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GEO 107N.50: Natural Disasters (Online)

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Geo 107N – Natural Disasters | Fall 2021

Instructor information

Instructor: Dr. Hilary Martens || Office: CHCB 329/330 || Distance Learning (WWW)
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Course description:

Earth is a dynamic planet that generates 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 grow. 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

Natural Science (N) General Education Learning Outcomes:

These courses present scientific conclusions about the structure and function of the natural world, and demonstrate or exemplify scientific questioning and validation of findings. Upon completion of a Natural Science course, a student will be able to:

1. Understand the general principles associated with the discipline(s) studied;
2. Understand the methodology and activities scientists use to gather, validate and interpret data related to natural processes;
3. Detect patterns, draw conclusions, develop conjectures and hypotheses, and test them by appropriate means and experiments;
4. Understand how scientific laws and theories are verified by quantitative measurement, scientific observation, and logical/critical reasoning;
5. And understand the means by which analytic uncertainty is quantified and expressed in the natural sciences.

Textbook:

To save you money and time, we have now made a full transition to using **Open Educational Resources** (OERs)! OERs are educational resources that exist in the public domain. We therefore no longer require a traditional fee-based textbook for this course. All required reading and learning materials will be provided to you, **free of charge**, within the course. ☺

If you would like to have a traditional textbook to supplement your learning experience, then I can recommend the following:
Optional e-book: Hyndman & Hyndman (2017), *Natural Hazards and Disasters*, 5th Ed., Cengage Learning

Important Dates:

UM Office of the Registrar: https://www.umt.edu/registrar/calendar.php

Course Calendar**:

** The topics and dates are highly unlikely to change, but occasional updates may be necessary due to unforeseen circumstances.

Dates	Topic	Assignments and Due Dates
Week 1	**Energy and Earth Systems**	Readings, Discussion Questions, and Daily Quizzes
30 August	Unit 1: Energy and Earth Systems	
01 September	Unit 1: Science of Disasters	
03 September	Unit 1: Hazard and Risk	
Week 2	**Plate Tectonics**	Readings, Discussion Questions, and Daily Quizzes
06 September	**Labor Day – No Class**	
08 September	Unit 2: Earth Structure	
10 September	Unit 2: Plate Boundaries	

Dates	Topic	Assignments and Due Dates
Week 3	**Earthquakes I**	Readings, Discussion Questions, and Daily Quizzes
13 September	Unit 2: Evidence for Plate Tectonics	
15 September	Unit 3: Faults	
17 September	Unit 3: Seismology	
Week 4	**Earthquakes I / II**	Readings, Discussion Questions, and Daily Quizzes
20 September	Unit 3: Earthquake Magnitude and Intensity	
22 September	Unit 4: Earthquake Forecasting	
24 September	Unit 4: Earthquake Hazard and Risk	
Week 5	**Earthquakes II**	Readings, Discussion Questions, and Daily Quizzes
27 September	Unit 4: Earthquake Early Warning	
29 September	**Catch-up / Independent Study Day**	*Opportunity to work on projects, readings, exams, and quizzes*
01 October	**Midterm Exam 1**	
Week 6	**Tsunamis**	Readings, Discussion Questions, and Daily Quizzes
04 October	Unit 5: Physics of Tsunamis	**Due: Midterm Exam 1**
06 October	Unit 5: Tsunami Effects and Mitigation	
08 October	Unit 6: What are Volcanoes?	
Week 7	**Volcanoes**	Readings, Discussion Questions, and Daily Quizzes
11 October	Unit 6: Volcanic Hazards	
13 October	Unit 6: Yellowstone Supervolcano	
15 October	**Catch-up / Independent Study Day**	*Opportunity to work on projects, readings, exams, and quizzes*
Week 8	**Atmosphere and Oceans**	Readings, Discussion Questions, and Daily Quizzes
18 October	Unit 7: The Water Cycle	**Due: Project Part 1**
20 October	Unit 7: Ocean-Atmosphere Interactions	
22 October	Unit 7: Monsoons and Mountain Winds	
Week 9	**Storms and Extreme Weather**	Readings, Discussion Questions, and Daily Quizzes
25 October	Unit 8: Drought and Heat Waves	
27 October	Unit 8: Severe Storms	
29 October	**Midterm Exam 2**	
Week 10	**Climate Change**	Readings, Discussion Questions, and Daily Quizzes
01 November	Unit 9: Principles of Climate	**Due: Midterm Exam 2**
03 November	Unit 9: Climate History and Change	
05 November	Unit 9: Mitigation of Climate Change	
Week 11	**Floods**	Readings, Discussion Questions, and Daily Quizzes
08 November	Unit 10: Stream Flow	
10 November	Unit 10: Flooding	
12 November	**Catch-up / Independent Study Day**	*Opportunity to work on projects, readings, exams, and quizzes*
Week 12	**Hurricanes**	Readings, Discussion Questions, and Daily Quizzes
15 November	Unit 10: Mitigating Flood Damage	**Due: Project Part 2**
17 November	Unit 11: Hurricane Formation	
19 November	Unit 11: Hurricane Damages	
Week 13	**Midterm & Thanksgiving Break**	Readings, Discussion Questions, and Daily Quizzes
22 November	**Catch-up / Independent Study Day**	*Opportunity to work on readings, exams, and quizzes*
24 November	**Thanksgiving Holiday – No Class**	
26 November	**Thanksgiving Holiday – No Class**	
Week 14	**Wildfires**	
29 November	**Midterm Exam 3**	
01 December	Unit 12: Causes and Behavior	**Due: Midterm Exam 3**

Dates	Topic	Assignments and Due Dates
03 December	Unit 12: Management and Mitigation	
Week 15	**Wildfires & Course Wrap-up**	**Available: Final Exam @ 5 PM on 18 November**
06 December	Unit 12: Montana Wildfires	
08 December	**Catch-up / Independent Study Day**	*Opportunity to work on readings, exams, and quizzes*
10 December	**Wrap up / Course Evaluations**	
Week 16	**Finals Week**	**Available: Final Exam @ 5 PM on 10 December**
13-17 December	**Final Exam**	**Final Exam (Due: Friday 17 December 2021 by 5 PM)**

Required assignments and exams:

1. Daily Readings: You are expected to complete daily readings as you work through the course.
2. [20%] Term Project: Natural Disasters in the News (Part 1: Find and summarize article; Part 2: Research and Reflect)
3. [20%] Daily Quizzes: One quiz per lesson. You may re-take the quizzes; I will only keep your highest scores.
4. [20%] Discussion Forums and Kick-Start Activities: Graded for effort, completeness, thoughtfulness, and grammar.
5. [10%] Midterm Exam 1: Energy and Earth Systems, Plate Tectonics, Earthquakes I, Earthquakes II
6. [10%] Midterm Exam 2: Tsunamis, Volcanoes, Atmosphere and Oceans
7. [10%] Midterm Exam 3: Storms and Extreme Weather, Climate Change, Floods, Hurricanes
8. [10%] Final Exam: Comprehensive (covering all units)

Course guidelines and policies:

Student conduct code

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the **Student Conduct Code**: https://www.umt.edu/safety/policies/default.php

Attendance

Regular participation in online course exercises is expected. Leading up to each course deadline (see green highlights in the calendar above), you may work through course materials at your own pace. However, if you need to miss or delay activities by a large amount of time (more than about one week), then 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

Important dates and deadlines are provided by the Office of the Registrar:
https://www.umt.edu/registrar/calendar.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. The University does not permit fundamental alterations of academic standards or retroactive modifications. It is the responsibility of the student to ensure that I am aware of requested modifications as soon as possible during the term (including providing me a copy of their official DSS letter).

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.” (Caltech)

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.

Grading policy

Term Project:	**20%**
Daily Quizzes:	**20%**
Discussions & Activities:	**20%** (Forums and Kick-Start Activities)
Midterm Exams:	**30%** (3 x 10%)
Final Exam:	**10%**

It is recommended that you begin assignments early and keep track of due dates. Although you can work through course materials mostly at your own pace, **exams and project assignments have specific due dates**. In order to be eligible to take the exams, certain units must be completed first. Daily quizzes will be graded, but you may re-take them as many times as you like, and I will only keep your all-time highest score from each quiz. Responses to Forums and Kick-Start Activities ("Participation") will be graded primarily for completeness, effort, thoughtfulness, and writing style (e.g. appropriate spelling and grammar, complete sentences, etc.), rather than the scientific "correctness" of the response.

We use traditional letter grades: A [93–100%], A- [90–92.99%], B+ [87–89.99%], B [83–86.99%], B- [80–82.99%], etc.

Late assignments

Late assignments will only be accepted for full credit with **prior written approval** (e.g. disability with official DSS letter) or as a result of **extenuating circumstances** beyond the control of the student (e.g. hospitalization of the student). Formal documentation must normally be provided in the case of extenuating circumstances. Situations will be evaluated by the instructor on a case-by-case basis, and the acceptance of a late assignment or exam is **not guaranteed**.

The guiding principal will be in the **spirit of fairness** to all students in the course, based on the **Honor Code** (see above). We have six deadlines during the term: three midterm exams, one final exam, and two project assignments. Leading up to each deadline, you may work through the material at your own pace. It is the responsibility of each student to plan ahead and submit work on time. **Late assignments will incur the following penalties**:

- **Projects**: A deduction of **10%** off the maximum possible grade will be assessed for every 24-hour period that elapses beyond the deadline. The weekend will count as one 24-hour period.
- **Midterm Exams**: A deduction of **20%** off the maximum possible grade will be assessed for every 24-hour period that elapses beyond the deadline. The weekend will count as one 24-hour period. If you missed the deadline for an exam, you must first email me to reopen the exam portal for you on Moodle.
- **Final Exam**: Late Final Exams will **not** be accepted.
- **Quizzes and Forums**: Quizzes and forum responses may be submitted at any time throughout the semester without penalty. Keep in mind, however, that certain activities must be completed in order to be eligible to take the exams.

Cultural leave policy

Cultural or ceremonial leave allows excused absences for cultural, religious, and ceremonial purposes to meet the student's customs and traditions or to participate in related activities. To receive an authorized absence for a cultural, religious or ceremonial event the student or their advisor (proxy) must submit a formal written request to the instructor. This must include a brief description (with inclusive dates) of the cultural event or ceremony and the importance of the student's attendance or participation. Authorization for the absence is subject to approval by the instructor. Appeals may be made to the Chair, Dean or Provost. The excused absence or leave may not exceed five academic calendar days (not including weekends or holidays). Students remain responsible for completion or make-up of assignments as defined in the syllabus, at the discretion of the instructor.

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/

Tips for Success and Frequently Asked Questions

1. Each "lesson" in our Moodle course is equivalent to one in-class lecture. I strongly recommend that you **take notes** as you read the content and engage with the multi-media (e.g. videos, animations, and activities). Taking notes, or even speaking out loud, may help you to engage more actively with the material and to retain it better.
2. **Use the quizzes at the end of each lesson as study guides.** The exam questions will be very similar to the quiz questions. Also, you can retake the quizzes as many times as you like, and I will only keep your top scores.
3. **Question:** Is it really true that I can take the quizzes as many times as I want, and you will only keep my all-time highest scores at the end of the semester? That seems too good to be true! **Answer**: Yes, this is correct! Everyone should get 100% for their quiz grade, no matter how many mistakes you make at first. The quizzes are designed as study guides. You can retake them as many times as you like. I will only keep your highest score of all time for each quiz. The bottom line → **The quizzes are risk-free – no stress, just learning!**
4. To be successful in this course, you must (1) submit all your work, and (2) **submit all your work on time**. Even if you fail an exam, chances are that you can still pass the class (and maybe even still receive an A!) as long as you submit all your work on time. The best thing to do is to stay on track and work diligently through the material each week. Do not put everything off until the last minute. If you work steadily and actively through the material, and submit all of your work on time, then you are highly likely to succeed in this class, regardless of your prior experience in math and science.
5. **I don't have a computer; can I take the course on my mobile phone?** Technically, yes you could take the course on most mobile phones, but it is **not recommended**. The small screen size of a mobile phone may make it difficult to navigate and read course materials. If you need a computer, free computers are available on campus for students to use, including at the Mansfield Library and in some departments.
6. **Start the project early**, and use the UM Writing Center as a resource. I know… procrastination is tempting. But I strongly encourage you to start your project early so that you can have time to create your best work and explore your topic fully!
7. **Feeling confused? Reach out!** Please feel free to start discussions and ask questions using the open forums at the bottom of each unit. Online courses present challenges for student engagement – it is easy to stay in your own bubble when you aren't in a classroom surrounded by other people. I encourage everyone to participate in the open discussions.
8. **This is my first online course – help!** I have structured the course with straight-forward navigation – you cannot move onto a new activity until a previous one is complete. For some activities (e.g. supplemental readings), you can mark completion on your own. For other activities (e.g. quizzes), completion will be marked automatically after you finish the quiz. Please take a moment right now to explore the main Moodle page for our course. Look for the links to the exams and the project. Please also keep an eye on deadlines (especially for the exams and project); it is your responsibility to submit your work on time. Feel free to reach out if you have questions. Have fun and enjoy the course!
9. **Why doesn't this class require a textbook?** In order to save students money and time, we have transitioned to using open educational resources (i.e. educational resources that are available free of charge). The additional learning resources are provided, **free of charge**, as supplemental readings and activities at the end of each lesson.
10. **How do you recommend that I prepare for the exams?** A good place to start would be to review the quizzes at the end of each lesson. Exam questions will be similar to the quiz questions. You might also find it helpful to review readings and "lecture" materials (e.g. videos and animations from each lesson). Unlike the quizzes, the exams will be timed and you will only be allowed to take each exam once. Only begin the exams when you are prepared to do so (but before the deadline).
11. **How can I engage more with other students in the course?** One of the best ways to engage directly with other students in the course is by posting to the open discussion forums at the end of each unit or the "Common Room" forum.
12. **Why are some quizzes, activities, and readings labeled as "optional"?** We have limited time to cover a huge variety of interesting and important topics! Rather than remove some of these topics from the course entirely, I have kept them in as optional activities/readings. If you are particularly interested in a certain topic that we do not have time to cover, then you may be interested to participate in some of the optional activities (but you are not required to do so). Each lesson has an optional quiz in addition to the required quiz – the optional quizzes provide you with an opportunity to review the lesson in greater detail, but they are not required. The optional quizzes contain questions from the graded quiz as well as additional questions that may help you to review the lesson in preparation for the exams.