ✓ **Analyzing** (investigating in depth the basic elements of an idea, experience or theory, such as a particular case or situation, and consider its components)
- ✓ **Synthesizing** (summarizing and organizing ideas, information or experiences into new, more complex interpretations and relationships)
- ✓ **Judgment** (making informed decisions about the value of knowledge, arguments or methods, such as examining how others have gathered and interpreted data, then assessing the soundness of their conclusions)
- ✓ **Applications** (applying theories or concepts to practical problems or in new situations)
- ✓ **Spatial analysis** (interpreting patterns of distribution and recognizing phenomena and processes as they occur in space)
- ✓ **Perception and geography** (assessing relationships between the experiences and perceptions of individuals/groups and the transformation of places and landscapes)
- ✓ **Regional understandings** (evaluating the organization of space into regions based upon understandings of physical and social environments)
- ✓ **Cultural interpretations of place and landscape** (observing the influence of culture and society in the transformation of places and landscapes)
- ✓ **Physical geographic analysis** (recognizing environmental processes and their spatial patterns as they are associated with changes in landscapes, climatic change, water regimes, and biotic interactions)
- ✓ **Human-environment interactions** (examining dynamics between social actions and the interpretations, use, quality, and change of physical environments)

**GEOG/ATMS 121 Calendar (order of topics may change as class progresses)**

Aug 30	Tu	Course framework and organization The scientific method. Weather vs. climate. Radiation and energy balance.	Chapter 3
Sep 1	Th	Earth-sun geometry and the seasons. Climate forcings, systems responses, and feedbacks	Chapters 3 and 4 Chapter 2
Sep 6	Tu	History of climate change science: from Arrhenius to the IPCC. Long-wave and short-wave global budgets <b>Quiz # 1</b>	Weart 1997 Web Chapter
Sep 8	Th	Satellite measures of Earth's energy budget Vertical structure of the atmosphere. The ozone layer	Web Chapter Chapters 4 and 17
Sep 13	Tu	Greenhouse planets. Automated weather stations Instrumental observations. Climate division data. <b>Quiz # 2</b>	Chapter 19 Lecture notes
Sep 15	Th	Oceanic instrumental data (sea surface temperature, etc.) Radiocarbon and the bomb spike	Chapter 5 Lecture notes
Sep 20	Tu	Oceanic circulation. ENSO <b>Quiz # 3</b>	Chapter 5
Sep 22	Th	Multi-annual modes of climate: PDO and NAO. Millennial-scale climate change: Bond cycles.	Lecture notes
Sep 27	Tu	Sea level changes since the last glacial maximum <b>Quiz # 4</b>	Lecture notes and Chapter 16
Sep 29	Th	Global dimming; volcanic eruptions and climate. The urban heat island.	Chapter 15 Lecture notes
Oct 4	Tu	<b>Exam Review</b>	
Oct 6	Th	<b>Midterm Exam</b>	
Oct 11	Tu	Drought indices	Heim 2002
Oct 13	Th	Wildfire in the western USA: land use or climate? <b>Quiz # 5</b>	Lecture notes
Oct 18	Tu	Fire regime changes in Nevada: the Mt. Irish example	Lecture notes
Oct 20	Th	Fire history, logging, and charcoal production in the Truckee/Lake Tahoe area <b>Quiz # 6</b>	Lecture notes
Oct 25	Tu	The Western Regional Climate Center	Timothy Brown, DRI

Oct 27	Th	Undergraduate research opportunities and the Academy for the Environment.	Mike Collopy
Nov 1	Tu	Climate change during the last 1000 years: the Little Ice Age and Medieval climate	Chapter 15
Nov 3	Th	Sierra Nevada lakes and potential mega-droughts in Medieval times <b>Quiz # 7</b>	Lecture notes
Nov 8	Tu	Operational weather and climate forecasting	David Myrick, NWS
Nov 10	Th	Climate and vegetation distribution (biomes) Pollen-based reconstructions of climate <b>Quiz # 8</b>	Chapters 9 and 14
Nov 15	Tu	Climate and water resources. Focus on the Colorado River Basin	Lecture notes
Nov 17	Th	Climate and insect outbreaks. Focus on British Columbia <b>Quiz # 9</b>	Lecture notes
Nov 22	Tu	Climate, CO <sub>2</sub> , and vegetation response. C <sub>3</sub> vs. C <sub>4</sub> plants Biodiversity: climatic vs. non-climatic factors	Chapter 8 Chapter 9
Nov 24	Th	THANKSGIVING – No classes	
Nov 29	Tu	The North American Drought Atlas and other Great Basin dendroclimatic records <b>Quiz # 10</b>	Lecture notes
Dec 1	Th	Climate change and bird populations	Tom Albright
Dec 6	Tu	Climate impacts on glaciers and other ice formations	Cassie Hansen
Dec 8	Th	The Nevada NSF-EPSCoR project on climate change	Scotty Strachan
Dec 13	Tu	<b>Exam Review</b>	
Dec 15	Th	<b>Final Exam (8:00 – 10:00)</b>	