EESC-1060: Natural Disturbances and Disasters

Fall 2024 Course Prospectus

INSTRUCTOR

Dr Siobhan Whadcoat [whadcoat@sas.upenn.edu], Rm. 451, Hayden Hall

COURSE MEETING TIMES

Mon/Wed, 3:30 – 5:00 pm, DRLB A5

COURSE DESCRIPTION

Natural disasters play a fundamental role in shaping landscapes and structuring ecosystems. The purpose of this course is to introduce you to both the natural and social science of disasters. This course will explore the geologic processes that cause natural disasters, the ecological and social consequences of disasters, and the role of human behavior in disaster management and mitigation. Through exploring these concepts, this class will provide you with a broad background in the geosciences and the basic tools needed to understand how earthquakes, volcanoes, landslides, hurricanes, and wildfires occur; the myriad of ways that we can mitigate against their impacts; and the way in which we can "calculate the cost" of these disasters. By the end of the course, you should be able to:

1. Explain the difference between *hazard* and *risk* and understand how risk is calculated.
2. Recognize and explain key geologic processes that cause natural disasters.
3. Understand how natural disasters shape the Earth's surface and disturb ecosystems.
4. Discuss how humans both exacerbate and reduce the impacts of natural disasters.

COLLEGE/LPS CURRICULUM REQUIREMENTS

This course fulfills the Sector VII Natural Science Across the Disciplines and Quantitative Data Analysis (QDA) requirements for all College and LPS Undergraduates.

COURSE FORMAT

This is a SAIL (Structured, Active, In-Class Learning) class with both in-class and online components. This means that we have an active classroom where most of the class time is devoted to problem-solving together via in-class worksheets, discussions, and other activities. You will work through these activities in small groups with the help of the instructor and TAs. To prepare for our in-class time, you will complete online modules that introduce you to the foundational material for each week. Periodically throughout the semester you will also complete assignments, designed to draw together the material that you are learning both in and out of class. These assignments provide an opportunity for you to develop your data literacy skills and deepen your understanding of course material. There will also be two non-cumulative exams throughout the semester. In this format, your full participation in both the online and in-class components are essential to your learning experience. If you do not enjoy learning via online materials and via engagement in active class discussions, this might not be the right class for you.

COURSE PRE-REQUISITES

This is an undergraduate, 1000-level course, and students may be from any program or major. There are no formal pre-requisites for the course, however you will need access to a computer to watch course videos on a regular basis. In addition, as this course fulfills the QDA requirement, you will be required to recall and use some standard math skills, including solving basic equations and plotting graphs. Recognizing that you may not have taken a math course for some time, there are some materials on Canvas that will refresh your memory and bring you up to speed. You will be expected to work through these materials, and both the instructor and the TAs will be available to help.

COURSE WORKLOAD & EXPECTATIONS

This course covers six topics, as outlined in the course schedule below. Each week you will complete an online module and related tasks and attend class (Mon & Wed) to participate in a variety of activities. Each week will conclude with a short quiz. In addition, there are four assignments throughout the semester and two open-book exams.

Table 1: Approximate course workload. Some weeks will entail a little more work than others, but in general you should allow ~6.5 hrs per week for this class (inclusive of in-class time).

Course Component	Hours	Total hours
SAIL class time	3 hrs per week (x14 wks)	42 hrs
Weekly online modules	2.5 hrs per week (x14 wks)	35 hrs
Assignments	3 hrs per assignment (x4)	12 hrs
Exams (open-book)	1.5 hrs + 6 hrs prep (x2 exams)	15 hrs
Total		**104 hrs** **(~6.5 hrs/week)**

GRADING**

Final grades are based on a combination of the components outlined above. The breakdown is as follows:

In-Class Activities: 15 %
Online Module Exercises: 15 %
Assignments: 40 %
Exam 1:   15 %
Exam 2:   15 %

**Please note that this is subject to minor changes

COURSE SCHEDULE

Table 2: Schedule of course topics, with approximate times of assignments and exams provided. Please note that this is subject to minor changes.

Week	Week beginning	Topic	Assignments
1	Aug 26	1: Introduction to Natural Disasters *The first class is on Aug 28; No class on Sep 2 (Labor Day)*	Assignment 1 *(due at end of Topic 2)*
2	Sep 4		
3	Sep 9	2: Earth Structure & Plate Tectonics	
4	Sep 16		
5	Sep 23	3: Earthquakes & Tsunami	Assignment 2 *(due at end of Topic 3)*
6	Sep 30		
7	Oct 7		
8	Oct 14	***Exam 1: Oct 16th** (Exam review class on Oct 14th)*	
9	Oct 21	4: Volcanoes	Assignment 3 *(due at end of Topic 5)*
10	Oct 28		
11	Nov 4	5: Landslides	
12	Nov 11		
13	Nov 18	6: U.S. Disasters in a Changing Climate: Hurricanes & Wildfire *No class on Nov 27 due to Thanksgiving week schedule*	Assignment 4 *(due at end of Topic 6)*
14	Nov 25		
15	Dec 2		
16	Dec 9	***Exam 2: TBD (University Final Exam Period, Dec 12 – 19)*** *(Exam review class on Dec 9th)*	