Instructor Name
School of Earth Sciences and Environmental Sustainability, Geology Program
Office: Bldg X, Room X; Phone: 523-XXXX; Email: instructor e-mail

<table>
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<tr>
<th>Class Time (Bldg 12, Rm 103)</th>
<th>Instructor Office Hours</th>
<th>Peer TA</th>
<th>Peer TA Office Hours</th>
<th>Peer TA ‘Office’ Location</th>
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You should attend your scheduled class, but if a conflict arises, please try to make one of the other two lectures if you can (this includes taking an exam).

Required Textbook:

*The textbook is on reserve at Cline Library to check out in 4-hour increments*

Liberal Studies Credit:
This is a 3-credit liberal studies course under the Lab Science distribution block. NAU requires that GLG 112L be completed concurrently with this lecture section of GLG 112 in order to receive liberal studies credit for this course in the Lab Science block.

What is this course about?
Geologic disasters are sudden natural events, such as volcanic eruptions, earthquakes, and landslides, which intersect with human experience. Disasters at an extreme scale, or catastrophes, are becoming more common, not necessarily because there are more hazardous geologic events today, but because Earth’s population is increasing at a rapid rate. In addition, the places around the world which are most susceptible to geologic disasters are densely populated. We will focus on geologic processes that cause the most significant damage and fatalities on Earth, and on hazards that are most likely to affect Arizona and the southwest. By the end of the semester you should have a better appreciation of what causes geologically hazardous conditions, how likely you are to experience one or more in your lifetime, the impact of geologic disasters on our economy and society, and how you can minimize risk.

What are the course objectives and what will you learn?
To better understand the Earth, the following essential skills will be emphasized and assessed:
- Quantitative analysis of spatial and temporal information
- Critical reading about Earth systems, processes, and history
- Critical thinking about why natural disasters occur and how Earth processes operate
- Scientific inquiry into Earth’s processes.

Upon successful completion of the course, you will be able to:
- Describe fundamental geological processes.
- Explain the causes for geologic disasters and describe their impacts.
- Analyze and interpret spatial & temporal data and the disaster’s relationship to humans.
- Evaluate and forecast the risk for geologic hazards.
- Explain how geologic disasters are relevant to your life and future.
Student Responsibilities

What is the policy on attendance?
Attendance is mandatory and you will lose points if you do not attend class. Each class period, we will cover the information that you need to take away from this class, including material that is not covered in the textbook.

Tardiness: DO NOT ARRIVE LATE – it is disruptive and you will miss important information at the beginning of class. If you arrive more than 5 minutes late you will lose a minimum 10% of the participation points for that day of class.

Attendance: If you miss class, DO NOT EMAIL ASKING WHAT YOU MISSED. Use BB Learn and your classmates to find the missed material. Any additional questions can be answered through the online discussion boards or office hours. If you are absent, you cannot receive participation points for class that day unless you have an institutional excuse (no other excused absences).

How should I take notes and study?
- Take thorough notes by copying illustrations and text from the board.
- Ask questions about muddy concepts during class
- Go over your notes every day after class; underline important ideas and clarify points while the ideas are fresh in your head.

How will this Class use the Blackboard online course shell?
Sign in at bblearn.nau.edu and find GLG112:
- Lesson materials
  - PowerPoint presentations
  - Lecture outlines and handouts
- Assessments
- Homework assignments (including Google Earth assignments)
- “Ask Your Instructor” discussion board
- “Ask My Classmates” discussion board
- Class syllabus
- Course Calendar with due dates and exam schedule
- Answer keys

What are my other responsibilities?
- Speak up! If you have a question, chances are good that other students have similar questions.

- Talk to me. Feel free to call me or e-mail me for an appointment anytime. I am always here to answer your questions or talk about geology. You may also use the “Ask Your Instructor” discussion board on BB Learn for general questions on course content, homework, exams, assessments, recent events, or anything else that comes to mind!

  - When you email any professor, please use the proper address and write in complete sentences with punctuation (i.e. you are not texting your professor).
GLG 112: Geologic Disasters Syllabus | 2012

- **Class Behavior:** I expect adult behavior during lectures. If you feel the need to hold a conversation or text/talk on the phone do so after class. Other people trying to listen do not appreciate distracting behavior. If you are disruptive you will be asked to leave.

- **Technology in the classroom:** If you wish to use your laptop in class to take notes you must get pre-approval from me in person. I will ask to see your notes a couple times during the semester. You will lose your laptop privilege if I see you using it in class for something other than note taking.

- **Cheating:** Cheating is a serious violation of the Student Code of Conduct, and will be treated as such. See attached NAU Policy Statement. Cheating on a test will result in a zero.

- **NAU Policy Statements:** http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html

**Where can I get help if I am struggling in this class?**
There are many resources available to you for help with this and other classes at NAU. If you are struggling in class, the best solution is to seek out help as early as possible.

- **Help from me!** My office hours are intended to be a resource for you. Come with any question, any time.

- **Peer TAs:** Peer TAs are undergraduate students who have taken this class before, or who are Geology majors. Peer TA office hours are also intended to be a resource for you! Come with any question, any time.

- **Student Learning Center:** The student learning center’s mission is to help you get ahead before you get behind!
  - Academic Success Workshops for time management, study skills, test taking strategies, and other topics are offered weekly. Class credit may be available for attendance.
  - [http://home.nau.edu/edsup/slc/](http://home.nau.edu/edsup/slc/)
Grades

How will I be graded?

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<tr>
<th>Grading Category</th>
<th>Percentage</th>
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<tr>
<td>Exams (3)</td>
<td>60%</td>
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<tr>
<td>Participation</td>
<td>16%</td>
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<tr>
<td>Online Assessments (Best 10 out of 12)</td>
<td>10%</td>
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<tr>
<td>Homework / Google Earth</td>
<td>14%</td>
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- **Exams:** Three mandatory exams will be given. Exams make up 60% of your final grade.
  - Exam dates will NOT change (barring some unforeseen geologic disaster).
  - The final exam date is assigned by the University. Look at those dates carefully. Do NOT make plans to leave town before the last exam.
  - Semester exams may include short answer, multiple choice, matching questions, and diagrams, and may cover all material assigned in the reading and in lectures.
  - **Make-up exams** will be given ONLY in the case of an institutional excuse, and I MUST be notified (by phone, email, or in person) before the exam.

- **Assessments:** There will be 12 open-book, Blackboard Learn online assessments worth a total of 10% of your final grade. I will drop your 2 lowest scores. The assessment dates are listed on the class schedule. There are absolutely no make-ups for assessments. If you are having technical difficulties, talk to me before the assessment closes!

- **Google Earth:** There will be 3 Google Earth assignments, each worth 3% of your grade.

- **Participation:** Participation points will be assessed in class every day. Your participation grade is 12% of your final grade for this class. Participation points include answering short critical thinking questions (GeoQuestions), working to solve a problem, or coming to class prepared for discussion.

- **Extra Credit:**

- **Late work:**

- **Challenges to Assigned Grades:**

- **Incompletes:** University policy prohibits the assignment of an “incomplete” grade except in extreme circumstances that are beyond the student’s control. To receive an incomplete requires the processing of a formal contract between the student and the faculty member documenting how and when the missing course materials will be completed.

How can I keep track of my grade?

You can find your current grade on Bb Learn. Grades for assignments will be posted within one week of the due date. Grades for exams will be posted within 2 weeks of the exam. Exams will always be returned to you in class within one week of the exam date.

**This is a working document – all information including course calendar and grading is subject to change. If so, you will be notified***
### Class Schedule: Subject to change per instructor

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading (due before class)</th>
<th>Assignments Due</th>
<th>Assessments (all on Blackboard unless otherwise stated)</th>
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**Withdrawals** – Important dates regarding adding/dropping classes are:
- 1/26/12 - last day to add/drop without a fee or petition
- 3/23/12 - last day to drop class with “W” and without petition and late fee
GLG112 Learning outcomes & Class Activities

**Plate Tectonics –**
Learning outcomes:

1) Understand compositional & rheological layers of the Earth and how their behavior drives heat flow and tectonic activity.
2) Describe the types of movement at plate boundaries and explain why earthquakes and volcanic activity are controlled by plate boundary locations.
3) Evaluate the geologic hazards associated with each type of plate boundary. Summarize the relationship between surficial features and plate tectonics.

List of activities in/out of class:

1) Fill in the blank: define Earth’s compositional layers by thickness, composition, and density.
2) Lecture tutorial: layers of the Earth classification – compositional & rheological
3) Brainstorm: Patterns of earthquakes & volcanoes around the world
4) Lecture tutorial: Sea floor age and features of plate boundaries
5) Diagram: Explain the presence and age trend of the Hawaiian Island chain.
6) Investigation: Where is the safest place to live?

**Rock Cycle –**
Learning outcomes:

1) Define igneous, metamorphic, and sedimentary rocks and describe how they form.
2) Explain the relationship between the rock cycle and where rock forming processes occur on Earth.

List of activities in/out of class:

1) Flagstaff Rock Hunt

**Earthquakes –**
Learning outcomes:

1) Describe how stress/strain relationships in the lithosphere produce faulting and earthquakes.
2) Identify movement on different types of faults and relate that movement to plate boundary settings.
3) Explain how seismic energy travels through the lithosphere in terms of speed and movement.
4) Interpret seismograms and compare earthquake measurement scales.
5) Discuss and evaluate the controls of earthquake intensity.
6) Summarize earthquake hazards and determine steps to take before and after earthquakes.
7) Explain the methods used to forecast earthquakes and mitigate earthquake damage and death tolls.
List of activities in/out of class:
1) Lecture tutorial: earthquake patterns and plate tectonics
2) Online research: earthquakes.usgs.gov
3) Diagram: fault identification (x2)
4) NOVA film: Deadliest Earthquakes
5) Brainstorm: Controls on ground shaking intensity
6) Investigation: Where damage might be expected? *
7) Investigation: Navigating the Globe with Google Earth

Tsunami –
Learning outcomes:
1) List and explain the causes of tsunami.
2) Illustrate how the wave properties of amplitude, velocity, & wavelength change from the open ocean to near shore.
3) Explain the factors that control wave run-up.
4) Recognize tsunami warning signs and determine the best course of action in the case of a tsunami.
5) Describe how to mitigate tsunami damage and death tolls.

List of activities in/out of class:
1) Discussion: What regions are at risk for tsunami and why?
2) Discussion: Evaluate the practicality of Japan’s escape pod NOAH
3) NOVA film: Japan’s Killer Quake

Volcanoes –
Learning outcomes:
1) Summarize how magma viscosity and gas content control the style of volcanic eruptions and volcano morphology.
2) Interpret eruption styles based on plate tectonic settings and magma properties.
3) Identify specific types of volcanoes and examples of each.
4) Describe how volcanic eruptions have affected civilizations through time.
5) Explain the hazards and evaluate the risk associated with each type of volcanic eruption.
6) Describe the methods used to predict volcanic eruptions.

List of activities in/out of class:
1) Lecture tutorial – magma classification
2) Lecture tutorial – relative viscosity of common substances
3) Lecture tutorial – volcano types
4) Think, Pair, Share – volcano morphology (each type)
5) Diagram: Mt. St. Helen’s eruptive process
6) Group evaluation: regional and global effects of Yellowstone
7) Brainstorm: tephra hazards
8) NOVA film: In the Path of a Killer Volcano
9) Investigation: How would you assess hazards on this volcano?
10) Investigation: Exploring the San Francisco Volcanic Field with Google Earth

**Streams and Flooding**

Learning outcomes:

1) Describe the processes that contribute water to streams and how topography and landforms determine the amount of water in a stream system.
2) Summarize the relationship between stream properties, channel patterns, and location within the stream system.
3) Identify the locations within a stream system where erosion and deposition occur.
4) Define stream discharge, recognize the factors that control discharge, and interpret hydrographs.
5) Explain how topography, geology, hydrology, and urbanization influence flash and regional flooding.
6) Interpret flash and regional floods on hydrographs.
7) Examine how urbanization influence’s flood severity and evaluate the methods used to control flooding and regulate floodplains.

List of activities in/out of class.

1) Lecture tutorial: stream terminology
2) Lecture tutorial: how do stream properties change from headwaters to base level?
3) Brainstorm: Factors that control discharge.
4) Lecture tutorial: Using hydrographs to analyze flash and regional flooding
5) Lecture tutorial: Flooding on the Rio de Flag
6) Mini field trip – Rio de Flag floodplain
7) Homework: Downstream movement of Indus River flood, Pakistan, 2010
8) Investigation: Stream system and flood analysis with Google Earth
9) Investigation: Flood frequency and urbanization*

**Mass Wasting**

Learning outcomes:

1) Compare and contrast the types of mass wasting.
2) Describe the triggers for and controls of mass wasting. Understand the relationship between driving and resisting forces.
3) List the methods used to mitigate mass wasting and evaluate the risk for mass wasting based on geological setting.
List of activities in/out of class:
1) Brainstorm: Mass movement speed classification
2) Brainstorm: Driving forces, resisting forces, & triggers
3) Lecture tutorial: mass wasting classification
4) Investigation: Which areas have the highest risk of slope failure?

Climate Change – *
Learning outcomes:
1) Describe the methods used to study climate and climate change through geologic history.
2) Understand the forces that control climate through time.
3) Explain how greenhouse gases contribute to global climate change.
4) List the methods used to mitigate regional & global climate change.
5) Evaluate the consequences of global climate change for future generations.

List of activities in/out of class:
1) Lecture tutorial: How does Earth’s orbit around the Sun affect climate?
2) Investigation: Climate records from Antarctic ice cores
3) Video: Earth – The Operator’s Manual
4) Brainstorm: Stabilizing CO₂ in the atmosphere