Natural Disasters
GEOL 308 Course Syllabus
(3 Units)

Humboldt State University
Department of Geology
Arcata, CA 95521

Spring 2017

Lecture: CRN 25477 Section 1 TR 17:00 – 18:20 Founders Hall 25

Instructor: Dr. Jason Robert Patton
Email: Jason.Patton@humboldt.edu
Office: Founders Hall 136
Phone: 707.826.3923

Course Website: http://www.science.earthjay.com/?page_id=4886

Office Hours: Tuesday 13:00 – 15:00

Prerequisites: GEOL 106 or GEOL 108 or GEOL 109 or GEOG 106, and upper division standing. GEOL 308L recommended to be taken concurrently

Caveat: Cannot count for geology majors as upper division specialization

Field Trips: Two Weekend Field Trips (Optional)


Required Textbook:


Recommended Reading:


Contact: Please don’t hesitate to email me with any questions, comments, or concerns. I welcome any feedback or suggestions. The best way to contact me for any reason is by sending an email directly to my HSU email Jason.Patton@humboldt.edu

Fulfills the following requirements: (1) upper division (area B) General Education requirements and (2) a core requirement for the BA Geoscience degree program.

Required Supplies: three ring binder for class handouts including blank paper for drawing illustrations and notes during class; colored pencils for making illustrations.
Course Description:
Mitigating geologic hazards through technology, behavioral and cultural adaptation, risk assessment and prediction, and communication of hazard information. Case studies of earthquakes, volcanoes, tsunamis, hurricanes, floods, landslides, and climate change.

The Purpose of this Class:
The geologic record has abundant evidence of large scale disruptions from earthquakes to volcanic eruptions, to landslides and tsunami. We may think of these as natural processes. However, we humans live on the Earth and rely on many of its resources. Large natural processes that disrupt our way of life can have disastrous consequences, the most serious being loss of life. As Earth scientists, we are charged with understanding potentially dangerous geologic events, and effectively communicating this knowledge to the general public to mitigate the effects of disasters. There is still much to be understood regarding geologic processes, and as you will learn, there are many factors beyond the geology that influence the intensity of a disaster.

This course introduces the multitude of factors – geologic, geographic, economic, political, and cultural – that affect both the exposure to natural disaster and its outcome. Whereas direct losses from disasters include loss of life, injuries, and damage to structures and infrastructure, indirect effects may have broader impact through long-term economic and political consequences. The Northridge (1994) and Loma Prieta (1989) earthquakes affected every Californian through added taxes and State recovery costs. The Kobe, Japan earthquake in 1994 affected the global economy through trade disruption and the failure of banks and the 2011 Japan tsunami caused a shortage of critical parts for global manufacturing. The 1972 Managua, Nicaragua earthquake led to the fall of the Somoza regime and set the stage for the Sandinista-Contra conflicts of the following decades. The Chinese government officially covered up the deaths of more than 15,000 people from an earthquake in 1970 because of concern it would impact the Cultural Revolution. The Indian Ocean tsunami both led to the resolution of one conflict (in Indonesia) and exacerbated another (Sri Lanka). Socioeconomic status was a primary factor in the severity of Hurricane Katrina’s impact on the Gulf Coast, and the recovery period in New Orleans has led to major changes in the demographics and economy.

Natural disasters hit developed and developing countries, the rich and poor, and affect diverse cultures. However, impacts of a disaster vary widely depending on the pre-existing economic environment and the local engineering practices, as well as the actions and cultural adaptations that communities have taken beforehand. The 1988 Spitak, Armenia earthquake (magnitude 7) killed at least 25,000 people. The 1989 Loma Prieta earthquake (magnitude 6.9) affected an area of similar population density but killed only 63. The difference in the casualty figures was in large part due to the construction standards and enforcement in the two countries. The 1985
eruption of Nevado del Ruiz in Colombia killed 22,000. The much larger 1991 eruption of Mt. Pinatubo in the Philippines killed fewer than 400, due to a successful warning and evacuation. Typhoon Zoe struck the tiny Island of Tikopia in the Solomon Islands in December 2002 with the strongest winds ever recorded to that time. There were no casualties and very few injuries because of the cultural adaptations made by Tikopians over millennia of living with typhoons. Even within a region hit by disaster, the impacts often differ significantly depending on mitigation actions taken beforehand and resource availability for recovery afterwards. Ferndale recovered quickly after the 1992 Cape Mendocino earthquake, and was very adept at garnering government resources. The recovery in more economically disadvantaged Rio Dell took far longer even though the losses were nearly the same.

Course Student Learning Outcomes:

HSU Department of Geology:

- Understand the causes of natural hazards and how human activities can exacerbate or reduce impact.
- Understand the disaster management cycle and activities that promote community resilience.
- Understand how climate change has affected natural disasters and what the possible effects will be in the future.

HSU College of Natural Resources and Sciences:

- Be able evaluate the significance and value of scientific concepts and technology as they apply to the development of past and current human civilizations and the natural world.
- Find (in the library or on the Internet) scientific information and critically evaluate conclusions drawn from these sources.

HSU:

- Apply scientific concepts and theories to develop scientific explanations of natural phenomena.
- Critically evaluate conclusions drawn from a particular set of observations or experiments.
- Discuss value systems and ethics associated with scientific endeavors.
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Humboldt State University Student Learning Outcomes:

HSU graduates will have demonstrated:

- Effective communication through written and oral modes.
- Critical and creative thinking skills in acquiring a broad base of knowledge and applying it to complex issues.
- Competence in a major area of study.
- Appreciation for and understanding of an expanded world perspective by engaging respectfully with a diverse range of individuals, communities and viewpoints.

HSU graduates will be prepared to:

- Succeed in their chosen careers.
- Take responsibility for identifying personal goals and practicing lifelong learning.
- Pursue social justice, promote environmental responsibility, and improve economic conditions in their workplaces and communities.

Grading

Late Assignments are NOT ACCEPTED. There are NO EXTRA CREDIT opportunities.

Your final grade will be comprised of:

<table>
<thead>
<tr>
<th>Summary</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation</td>
<td>100</td>
</tr>
<tr>
<td>Course Notes and Illustrations</td>
<td>100</td>
</tr>
<tr>
<td>Home &amp; Class Activities</td>
<td>100</td>
</tr>
<tr>
<td>Group Project</td>
<td>50</td>
</tr>
<tr>
<td>Quizzes</td>
<td>400</td>
</tr>
<tr>
<td>Final Report</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td>1000</td>
</tr>
</tbody>
</table>

There are 1000 points available and grades are assigned by the percentage of total points as follows:

1000-940=A  939-900=A-  899-870=B+  869-830=B  829-800=B-  
799-770=C+  769-700=C  699-670=D+  669-600=D  <599=F

Communication:

The instructor will send announcements via email to the student’s humboldt.edu email addresses. Students should check their email regularly (at least once a day). Please contact the instructor only via the email listed above. The instructor will respond at their earliest convenience. Students will exchange contact information with their peers on the first day of classes. This is important so that if anyone misses a class, they can contact more than one of their peers to go over the notes and lab materials.
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Classroom Conduct:
Side conversations among classmates are disrespectful and disruptive to the instructor and your fellow students. Questions or comments about the course material are welcome at all times but should be approached in a respectful manner.

Electronic and Smart Devices:
The use of cell phones, iPods, or other items that may distract you, your instructor, or your classmates are not permitted during class. All such devices must be turned off. Failure to comply is grounds for removal from classroom, a failed grade, or disciplinary action.

Name changes, gender identity and pronouns:
If the name or gender on your HSU email account or Moodle name is different than the one you are and are called by, please tell me.

Academic Honesty:
You are encouraged to work together to review notes from lectures, to work on problems from the text, and to formulate ideas for any take-home assignments. However, all work you turn in must be your own independent, original work.

In the event that any work is copied from another student, zero credit will be given to all students involved (regardless of who copied from whom).

Any sources of information used in your written work must be referenced (regardless of whether the material was copied word-for-word). This includes your text book and all internet sources (reference these by including the name and URL). Any work including un-referenced material from another source (regardless of whether it was copied word-for-word) will be given zero credit.

More information is available at:
http://www.humboldt.edu/studentrights/academic_honesty.php

Academic Misconduct: Cheating, plagiarism, collusion, abuse of resource materials, computer misuse, fabrication or falsification, multiple submissions, complicity in academic misconduct, and/or bearing false witness will not be tolerated. Violations will be dealt with according to the procedures and sanctions proscribed by Humboldt State University. Students caught plagiarizing or cheating on exams will receive an “F” in the course.

University Policies:
Student Code of Conduct: Students are responsible for following the standards described in the Student Code of Conduct.
https://www2.humboldt.edu/studentrights/sites/default/files/images/code_of_conduct.pdf
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Students with Disabilities: Persons who wish to request disability-related accommodations should contact the Student Disability Resource Center in the Learning Commons, Lower Library, 826-4678 (voice) or 826-5392 (TDD). Some accommodations may take up to several weeks to arrange. http://www.humboldt.edu/disability/

Add/Drop policy: Students are responsible for knowing the University policy, procedures, and schedule for dropping or adding classes.
http://www.humboldt.edu/~reg/regulations/schedadjust.html

Emergency evacuation: Please review the evacuation plan for the classroom (posted on the orange signs), and review http://www.humboldt.edu/emergencymgmtprogram/evacuation_procedures.php for information on campus Emergency Procedures. During an emergency, information can be found campus conditions at: 826-INFO or www.humboldt.edu/emergency

Academic honesty: Students are responsible for knowing policy regarding academic honesty:
http://www.humboldt.edu/studentrights/academic_honesty.php

Academic dishonesty is willful and intentional fraud and deception to improve a grade or obtain course credit. It includes all student behavior intended to gain unearned academic advantage by fraudulent and/or deceptive means.

Attendance and disruptive behavior: Students are responsible for knowing policy regarding attendance and disruptive behavior:
http://www.humboldt.edu/studentrights/attendance_behavior.php

Additional University Policies: See the link below for the official University policies on a) academic honesty, b) attendance and disruptive behavior, c) complaints against HSU employees, d) student code of conduct, e) animals in classrooms, f) adding/dropping classes, g) campus emergency procedures, h) counseling and psychological services, i) student disabilities resource center, j) financial aid office, k) academic and career advising center.

http://www2.humboldt.edu/academicprograms/syllabus-addendum-campus-resources-policies

* Please note that this document is informational and subject to change.
# Natural Disasters

## GEOL 308 Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture</th>
<th>Reading (Text)</th>
<th>Reading (Suppl.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 M</td>
<td>1/17/2017</td>
<td>Introduction: The Disaster Management Cycle</td>
<td>Prologue</td>
<td>Course Documents; Living on Shaky</td>
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<tr>
<td></td>
<td>W 1/19/2017</td>
<td>Disaster Fundamentals</td>
<td>ch. 1</td>
<td>Tobin Natural Disaster 1-15</td>
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<tr>
<td>2 M</td>
<td>1/24/2017</td>
<td>Weather Basics</td>
<td>ch. 9</td>
<td>Tikopians and Hurricane Zoe</td>
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<tr>
<td></td>
<td>W 1/26/2017</td>
<td>Weather Hazards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 M</td>
<td>1/31/2017</td>
<td>Hurricane Katrina; Typhoon Haiyan</td>
<td>ch. 10</td>
<td>Hurricane Katrina and Typhoon Haiyan</td>
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<tr>
<td></td>
<td>W 2/2/2017</td>
<td>El Niño - La Niña</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 M</td>
<td>2/7/2017</td>
<td>Quiz #1; Floods</td>
<td>ch. 6</td>
<td>USGS Flood Hazards and Debris Flow</td>
</tr>
<tr>
<td></td>
<td>W 2/9/2017</td>
<td>Floods: Case Studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 M</td>
<td>2/14/2017</td>
<td>Mass Wasting</td>
<td>ch. 7</td>
<td>USGS Venezuela Debris Flow Oso Landslide</td>
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<tr>
<td></td>
<td>W 2/16/2017</td>
<td>Landslides: Case Studies</td>
<td></td>
<td></td>
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<tr>
<td>6 M</td>
<td>2/21/2017</td>
<td>Plate Tectonics</td>
<td>ch. 2</td>
<td>Notes on Plate Tectonics</td>
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<tr>
<td></td>
<td>W 2/23/2017</td>
<td>Earthquake Faults</td>
<td></td>
<td>Notes on Faults</td>
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<tr>
<td>7 M</td>
<td>2/28/2017</td>
<td>Earthquakes</td>
<td>ch. 3</td>
<td>Earthquake Reports</td>
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<tr>
<td></td>
<td>W 3/2/2017</td>
<td>Earthquake Case Studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 M</td>
<td>3/7/2017</td>
<td>Quiz #2; Seismic Hazards</td>
<td>ch. 3</td>
<td>USGS Seismic Hazard</td>
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<tr>
<td></td>
<td>W 3/9/2017</td>
<td>Seismic Hazards</td>
<td></td>
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<tr>
<td>NA M</td>
<td>3/14/2017</td>
<td>Spring Break</td>
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<td></td>
<td>W 3/16/2017</td>
<td>Spring Break</td>
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<tr>
<td>9 M</td>
<td>3/21/2017</td>
<td>Tsunami</td>
<td>ch. 4</td>
<td>USGS Tsunami</td>
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<tr>
<td></td>
<td>W 3/23/2017</td>
<td>Tsunami</td>
<td></td>
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<tr>
<td>10 M</td>
<td>3/28/2017</td>
<td>Japan and Sumatra Tsunami</td>
<td></td>
<td>Earthquake Reports</td>
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<tr>
<td></td>
<td>W 3/30/2017</td>
<td>Coastal Hazards</td>
<td>ch. 11</td>
<td>Coastal Hazards</td>
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<tr>
<td>11 M</td>
<td>4/4/2017</td>
<td>Quiz #3; Climate</td>
<td>ch. 12</td>
<td>IPCC 5th AR SPM</td>
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<td></td>
<td>W 4/6/2017</td>
<td>Climate Change</td>
<td></td>
<td></td>
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<tr>
<td>12 M</td>
<td>4/11/2017</td>
<td>Sea Level Rise</td>
<td>ch. 12</td>
<td>Sea Level Rise</td>
</tr>
<tr>
<td></td>
<td>W 4/13/2017</td>
<td>Volcanoes</td>
<td>ch. 5</td>
<td>USGS Long Valley, Lassen, Shasta</td>
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<tr>
<td>13 M</td>
<td>4/18/2017</td>
<td>No Class: Online Activity: Volcano: Case History</td>
<td>ch. 5</td>
<td></td>
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<td></td>
<td>W 4/20/2017</td>
<td>No Class: Online Quiz #4; Online Activity Wildfire</td>
<td></td>
<td></td>
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<tr>
<td>15 M</td>
<td>5/2/2017</td>
<td>Class Presentations</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>W 5/4/2017</td>
<td>Class Presentations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/9/2017</td>
<td>Final Report Due</td>
<td></td>
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</tbody>
</table>
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GEOL 308 Course Expectations

Class will start on time at 5:00 PM. You are responsible to be present for and be attentive to all the material covered in class. If you need to leave the class early, please let me know before the class starts. Lateness is unprofessional and chronic lateness is unacceptable. Rare lateness to class is completely understandable, but chronic lateness will result in a reduced attendance and participation grade.

This is a college-level science class, and will require a commitment of your time outside of class. This at-home time will enable you to digest the material we cover in class and help when you are asked on the exams to apply these concepts to different problems and applications.

You will spend 6 hours per week on course material outside of class, on average. You are encouraged to set aside a specific time each week outside of class devoted solely to each course:

- Reviewing lecture notes and in-class exercises each week
- Reading the textbook
- Studying for the exam

Note that 6 hours per week at home is the average minimum to pass. Some students may require more time at home just to pass; for some in this course that may be enough to get an A. A student who is very attentive in class, asks questions, and takes careful notes will need less at-home time.

You need to attend lectures and participate in class discussions. Much of the course material will only be presented in lecture, and quizzes and the final exam will be based on lecture material. Last minute changes in lecture topics, reading assignments or other requirements may. If you miss a lecture, it is your responsibility to get the missed material and to find out about any assignments from a classmate. It is your responsibility to communicate to me if you are having a problem with class material. I am available during office hours and by apportionment. You will also be working on group hazards projects in class. Missing class may not only affect your grade, but that of others in the class.
Absences: It is extremely difficult to do well in this class without attending all the lectures. I understand there will be an occasional absence due to illness or emergency, however I consider more than two absences per semester excessive. If you do miss a class:

1. Obtain the course material online (PowerPoint slides, extra reading, and handouts). The slides will include information about any homework or in-class exercises that were assigned. Most assignments and handouts referenced by the slides will be in your handouts.
2. Next, try to obtain a copy of lecture notes from a classmate since there are many things we cover that are not spelled out directly on the slides or handouts. This is the most important step.
3. Read the required reading covering the material you missed.
4. After this, feel free to contact me by email with any questions.

Course Withdrawal. The University has strict policies on withdrawing from classes. You can drop this class with no fee and no permission up until the census date January 30. The course will not appear on your transcript. After that date, there are only two options to drop classes:

1. Serious and Compelling Reason: Examples – psychological problems, loss of childcare, job conflicts. Note: taking too many units or doing poorly in classes is not considered a valid reason to drop the class. You must provide written documentation. Deadline to drop with a “Serious and Compelling Reason” is April 6. A $20 fee, and a grade of W will show up on your transcript. You will receive no units and there is no impact on your GPA. You cannot withdraw from more than 18 units of class over your undergraduate career at Humboldt.
2. Catastrophic withdrawal: Examples – serious illness, accident, death in the family, being called to military service. Requires formal documentation (doctor’s note, obituary, service notice etc.). Grade of W on your transcript, does not count in GPA. Can be granted at any time in the semester and does not count toward your 18 unit limit above.

Incompletes are given only in extreme emergency situations. I require that incompletes be finished within a few weeks of the scheduled final unless you have an extraordinary situation. Don’t ask me for an incomplete if you are not passing the course at the time. If you are having any difficulties meeting assignments, or with the material, please see me early on! We can usually work something out if you don’t wait till the last minute. Check your grades! Please keep all of your returned work for the duration of the term (in your 3-Ring Binder!). I will post your grades on course Canvas page. If you don’t understand how that number is determined, please see me right away and I will make corrections if you have documentation of what you really earned.


**Natural Disasters**

**GEOL 308 Course Expectations**

**Final grade active attendance boost:** If your final course grade after rounding to the nearest whole number is within 1 percentage point of a grade transition (C to C+, D to C, A- to A, etc.) I will give you the boost needed to obtain the higher grade if you have actively attended most classes and succeeded in many of the in-class pop quiz questions. More than 2 unexcused absences is considered excessive and will disqualify you from this opportunity. Conduct not in accordance with that outlined in the syllabus will also prevent you from receiving this bonus.

**Computer skills:** This class will require computer use outside of class. Activities involving the 4 skills listed below will be included throughout the semester. In addition, you will be expected to check Canvas and your email regularly for announcements.

1. Send and receive email from your Humboldt State University email account. Please only send email to my HSU email address.
2. Open a web browser and access a web page if you are given the web address.
3. Access the course material online (handouts, slides, announcements, etc.).
4. Create, edit, and export Microsoft word (.doc or .docx), Microsoft Excel (.xls or .xlsx) and Adobe .pdf documents. We will also be using specialized software to create, edit, and export files of other formats.

**Groups:** This class will conduct some class work in groups. Students are encouraged to collaborate by collecting data, taking notes, and sharing these data and results. Some assignments will be turned in as a group and for some activities, students are required to turn in individual reports and assignments. See the notes about academic honesty in the Syllabus.

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Natural Hazards
GEOL 308 Course Information

Lectures: Lectures will consist of presentations and discussions led by the professor. Reading supplemental to the required textbook reading will be provided one week prior to the day that they are discussed in class.

Reading: The readings are primarily from Keller, E.A. and DeVecchio, D.E., 2015, *Natural Hazards*, 4th edition (3rd edition ok – but you will need to determine relevant pages). This reading is essential to your comprehension of the material in this course and will be a key to your success. In addition, there are additional readings most every week. The student is expected to read the assignment before class.

Activities: There will be in-class and homework assignments during the term, based on required reading, a class video, or an in-class project. The in-class activities are not announced in advance. If you miss a class, you have one lecture period to make it up. Every few weeks, you will be meeting in lecture with others from the same geographical region to discuss breaking disaster events and longer-term issues in the region. During the semester and at the end of the term, you will report on your region to the rest of the class. The homework activities will be distributed a week before they are due and are also posted on the course website. All will require Internet access. Some of the questions on each assignment will be related to a country that you will be following throughout the semester. LATE ASSIGNMENTS will lose 5% a day. No assignments are accepted a week after the due date. If you are having difficulty with an assignment, please contact me early on and I will help you. If an emergency occurs, let me know as soon as you are able to communicate with me.

I don’t mind your working with a friend or in a group on homework assignments, as long as you understand the work and write your answers in your own words. When I get two or more assignments that are worded identically, I suspect copying and neither one of you will get credit. Write in your own words. See the Academic Honesty section in the syllabus!

Group Project: Everyone in the class will choose a country in the world to research during the term. It is your responsibility to understand the natural disaster risks in your country, including the country’s responses to past natural disasters, disaster preparedness and current events. About five times during the term you will meet as a regional group. For example, all of the folks with countries in South America will be in one group, everyone in Asia will be in a different group. You will compile summary disaster information for your group and give short group reports to the rest of the class.
Participation: Students will be given up to 100 points for participating in class. Full credit will be given if students attend regularly, ask and answer questions in class, and participate in class discussion. When students conduct in behavior that is not respectful (as outlined in the syllabus), they jeopardize their participation grade.

Pay attention to what is happening in the world - if you hear of something of interest to the class, please bring it up in lecture or send me an email more than a couple hours before class. An easy way to keep on top of earthquake activity is to call the Humboldt Earthquake Hotline (707-826-6020) every day for a recorded summary of local, regional and global earthquake activity. Check out the website science.earthjay.com for Earthquake Reports. Other good sources of information include the Pacific Tsunami Warning Center, the National Weather Service (here in Eureka), and earthquake.usgs.gov.

Quizzes: Four Quizzes are scheduled. You will have the first half hour of the lecture period to complete them. They focus on material presented since the last quiz. Questions may be drawn from lectures, homework, readings, and class discussion. If you have the OK from the Learning Center for extra time on tests, please let me know early in the term and I can arrange for you to take the quizzes elsewhere. Here is the Learning Center website: http://www2.humboldt.edu/learning/index.php

Missing a quiz: Make-up quizzes must be arranged for **in advance of the quiz**. In the event of an emergency or sudden illness that prevents you from attending the exam, you must contact me as soon as possible and arrange a time for the quiz to be completed. If you miss a quiz (and do not contact me to make it up) or if you arrange a makeup that you do not take, you will receive a zero for that quiz.

Course Notes and Illustrations: Each lecture may include handouts and several on-board illustrations that relate to the specific topic being discussed for that day. You will use your notebook to copy and label any illustrations. You are **required to have a three-ring binder** containing these handouts and your notes taken during every class. The notebooks will also contain **all of your course materials** (labs, syllabus, quizzes, etc.). Your material must be **well organized** within the notebook. These will be evaluated during the final quiz. Credit of 100 points is given for careful reproduction of the illustrations including any notes, labels, and graphs. Don’t miss out on this opportunity for 100 points (10% of your grade).

Final Report: In order for any positive change to occur, scientists must effectively communicate their findings to the general public. You will be tasked with researching a country in the world
(outside the US and Canada) and presenting a report that details the country’s susceptibility to natural disasters. Your report should identify the risk of natural disasters, include recommendations for minimizing their impacts, as well as a disaster response plan. We have different strengths when it comes to communication. Thus, you may choose whether you do a written or oral final report. Oral reports should be well rehearsed, persuasive and informative. You will have 10 minutes with 5 minutes to answer questions.

If you choose a written report, it must be a clearly written, well organized document that includes technical information that is presented in a way that is accessible to the lay-person. The report will be typed in font size 12, double spaced, and turned in electronically by 5 PM, May 9, 2017. The report will be 6-10 pages long (5 ½ pages does not count). The paper will include between 1 and 3 figures and 1 and 3 data plots or tables. Each table, plot, or figure needs to have a caption describing the table, plot, or figure. The filename needs to include the course number, the country, and your last name, in the following format: GEOL308_Earthquakistan_lastname.docx (or *.pdf). The research topic needs to be related to subjects covered in class. Students must use at least three peer review journal articles as references for their research paper. Submit the document in digital form via email to the instructor.

**Electronic Presentations:** All electronic presentations will be posted to the website for this course. Please use these presentations to review course material and to prepare for your exams and reports.

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