Dates are approximate and the syllabus is subject to change.
Abbott is the primary text; all other readings are on reserve in Kresge Library.

**Week 1 (June 20-27)**

Why study natural disasters?
What kinds of questions can be asked?
What is the cost to society of natural disasters?

Basic earth structure: the necessary context for examining natural disasters
  - Nature of geological time
  - Internal processes and plate tectonics
  - Surficial processes

What is scientific inquiry and how do scientists pursue it?

Reading: Abbott, Chs. 1, 2

**Weeks 2 and 3: Earthquakes (June 30-July 2; July 7-11)**

What causes earthquakes?

Types of earthquake hazards and effects
  - Shaking; fault scarps; liquefaction; landslides; structural damage; tsunamis; effects on human psychology and culture

Quantification of earthquakes
  - Seismometers
  - Types of seismic waves
  - Locating earthquakes
  - Earthquake statistics: Rates, spatial distribution
  - Quantifying earthquake size: Magnitude, energy, moment

Tsunamis

Basis for earthquake prediction: possible precursors

Actual predictions and case histories
  - Success, failures, fiascoes, and charlatans
  - Why is it so hard to accurately predict earthquakes?

Mitigation of seismic hazards

Reading: Abbott Chs.3, 4, 5
**Weeks 4 and 5: Volcanic hazards (July 14-18, 21-25)**

Volcanic hazards: lava, tephra, nuées ardentes, pyroclastic flows, bombs, gases, lahars

Where do volcanic eruptions occur?
Types of volcanoes
  Shapes
  Magma types

Prediction of eruptions
  Monitoring
  Impending signs
  Successful and unsuccessful predictions: Case histories and lessons learned (or not learned)

Mitigation of risk
  Zoning/building
  Evacuation plans/emergency preparation
  Human engineering

Eruptions that may have had a significant human impact
  Thera (Santorini)
  Tambora
  El Chichon and Pinatubo

Reading: Abbott Chs. 6, 7;

**July 25: Midterm**

**Week 6: Floods (July 28-August 1)**

Consequences of floods (positive and negative)

Causes of floods

Frequency of flooding--a means to prediction?

Mitigation strategies: success or exacerbation?

Reading: Abbott, Ch. 12

**Weeks 7 and 8: Weather related hazards (August 4-8, 11-15)**

Physics of weather
  Expansion of gases; buoyancy
  Latent heat, condensation, and evaporation
  Coriolis forces

Tornadoes

Hurricanes

Nor’easters
El Niño; effects and possible causes

Reading: Abbott, Chs.9, 10, 11

**Week 9: Meteorite and comet impacts (August 18-20)**

Should impacts be considered a hazard? Human timescales vs. geological timescales

Evidence for impacts in the geological and planetary record

The Cretaceous-Tertiary impact; plant and animal extinctions.
   The death of the dinosaurs???

How to estimate recurrence of low probability events such as impacts? Statistics or, “What, me worry?”

Reading: Abbott, Chs. 14, 15