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GEO 107N.50: Natural Disasters

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Geo 107N – Natural Disasters

Instructor information

Instructor: Dr. Hilary Martens || Office: CHCB 329/330 || Distance Learning (WWW)
 Email: hilary.martens@umontana.edu || Phone: 406.243.6855 || Office hours: By appointment

Course description:

Earth is a dynamic planet that produces energy internally and acquires energy from outside sources. The concentration and release of energy due to natural processes can cause catastrophic destruction and loss of life. The Earth currently supports a human population of over 7 billion, and the population continues to increase exponentially. Understanding the science and risks behind natural disasters can help us to prepare for and mitigate the impact of destructive events. In this course, we will explore many of the most common natural disasters and the forces that drive them. In particular, we will study plate tectonics, earthquakes, volcanoes, tsunamis, tornadoes, hurricanes, climate change, floods, fires, landslides, avalanches, and impacts with space objects.

Learning Outcomes:

By the end of the course, students should be able to:

1. Describe the causes and consequences of plate tectonics and the transfer of energy between Earth systems
2. Differentiate between natural hazards, disasters, and risks
3. Describe the physical processes that drive a wide variety of natural disasters
4. Develop plans for personal preparedness in their own communities
5. Assess natural hazards in the environment based on previous natural events and physical characteristics
6. Consider how natural events can trigger or exacerbate other natural events
7. Discuss best practices for mitigating economic losses and human casualties from future natural disasters
8. Appreciate the impact of natural hazards on society and the role that science can play in hazard mitigation

Required textbooks:

Hyndman & Hyndman (2017), *Natural Hazards and Disasters*, 5th Ed., Cengage Learning

Course Calendar*:

* Subject to change: We will try to stick to the schedule as best as possible, but may need to adjust from time to time.

| Dates | Topic | Special Assignments and Due Dates |
|----------------------|------------------------------------|---|
| 01/22 – 01/26 | Human Populations | Readings, Discussion Questions, and Daily Quizzes |
| 22 January | Energy Sources | |
| 24 January | Human Population | |
| 26 January | Education and Economics | |
| 01/29 – 02/02 | Plate Tectonics | Readings, Discussion Questions, and Daily Quizzes |
| 29 January | Earth Structure | |
| 31 January | Plate Boundaries | |
| 2 February | Sea-Floor Spreading | |
| 02/05 – 02/09 | Earthquakes I | Readings, Discussion Questions, and Daily Quizzes |
| 5 February | Faults | |
| 7 February | Seismology | |
| 9 February | Earthquake Magnitude and Intensity | |
| 02/12 – 02/16 | Earthquakes II | Readings, Discussion Questions, and Daily Quizzes |
| 12 February | Earthquake Forecasting | |
| 14 February | Earthquake Hazard and Risk | |
| 16 February | Earthquake Early Warning | Due: Term Project 1 – Part 1 -- Available: Midterm Exam 1 (Due: Monday 26 February 2018) |
| 02/19 – 02/23 | Tsunamis | Readings, Discussion Questions, and Daily Quizzes |
| 19 February | Presidents' Day (no class) | |
| 21 February | Physics of Tsunamis | |
| 23 February | Tsunami Effects and Mitigation | |
| 02/26 – 03/02 | Volcanoes | Readings, Discussion Questions, and Daily Quizzes |

| Dates | Topic | Special Assignments and Due Dates |
|----------------------|---|--|
| 26 February | What are Volcanoes? | Due: Midterm Exam 1 |
| 28 February | Volcanic Eruptions | |
| 2 March | Volcano Hazards | |
| 03/05 – 03/09 | Mass Movements | Readings, Discussion Questions, and Daily Quizzes |
| 5 March | Catch-up / Independent Study Day | <i>Opportunity to work on projects, readings, exams, and quizzes</i> |
| 7 March | Causes of Mass Movements | |
| 9 March | Types of Mass Movements | |
| 03/12 – 03/16 | Atmosphere and Oceans | Readings, Discussion Questions, and Daily Quizzes |
| 12 March | Earth's Water Cycle | |
| 14 March | Ocean-Atmosphere Interactions | |
| 16 March | Monsoons and Mountain Winds | Available: Midterm Exam 2 (Due: Wednesday 4 April 2018) |
| 03/19 – 03/23 | Severe Weather and Storms | Readings, Discussion Questions, and Daily Quizzes |
| 19 March | Drought and Heat Waves | |
| 21 March | Severe Storms | |
| 23 March | Tornadoes | Due: Term Project 1 – Part 2 |
| 03/26 – 03/30 | ** Spring Break (no classes) ** | |
| 04/02 – 04/06 | Climate Change | Readings, Discussion Questions, and Daily Quizzes |
| 2 April | Principles of Climate | |
| 4 April | Climate History | Due: Midterm Exam 2 |
| 6 April | Mitigation of Climate Change | |
| 04/09 – 04/13 | Floods | Readings, Discussion Questions, and Daily Quizzes |
| 9 April | Stream Flow | |
| 11 April | Flood Intensity | |
| 13 April | Mitigating Flood Damage | Due: Term Project 2 – Part 1 |
| 04/16 – 04/20 | Hurricanes | Readings, Discussion Questions, and Daily Quizzes |
| 16 April | Catch-up / Independent Study Day | <i>Opportunity to work on projects, readings, exams, and quizzes</i> |
| 18 April | Hurricane Formation | |
| 20 April | Hurricane Damages | Available: Midterm Exam 3 (Due: Monday 30 April 2018) |
| 04/23 – 04/27 | Wildfires | Readings, Discussion Questions, and Daily Quizzes |
| 23 April | Causes and Stages | |
| 25 April | Spread of Fires | |
| 27 April | Montana Wildfires | |
| 04/30 – 05/04 | Impacts with Space Objects | Readings, Discussion Questions, and Daily Quizzes |
| 30 April | Space Objects | Due: Midterm Exam 3 |
| 2 May | Historic Impacts | |
| 4 May | Risk of Impacts | Due: Term Project 2 – Part 2 |
| 7-11 May | Final Exam | Final Exam (Due: Friday 11 May 2018 by 5 pm) |

Required assignments and exams:

1. Daily Readings: You are expected to complete daily readings as you proceed through the course.
2. [15%] Term Project 1: Historical Natural Disaster
3. [15%] Term Project 2: Interview a Community Leader
4. [10%] Midterm Exam 1: Human Populations, Plate Tectonics, Earthquakes I, Earthquakes II
5. [10%] Midterm Exam 2: Tsunamis, Volcanoes, Mass Movements, Atmosphere and Oceans
6. [10%] Midterm Exam 3: Severe Weather and Storms, Climate Change, Floods, Hurricanes
7. [10%] Final Exam: Comprehensive
8. [20%] Daily Quizzes: You may re-take the daily quizzes as many times as you wish; I will take your highest scores.
9. [10%] Discussion Questions: You will be awarded full credit when your responses are on topic and complete.

Course guidelines and policies:

Student Conduct Code

All students are expected to abide by The University of Montana's Student Conduct Code:
https://www.umt.edu/vpsa/policies/student_conduct.php

Attendance

Regular participation in online course exercises is expected. If you need to miss or delay an activity, please inform me in advance.

Course withdrawal

Please refer to Institute policy on adding, dropping, and withdrawing from courses:
<https://www.umt.edu/registrar/students/dropadd.php>

Disability modifications

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and [Disability Services for Students](#). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Assignment expectations

Readings, quizzes, projects, exams and other course activities are expected to be completed thoughtfully and on-time.

Honor Code: "No member of the community shall take unfair advantage of any other member of the community." *

Plagiarism: Reproducing the work of someone else, and representing the work as your own, without appropriate citation and * attribution is forbidden. Plagiarism extends beyond tangible material to also include ideas. When in doubt, cite. *

Collaboration: Since the course is fully on-line, peer-to-peer collaboration will not look the same as in other courses. Although you * are welcome and encouraged to discuss general course materials with your fellow classmates, it is expected that you complete the readings, daily quizzes, discussion questions, term projects, and exams on your own. Please respect and uphold the Honor Code.

More information on UM's academic policies and procedures:
http://archive.umt.edu/catalog/14_15/academics/academic-policy-procedure.php

Grading policy

| | | | | |
|-----------------|---------------|--|-----------------------|-----|
| Term Project 1: | 15% | | Term Project 2: | 15% |
| Daily Quizzes: | 20% | | Discussion Questions: | 10% |
| Midterm Exams: | 30% (3 x 10%) | | Final Exam: | 10% |

Late assignments will not be accepted. It is recommended that you begin assignments early and keep track of due dates. Daily quizzes will be graded, but you may re-take them as many times as you like, and I will only record your highest scores. Responses to Discussion Questions will not be graded for specific content, but they must be on topic and written in complete sentences.

Additional Information and resources

Student Academic Resources *

Disability Services for Students (DSS): <http://www.umt.edu/dss/> *
The Writing Center: <http://www.umt.edu/writingcenter/> *
Office for Student Success: <http://www.umt.edu/oss/> *
Career Services: <http://www.umt.edu/career/> *
Mansfield Library: <http://www.lib.umt.edu> *

Student Health and Wellbeing *

Curry Health Center (mental health, physical health, pharmacy, health promotion): <http://www.umt.edu/curry-health-center/> *
Campus Recreation: <http://www.umt.edu/crec/> *
DiverseU: <http://www.umt.edu/diverseu/> *
Student Activity Groups: http://www.umt.edu/asum/student_groups/ *