

Principles of Geoscience: Natural Hazards and Society (GEOSC-111)

Spring 2025 Syllabus

Instructor: Shreya Kanakiya

Office: Taylor Science Center Room 1022

Email: skanakiy@hamilton.edu

Class Schedule: Mon-Wed-Fri 11.00-11.50 AM | **Lab Schedule:** Wed 1.00-3.00 PM **Class/Lab Location:** Classes will be held at Taylor Science Center Room 1033. Labs will be conducted in rooms 1033 and 3019 in the Taylor Science Center based on the contents that week, location details will be confirmed on the Monday before each lab.

Welcome to Principles of Geoscience: Natural Hazards and Society!

Natural hazards shape several aspects of our society. In this course, we will undertake an interdisciplinary study of how natural hazards impact our society. We will explore the nature of various natural hazards including earthquakes, volcanic eruptions, landslides, flooding, severe weather, and climate change, and the risk they pose to society. Emphasis will be placed on understanding current hazard monitoring and prediction strategies, data and science-based risk assessment, and associated uncertainty. We will also discuss case studies of various mitigation practices.

Educational Goals and Learning Outcomes

Hamilton College challenges its students to foster the fulfillment of the eight educational goals throughout their time at the College. Below is a description of how the expected learning outcomes of this course promote several of these goals:

- **Intellectual Curiosity and Flexibility** - Students will examine facts, phenomena, and issues about natural hazards and how they impact our society.
- **Aesthetic Discernment** - Students will learn to evaluate and describe patterns in past natural disasters. They will learn to interpret data from various hazard monitoring methods.
- **Analytic Discernment** - Students will learn basic concepts in the scientific field of Earth Sciences. They will also learn how to analyze and interpret data from various hazard monitoring methods to make inferences about the risk posed to society.
- **Disciplinary Practice** - Students will engage in the focused practice of disciplinary techniques and methods in natural hazards, catastrophe modeling, and risk management.
- **Communication and Expression** - Students will learn to communicate and express their interpretations about natural hazard risk in both written and oral forms through formal presentations and informal classroom discussions. They will discuss ways to communicate information about risk to help people make informed decisions to mitigate the effects of a potential hazard.
- **Ethical, Informed, and Engaged Citizenship** - Students will be asked to consider and evaluate how exposure to natural hazards and their impacts is distributed across different regions. They will engage in discussions to develop strategies for reducing vulnerability to natural hazards risk.

Quantitative & Symbolic Reasoning (QSR)-Intensive designation:

This course meets the College's expectations for the QSR-Intensive designation. Therefore, this class will:

- Include material in at least one of the following three categories:
 - **Statistical Analysis** - The use of statistical analysis to describe data and make inferences.
 - **Mathematical Representation** - The use of mathematical models such as those based on graphs, equations, and geometric objects to represent patterns, relationships, and forms.
 - **Logic and Symbolic Reasoning** - The use of formal logic or symbolic reasoning such as in the following examples: the proper construction of a computer program or a formal proof; the analysis of language in linguistics; or the study of music theory.
- Include four or more graded assignments (tests, quizzes, problem sets, labs, oral presentations, exhibits) in at least one of the three categories described above. QSR projects will be substantial and will be distributed across the semester.
- Provide explicit instruction in problem-solving or data analysis techniques and strategies specific to the level and content of the course.

Textbook and Readings

The following textbook will be used in this course - Natural Disasters (1st Edition), 2022, Stephen Marshak, Robert Rauber, and Neil Johnson. The textbook will be available through the Hamilton College Bookstore. Additional readings will be uploaded on Blackboard.

Course Schedule

Dates	Topic	Assignments
Part 1: Introduction		
Week 0 & 1 (Jan 22 to Jan 24)	Hazards vs risk. Natural hazards vs Natural disasters. Energy sources of natural disasters.	
Week 2 (Jan 27 to Jan 31)	Earth's structure and plate tectonics. Plate boundaries and hazards.	Quiz 1# Natural hazards and risk (Due Fri Jan 31 at 4 PM)
Part 2: Geophysical hazards		
Week 3 (Feb 3 to Feb 7)	Faults and Earthquakes. Seismic waves, earthquake characteristics, and ground motion.	
Week 4 (Feb 10 to Feb 14)	Earthquake prediction, forecasts, and mitigation.	
Week 5 (Feb 17 to Feb 21)	Tsunami generation, movement, and mitigation.	
Week 6 (Feb 24 to Feb 28)	Generation of magma, volcanoes in various tectonic environments, types of volcanoes, and eruption products.	Quiz 2# Geophysical hazards 1 (Due Fri Feb 28 at 4 PM)
Week 7 (Mar 3 to Mar 7)	Volcanic hazards and mitigation	
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Course Schedule – continued from previous page

Dates	Topic	Assignments
Week 8 (Mar 10 to Mar 14)	Development of slope instabilities. Types of downslope movement, landslide hazards, and mitigation.	Mid-term Assignment ((Due Fri Mar 14 at 4 PM)
Week 9 (Mar 17 to Mar 21)	Spring recess	
Week 10 (Mar 24 to Mar 28)	Spring recess	
Part 3: Meteorological hazards		
Week 11 (Mar 31 to Apr 4)	Basic elements of weather. Thunderstorms and tornadoes.	
Week 12 (Apr 7 to Apr 11)	Hurricane formation, classification and movement. Storm damages. Hurricane prediction and planning. Extratropical cyclones and Nor'easters.	Quiz 3# Meteorological hazards (Due Fri Apr 11 at 4 PM)
Part 4: Hydrological hazards		
Week 13 (Apr 14 to Apr 18)	Stream and flood processes.	Quiz 4# Hydrological hazards (Due Fri Apr 18 4 PM)
Part 5: Climatological hazards		
Week 14 (Apr 21 to Apr 25)	Earth's climate history. Climate Change impacts and mitigation.	
Week 15 (Apr 28 to May 2)	Wildfire processes and behaviors. Wildfire management and mitigation.	Quiz 5# Climatological hazards (Due Fri May 2 at 4 PM)
Part 6: Informed decision-making and risk communication		
Week 16 (May 5 to May 9)	Downward counterfactual, risk communication, and the role of society.	
Week 17 and 18 (May 12 to May 19)	Finals	Final exam (Due Fri May 19 at 4 PM)

Office hours

Scheduled office hours Mon 1.30-2.30 PM, Wed 3-4 PM, or by appointment. Scheduled office hours will be held in my office in the Taylor Science Center, Room 1022. Other appointments may be held via Zoom or in-person. Office hours are an opportunity for you to get to know me and for me to get to know you. While you are welcome to drop by directly during office hours, to ensure that all of you get an opportunity to talk, I highly encourage you to reserve a 20-minute slot via Calendly a day in advance (https://calendly.com/skanakiy-hamilton/office_hours_20min_reservation). If you can briefly mention what you would like to talk about, that would also help me come more prepared. Note that the time slots on Calendly are not meant to limit your time to 20 min but rather ensure that everyone who wants to come to office hours has an opportunity to talk. We can always find additional time outside of office hours to discuss more. Come with questions about the natural hazards class, getting involved in research, career-related questions, or anything else you feel like chatting about. My goal is to help you succeed at Hamilton and beyond and I am here to help you in any way I can.

Grading

The final grades will be determined at the semester's end based on the aggregate grades for each of the below assessment criteria. The quizzes and final exam will be in multiple-choice and/or short-answer format. Course grades will be assigned on the below scale.

Assessment Criteria	
Assessments	Percent of final grade
Weekly class/lab exercises	30%
Mid-term Assignment	15%
Homework Readings & Class Participation	5%
Quizzes	35%
Final exam	15%

Grading Scale	
Grade values	Grade
97-100%	A+
93-96.9%	A
90-92.9%	A-
87-89.9%	B+
83-86.9%	B
80-82.9%	B-
77-79.9%	C+
73-76.9%	C
70-72.9%	C-
67-69.9%	D+
63-66.9%	D
60-62.9%	D-
< 60%	F

Student Resources

Support services such as the Writing Center, Quantitative and Symbolic Reasoning Center, Oral Communications Center, and Language Center are available to all students for all courses through Hamilton College.

- **Writing Center:** <https://my.hamilton.edu/academics/centers/writing>
- **Oral Communication Center (OCC):** <https://my.hamilton.edu/academics/centers/oralcommunication>
- **Quantitative & Symbolic Reasoning Center (QSR):** <https://my.hamilton.edu/academics/centers/qsr>
- **Language Center:** <https://www.hamilton.edu/academics/centers/languagecenter>

College & Classroom Policies

Attendance

Most of this course involves hands-on data analysis, discussion of materials, and group work. It is therefore expected that students attend all classes and labs. If you must miss a class or lab, please inform the instructor by email as soon as possible and arrange to obtain notes and information from a classmate. You will still be held responsible for the content, materials, and discussion that you missed. If any extenuating circumstances will prevent you from attending class for an extended period (e.g. severe illness) please contact the Instructor as soon as possible to work out a plan. If any circumstances prevent me from coming to a class, I will inform you through email in advance or through a colleague on the day.

Honor Code

All students are required to read and abide by the Hamilton College Honor Code (<http://www.hamilton.edu/student-handbook/studentconduct/honor-code>). Academic integrity is expected at all times. If you are not clear on how the Honor Code applies to activities and assignments specific to this course, please be sure to ask for clarification.

Classroom Conduct

I want this class to be welcoming for all students and an environment where everyone can freely ask questions, discuss their ideas even if they are conflicting, and help each other learn. We are on this journey together and an environment of mutual respect will create a positive learning experience for everyone involved. All students are expected to familiarize themselves and abide by the Hamilton College Code of Student Conduct.

Accommodations

I want to ensure that this class is accessible to all students. Hamilton is committed to making reasonable accommodations for students with properly documented disabilities. If you are eligible to receive an accommodation(s) and would like to make a formal request for this course, please discuss it with the Instructor within the first two weeks of the semester. You will need to provide the Assistant Dean for Accessibility Resources with appropriate documentation of your disability at the start of the semester. More information is available at <http://www.hamilton.edu/student-handbook/other/disability-support-services>. I request that any student with a documented disability needing academic adjustments or accommodations make an appointment to speak with me within the first two weeks of the semester. All discussions will remain private/confidential.

Late Work

If there is ever a need to submit work late, please inform the instructor 48 hrs before the work is due and obtain approval. Work submitted late without informing and receiving approval from the instructor will count against the final grade. If there are extenuating circumstances (e.g., death in the family, severe illness) that prevent you from coming to class for any in-class graded work, talk to the instructor about the possibility of a make-up assignment.

Use of Technology

Feel free to use laptops/ tablets to take notes in class if you prefer. All cell phones must be silenced and put away during class, lab, and field trips. If you suspect an emergency and need to take a phone call, feel free to step out of the classroom to take the call. Many class activities will require the use of a laptop. I will let you know in advance to bring a laptop along when needed. Use of technology other than for normal course-related work is not permitted during class, lab, or fieldwork.

Safety

Safety should be everyone's primary concern. I will let you know if any lab/ class activity requires special safety measures. If in doubt, err on the side of caution and ask the instructor. Always remember that you are responsible for not only your safety but for the well-being of those around you.

Support for Mental Health

There are times when each of us feels overwhelmed, anxious, or depressed. There are many resources available on campus to support you:

- Counseling Center (www.hamilton.edu/offices/counselingcenter, 315-859-4340) located at 100 College Hill Road offers individual and group therapy, peer counselors, psychiatric treatment, and a 24-hour hotline. Press option 2 to speak with a counselor 24/7/365
- Associate Dean of Students for Student Support Services Sarah Solomon (ssolomon@hamilton.edu)
- Associate Dean of Students for Academics Adam Van Wynsberghe (avanwyns@hamilton.edu)
- Your faculty advisor
- Your RA and Area Director in your residence hall

If at any time you feel suicidal or in danger of harming yourself or others, reach out for support! The Hamilton community cares and is available to help. Campus Safety is available 24/7 for urgent concerns (315-859-4000), as is the Counseling Center (315-859-4340 opt 2).

Disclaimer

The syllabus and schedule are meant to be comprehensive. However, if adjustments are needed as we progress through the course, I will inform you of any changes made and provide an up-to-date syllabus on Blackboard. Furthermore, in the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within the timeframe. I will provide an updated syllabus should such a need arise which will supersede this version.