

# Geo 107N – Natural Disasters | Fall 2019

## Instructor information

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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

## Textbook:

**To save you money and hassle**, we are transitioning this semester to **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. ☺

**Feedback Welcome:** OERs are still relatively new, and are not well funded like commercial textbooks. To optimize quality and content, I have pulled materials from a wide variety of different sources, with the goal of providing the most enriching, accurate, clear, and useful learning experience possible. I hope that the free resources will facilitate an improved and fairer learning experience for each and every student. Particularly since this is the first time we are using OERs in Geo 107N, I welcome your feedback throughout the semester (you may email me directly and/or respond to the surveys mid- and post-semester). In what ways has your learning experience been improved, or worsened, by replacing a traditional fee-based textbook with OERs?

If you would still prefer a traditional textbook to supplement your learning experience, then I can recommend the following:

**Optional e-book (not required!):** Hyndman & Hyndman (2017), *Natural Hazards and Disasters*, 5<sup>th</sup> Ed., Cengage Learning [Access codes are available directly from Cengage (and also usually from the UM Bookstore)]

## 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
<b>08/26 – 08/30</b>	<b>Energy and Earth Systems</b>	Readings, Discussion Questions, and Daily Quizzes
26 August	Unit 1: Energy and Earth Systems	
28 August	Unit 1: Science of Disasters	
30 August	Unit 1: Hazard and Risk	
<b>09/02 – 09/06</b>	<b>Plate Tectonics</b>	Readings, Discussion Questions, and Daily Quizzes
02 September	<b>Labor Day – No Class</b>	
04 September	Unit 2: Earth Structure	
06 September	Unit 2: Plate Boundaries	
<b>09/09 – 09/13</b>	<b>Earthquakes I</b>	Readings, Discussion Questions, and Daily Quizzes
09 September	Unit 2: Sea-Floor Spreading	
11 September	Unit 3: Faults	
13 September	Unit 3: Seismology	
<b>09/16 – 09/20</b>	<b>Earthquakes II</b>	Readings, Discussion Questions, and Daily Quizzes
16 September	Unit 3: Earthquake Magnitude and Intensity	<b>Last day to drop course on Cyberbear</b>
18 September	Unit 4: Earthquake Forecasting	

Dates	Topic	Assignments and Due Dates
20 September	Unit 4: Earthquake Hazard and Risk	
<b>09/23 – 09/27</b>	<b>Tsunamis</b>	Readings, Discussion Questions, and Daily Quizzes
23 September	Unit 4: Earthquake Early Warning	
25 September	Unit 5: Physics of Tsunamis	
27 September	Unit 5: Tsunami Effects and Mitigation	<b>Due: Midterm Exam 1</b>
<b>09/30 – 10/04</b>	<b>Volcanoes</b>	Readings, Discussion Questions, and Daily Quizzes
30 September	Unit 6: What are Volcanoes?	
02 October	Unit 6: Volcanic Eruptions	
04 October	Unit 6: Volcano Hazards	
<b>10/07 – 10/11</b>	<b>Mass Movements</b>	Readings, Discussion Questions, and Daily Quizzes
07 October	<b>Catch-up / Independent Study Day</b>	<i>Opportunity to work on projects, readings, exams, and quizzes</i>
09 October	Unit 7: Causes of Mass Movements	
11 October	Unit 7: Types of Mass Movements	<b>Due: Project Part 1</b>
<b>10/14 – 10/18</b>	<b>Atmosphere and Oceans</b>	Readings, Discussion Questions, and Daily Quizzes
14 October	Unit 8: Earth's Water Cycle	
16 October	Unit 8: Ocean-Atmosphere Interactions	
18 October	Unit 8: Monsoons and Mountain Winds	
<b>10/21 – 10/25</b>	<b>Storms and Extreme Weather</b>	Readings, Discussion Questions, and Daily Quizzes
21 October	Unit 9: Drought and Heat Waves	
23 October	Unit 9: Severe Storms	
25 October	Unit 9: Tornadoes	<b>Due: Midterm Exam 2</b>
<b>10/28 – 11/01</b>	<b>Climate Change</b>	Readings, Discussion Questions, and Daily Quizzes
28 October	Unit 10: Principles of Climate	
30 October	Unit 10: Climate History	
01 November	Unit 10: Mitigation of Climate Change	
<b>11/04 – 11/08</b>	<b>Floods</b>	Readings, Discussion Questions, and Daily Quizzes
04 November	Unit 11: Stream Flow	
06 November	Unit 11: Flood Intensity	
08 November	Unit 11: Mitigating Flood Damage	<b>Due: Project Part 2</b>
<b>11/11 – 11/15</b>	<b>Hurricanes</b>	Readings, Discussion Questions, and Daily Quizzes
11 November	<b>Veterans Day Observed – No Class</b>	
13 November	Unit 12: Hurricane Formation	
15 November	Unit 12: Hurricane Damages	
<b>11/18 – 11/22</b>	<b>Wildfires</b>	
18 November	Unit 13: Causes and Stages	
20 November	Unit 13: Spread of Fires	
22 November	Unit 13: Montana Wildfires	<b>Due: Midterm Exam 3</b>
<b>11/25 – 11/29</b>	<b>Break</b>	Readings, Discussion Questions, and Daily Quizzes
25 November	<b>Catch-up / Independent Study Day</b>	<i>Opportunity to catch-up, work ahead, and study for the Final</i>
27 November	<b>Student Travel Day – No Class</b>	
29 November	<b>Thanksgiving Break – No Class</b>	
<b>12/02 – 12/06</b>	<b>Space Objects</b>	Readings, Discussion Questions, and Daily Quizzes
02 December	Unit 14: Space Objects	
04 December	Unit 14: Historic Impacts	
06 December	Unit 14: Risk of Impacts	<b>Available: Final Exam @ 5 PM</b>
<b>09-13 December</b>	<b>Final Exam</b>	<b>Final Exam (Due: Friday 13 December 2019 by 5 PM)</b>

## Required assignments and exams:

1. Daily Readings: You are expected to complete daily readings as you work through the course.
2. [20%] Term Project: Current Event
3. [20%] Daily Quizzes: You may re-take the daily quizzes as many times as you wish; I will take your highest scores.
4. [15%] Participation: Discussion forums and kick-start activities.
5. [10%] Midterm Exam 1: Energy and Earth Systems, Plate Tectonics, Earthquakes I, Earthquakes II
6. [10%] Midterm Exam 2: Tsunamis, Volcanoes, Mass Movements, Atmosphere and Oceans
7. [10%] Midterm Exam 3: Storms and Extreme Weather, Climate Change, Floods, Hurricanes
8. [15%] Final Exam: Comprehensive

## 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. 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>

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.

### 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:	<b>20%</b>
Daily Quizzes:	<b>20%</b>
Participation:	<b>15%</b>
Midterm Exams:	<b>30%</b> (3 x 10%)
Final Exam:	<b>15%</b>

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 keep 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.

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.

## 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/](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 are in need of 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.