EARTH, PLANETARY, AND SPACE SCIENCES 13

EPS SCI 13—411-039-200

NATURAL DISASTERS

Public Affairs 2270; TR 2:00 P.M.—3:15 P.M.

Final Examination, Monday, June 12, 2017, 8:00 A.M.—11:00 A.M.

Midterm Examination in class, Thursday, May 4

INSTRUCTOR:

Professor William I. Newman, 4640 Geology
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Office Hours: M 4:00 P.M., W 4:00 P.M.; and by appointment

TEACHING ASSISTANTS:

Erik Weidner, 1708 Geology (Physical Science)
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Office Hours: W 10:00 A.M., T 11:00 A.M., R 4:00 P.M., and by appointment

Diversity Teaching Assistant (TBA)

LECTURE: TR 2:00 P.M.—3:15 P.M., Public Affairs 2270

DISCUSSION SECTIONS: W 11:00 A.M., 12:00 P.M., 1:00 P.M.; Geology 5655

FIELD TRIP: 8:00 A.M. – 4:00 P.M., TBD

COURSE WEB SITE: *Not shown here*

CATALOG DESCRIPTION

Lecture, three hours; discussion, one hour; one field day. Global urbanization together with historical demographic population shift to coastal areas, especially around Pacific Ocean's "Ring of Fire," are placing increasingly large parts of this planet's human population at risk due to earthquakes, volcanoes, and tsunamis. Global climate change combines with a variety of geologic processes to create enhanced risks from catastrophic mass movements (e.g., landslides), hurricanes, floods, and fires. Exploration of physical processes behind natural disasters and discussion of how these natural events affect quality of human life. P/NP or letter grading.

DESCRIPTION OF COURSE:

Global urbanization together with a historical demographic population shift to coastal areas, especially around the Pacific Ocean's "ring of fire," are placing increasingly large parts of this planet's human population at risk due to earthquakes, volcanoes, and tsunami (commonly called "tidal waves" although misleading). While physically and economically attractive, these and similar geographic regions were formed geologically by plate tectonic processes that make them the home to more than 70% of terrestrial seismic activity, including earthquakes and volcanoes as well as tsunami. In addition, global climate change combines with a variety of geologic processes to create enhanced risks from catastrophic mass movements (e.g., landslides), hurricanes, floods, and fires. Soil subsidence ("sinkholes") and erosion, including desertification, have substantial effects in many parts of the globe. Pandemics, historically, have been a major cause of human suffering and death, while population growth and anthropogenic impacts upon Earth's environment have re-emerged as formidable obstacles to mankind. Finally, we know that impacts with space objects, especially asteroids and comets, have played a major role in the evolution of life, and have resulted in mass extinctions over geologic history and that "space weather," the outcome of solar flares and prominences, could immobilize our technologically advanced society.

The purpose of this course is to channel the interest that has emerged among UCLA students in how these natural events affect the quality of human life and convert that interest into an understanding of the physical and some biological processes that produce these events. Moreover, recent events have demonstrated that we need to understand the role of the media and political forums as well as science education in our ability to deal intelligently with these topics. This has taken on increased urgency in an era of "post-truth" and "alternative facts." In addition, humans have had a profound influence on this planet ranging from various forms of pollution and excessive resource usage to the threat of pandemics and even limited-scale biological and nuclear warfare. The world today is dramatically different from what it was during the height of American influence. In addition to the science underlying natural disasters, we need to address questions of emergency preparation and emergency response. This course, unlike most GE physical science courses, could have a very direct impact upon your lives. In addition, we will explore an additional dimension pertaining to the impact of natural hazards upon humans: the highly-varied outcomes that depend upon the location of these events and the quality of life enjoyed by those affected. We will come to appreciate that differences in construction methods, infrastructure, and the availability of medical help, food, and water, and the role of poverty, had major influences.

Owing to this course's focus on the forces of nature and their global impact upon the quality of life, this class dedicates a substantial part of its effort to issues pertinent to natural hazards and their diverse effect upon the human condition. This course meets the new diversity requirement established by the College of Letters and Science at UCLA as established in http://www.registrar.ucla.edu/Academics/Diversity-Requirement/College-of-Letters-and-Science-Diversity-Requirement .

This will be a primarily lecture-based course, with 3 lecture-hours per week given by the professor and 1 discussion hour led by our two teaching assistants. During the discussion sessions, one TA will focus on the physical and, sometime, biological effects associated with natural hazards, disasters, and catastrophes, while the other will focus upon their

effect upon the human condition including the competing roles of politics, economics, public health, infrastructure, differences in cultural norms, etc. Our purpose here is to explore the full range of effects that the forces of nature have upon the very different demographic groups sharing this planet.

We will spend approximately one lecture per textbook chapter plus have special lectures on climate change, earthquake preparedness, epidemics and vaccination, famine and water shortages, population growth, space weather, and energy needs. The discussion sessions will focus on the class presentations and relevant text material, plus special topics of current interest (e.g., the role of the media, science education, natural hazard prediction, bio and nuclear hazards). A course website will be employed to provide up-to-date information on current events and other lecture materials. The course will also include a mandatory one-day geology field trip to visit sites within 50 miles of Los Angeles where the effects of these dynamic physical processes can be better appreciated and understood. (We will survey student schedules on the first day of lectures to identify the weekend days when the field trips are conducted. You will be asked to sign up for one of them, on a first-come-first-served basis.) The field trip is a formal requirement for the course and attendance will be taken; "hands on" instruction is the most-effective way of learning—a University of California Liability Waiver must be executed before departing on these trips. For those individuals who cannot come and provide medical documentation attesting to their inability to participate, a 10-page single-space research paper (including references and diagrams) will be accepted—the topic will be selected in consultation with the professor and will also include a 15-minute interview concerning the paper; from past experience, you will learn more from the field trip and have fun in the process, so participation is strongly encouraged. (Students who do *not* participate in the field trip nor qualify to write the substitute paper will have 10% deducted from their aggregate score leading to their final grade.) If your schedule presents conflicts due, for example, to official athletic activities where we receive formal notification from the athletics department during the first week of class, we will seek to find some accommodation. You must be present to hand in homework assignments and take the mid-term and final examinations as well as attend the mandatory field trip. This course is available for letter grades or P/NP; please make certain that you have registered using the grading scheme that is most appropriate to your situation and major.

Performance in the course will be evaluated on the basis of a mid-term examination (Thursday, May 4 in class) for 10% of the overall grade, a final examination (Monday, June 12 at 8:00 A.M., with the location TBD) for 20% of the overall grade, and three assignments for 10% each (given approximately every three weeks). In addition, there will be two required research papers, valued at 10% and 20%, respectively, on diversity-related issues; more detailed information regarding these will be provided in class. I will be employing "active learning" methodologies using iClicker during my lectures to assess how well you understand concepts introduced in class, and am allocating 10% of the final grade to your iClicker score. You will be required to consult with our TA charged with oversight of the diversity component, as to the selection of topics, finding good resources for the papers, and advice regarding their writing. Importantly, the research papers must be fact-based; while opinion has a role in working with facts, opinions alone are not an acceptable substitute for knowledge. Papers will be submitted through "Turn-it-In" with details to be announced, and plagiarism will be regarded very

unfavorably. We will have special presentations addressing paper writing and finding reliable sources of information. While the Internet is an invaluable tool, remember "Sturgeon's Law" which notes that 90% of what you will find on the net is demonstrably false. Turn-it-In can identify how much of your material is "cut and paste," and that is strongly discouraged; if it assesses your research papers as having more than 10% of its material copied without attribution, there will be major penalties. Erik Weidner, our physical science TA, will collect in class your assignments and will be charged with grading them, as well as providing advice during office hours regarding the science underlying the topics that we will explore. A fundamental aspect of this course is to integrate the scientific and human dimensions of natural disasters.

Attendance and participation in the discussion sessions is critical to your understanding of the topics addressed. These issues are very real and will provide the formal lecture topics and discussion sessions a sense of urgency not often encountered in physical science courses; moreover, they will help integrate what you learn scientifically with the human dimension. Particular attention will be given to the interplay between natural hazards and social factors.

Our textbook (required) are available through the ASUCLA bookstore. Our principal textbook is Keller, E.A. and DeVecchio, D.E. 2012. *Natural Hazards*, 4th edition, Upper Saddle River, NJ: Prentice Hall. I also have adopted as a text, Mann, M.E. and Kump, L.R. 2015. *Dire Predictions: Understanding Global Warming*, New York, NY: Dorling-Kindersley. Both books are available for purchase online. I have appended to this syllabus a long list of books that are particularly valuable in researching your papers, as well as the various topics addressed in this course.

As indicated earlier, we will be employing adaptive learning technologies during the lectures. **iClicker2 or iclicker+.** iclicker is a response system that allows you to respond to questions we pose during class. Clickers are likely to significantly increase your learning in the classroom. You may not use the iclicker mobile app, because that overloads the wireless network in such large classes. Clickers are available either for purchase at the bookstore, on ebay or amazon, OR through a UCLA clicker loan program that you can read more about here: http://lendme.oid.ucla.edu/. **You will need to go to www1.iClicker.com to register your remote.** Please do so before our class on April 11.

In addition to meeting the UCLA College of Letters and Science physical science GE requirement (5 units) and its diversity requirement, we are a partner in the University of California Climate and Sustainability Education Resource Library. You may find some helpful resources at http://cserl.ucop.edu/courses/eps-sci-13 and can proceed from there to other UC resources relating to climate and sustainability.

Owing to the increasing urgency identified in the scientific community regarding climate change, a substantial focus of our course, particularly during the second half of the quarter, will be on climate change. Indeed, global warming and its attendant effects will dramatically alter human life during the coming century in ways that we are only beginning to appreciate. This course is designed to teach you some real-life lessons about the planet we live on emerging from natural disasters and issues germane to sustainability. I hope that it will promote substantial thought and discussion among you. This is your planet, and your lives depend on it!

References for EPS SCI 13, Natural Disasters, S2017: Prof. W. I. Newman, x5-3912

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SYLLABUS:

We will be using Keller and DeVecchio's *Natural Hazards* as well as Mann and Kump's *Dire Predictions*, covering nearly 2 chapters *each* week. Much of the lecture material is not readily available elsewhere. I am adopting this rapid pace to give us sufficient time to address the "human" elements detailed in the course description. You are responsible for reading carefully the textbooks. In particular, I will describe and discuss major natural disasters following their occurrence during this quarter. The films that I will show in class (sometimes providing only the initial portion of each) are readily available online via NOVA or YouTube or other easily accessible sources. They have been selected to provide an effective overview of some of the major issues that we will have to confront today and for many years to come.