

Natural Hazards - Geology 209

Instructors: Dr. Arlo Weil 130 Park Science Building;

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Official office Hours – Monday and Friday 2 – 4pm.

Class meeting time – Tue. and Thu. 10:00 a.m. to 11:30 a.m.; **Class location** - Park 243

Course Web Page: <http://www.brynmawr.edu/geology/209/>

Required reading: *Natural Hazards and Disasters*, by Hyndman and Hyndman

Grading:

• Two one-hour midterm exams	~20%
• One one-hour final exam	~10%
• Homework exercises	~60%
• Natural Disaster Log	~10%
Total	100%

Class Objective: This course will examine the natural hazards that occur on Earth and their effects on society. The emphasis will be on 1) the actual risk that natural disasters pose, their geographical distribution, the perceived risk that people associate with them, and the various methods of response, and 2) the fundamental principles behind what causes natural disasters and why they occur. A complete understanding of natural disasters requires some concepts from mathematics, physics and chemistry. There will be a few equations, and computer exercises that will be quantitative, so you need some algebra and geometry from high school. The primary objective of the course is to arrive at an understanding and appreciation of the impact that extreme natural events have, or can have, on the lives of people and communities, as well as the geology behind these often devastating phenomena. To this end, we will examine the causes and characteristics of phenomenon like earthquakes, volcanic eruptions, landslides, storms, floods, giant sea waves, meteor impacts, climate changes, and mass extinctions.

Homework: Topical assignment will be given out to the class approximately once every week. All assignments are required and are due a week from when they are handed out – unless otherwise specified. The assignments will emphasize the quantitative aspects of what is being discussed in class that week. Many of the assignments will require the use of a computer and the Microsoft program Excel. The problem sets make up the majority of the students grade. **Late assignments are not acceptable!!!**

Exams: Two one-hour midterms and a final exam are required. The exams will be a mix of theoretical concepts from the homework as well qualitative understanding of the topics discussed in lecture. The format of the exams will be a combination of problem solving and short answer questions.

Natural Hazard Journal (NHJ): Throughout the term students are required to keep a NHJ of five significant Natural Hazard events that happened over the semester and have made the media headlines.

Each entry must contain the following parts:

- 1. Date of the event**
- 2. Sources for information concerning the event - the sources could be from the newspaper, magazines or the web.**
- 3. A paragraph summary of the event, including a description of the affects the event had on humans and society**
- 4. A short discussion, displaying critical thinking, of the importance, implications or consequences of this event and what could have been done to mitigate the damages.**

Journals MUST be typed.

Journals are due on the last day of class.

Natural Hazards – 209 Schedule

Dates	Subject	Reading	Problem Sets
Week 1 January 20 - 23	<ul style="list-style-type: none"> • Introduction • Risk - what is Risk?? • Quantification of risk 	<ul style="list-style-type: none"> • Chap 1 • Class Handout 	<ul style="list-style-type: none"> • Introduction to physical principles
Week 2 January 26 – 30	<ul style="list-style-type: none"> • Plate Tectonics • The Dynamic Earth 	<ul style="list-style-type: none"> • Chap 2 	<ul style="list-style-type: none"> • Plate Tectonics
Week 3 February 2 - 6	<ul style="list-style-type: none"> • Seismology • Seismic Waves • Earthquake Mechanics 	<ul style="list-style-type: none"> • Chap 3 	<ul style="list-style-type: none"> • Seismology and Earthquake mechanics
Week 4 February 9 - 13	<ul style="list-style-type: none"> • Earthquakes and Tectonics • Earthquake Risk 	<ul style="list-style-type: none"> • Chap 4 	<ul style="list-style-type: none"> • Earthquake Risk assessment
Week 5 February 16 - 20	<ul style="list-style-type: none"> • Volcanism • Volcanic Eruptions • The Chemistry of Magmas 	<ul style="list-style-type: none"> • Chap 6 	<ul style="list-style-type: none"> • Physical properties of Volcanoes and Lava
Week 6 February 23 –27	<ul style="list-style-type: none"> • Volcanism and Tectonics • Volcanic Risk 	<ul style="list-style-type: none"> • Chap 7 	<ul style="list-style-type: none"> • Volcanic Risk Assessment
Week 7 March 2 – 6	<ul style="list-style-type: none"> • Earthquake-triggered events: Mass wasting and Tsunami 	<ul style="list-style-type: none"> • Chap 8 • Chap 5 	<ul style="list-style-type: none"> • Submarine slope failure & Tsunami
Week 8	<ul style="list-style-type: none"> • Spring Vacation 		
Week 9 March 16 – 20	<ul style="list-style-type: none"> • Earth's Energy • Bolide Impacts • Gravitational Energy 	<ul style="list-style-type: none"> • Chap 17 	<ul style="list-style-type: none"> • Celestial Mechanics
Week 10 March 23 – 27	<ul style="list-style-type: none"> • Weather Hazards 1: Climate 	<ul style="list-style-type: none"> • Chap 10 	<ul style="list-style-type: none"> • Atmos. & Weather analysis
Week 11 March 30 – April 3	<ul style="list-style-type: none"> • Weather Hazards 2: Hurricanes 	<ul style="list-style-type: none"> • Chap 14 	<ul style="list-style-type: none"> • Flood (drought) hazard analysis
Week 12 April 6 - 10	<ul style="list-style-type: none"> • Weather Hazards 3: Thunderstorms & Tornadoes 	<ul style="list-style-type: none"> • Chap 15 	<ul style="list-style-type: none"> • Runoff and Debris flow analysis
Week 13 April 13 - 17	<ul style="list-style-type: none"> • Coastal Hazards: Waves, Sea-level Rise & Erosion 	<ul style="list-style-type: none"> • Chap 13 	<ul style="list-style-type: none"> • Wave processes, sand transport
Week 14 April 20 - 24	<ul style="list-style-type: none"> • Rivers and Flooding 	<ul style="list-style-type: none"> • Chap 11 • Chap 12 	<ul style="list-style-type: none"> • Prediction: Storm Paths, Wave size
Week 15 April 27 – May 1	<ul style="list-style-type: none"> • Conclusions • Population Growth 		<ul style="list-style-type: none"> • Natural Hazards Journal due
Week 16 May 4 – 16	EXAM/Review WEEK		