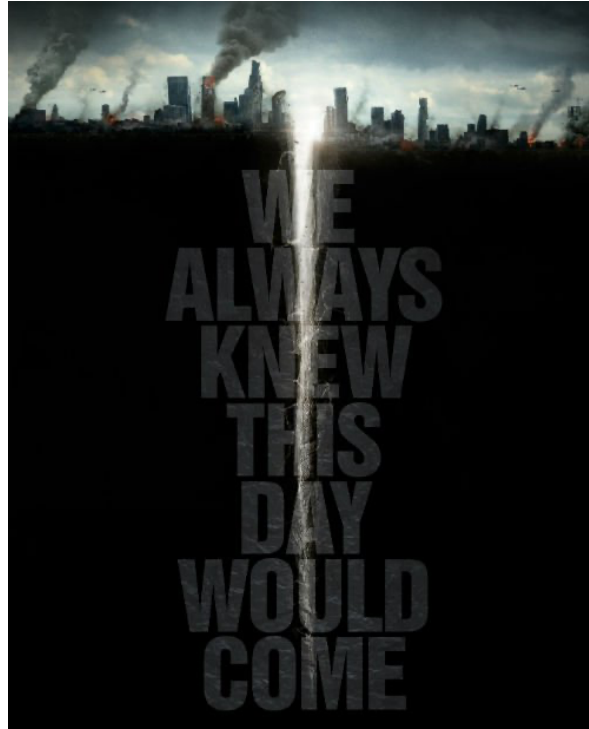


# Honors Forum – UNHP 1100

## Earthquakes in Hollywood

**When and Where:**

Fall Semester, 2022  
Thu 2:40 to 3:35 p.m.  
Engr. Tech Bldg. 200

**Instructor:**

Thomas Göbel  
office: CERI House 2, room 107  
contact: 901-678-4885, [thgoebel@memphis.edu](mailto:thgoebel@memphis.edu)  
Office hours: T 2 to 4 p.m. or by appointment  
Center for Earthquake Research and Information (see map)  
3890 Central Avenue, (EQ2), Room 107



This map shows the locations of the Engineering Tech Building and of the Center of Earthquake Research and Information (CERI). The instructor's office is at CERI, House 2, which is the second building when coming from campus (entrance is in the back).

## Course Description

This class will focus on how science – specifically active tectonic processes (e.g. earthquakes and volcanoes) – is depicted in disaster movies. Students will learn how the Earth works through: presentations, experiments, in-class projects, lectures and – of course – Hollywood movies. We will discuss fundamental earth science concepts such as plate tectonics and mantle convection, and how large-scale processes lead to local phenomena such as volcanic eruptions, tsunamis and earthquakes. Subjects will include theory of plate tectonics, earthquakes and faulting, volcanic eruptions, plate boundary processes, mantle convection, hot spots, surface deformation, elastic rebound, tsunamis, intraplate earthquakes and seismic hazard along the New Madrid seismic zone.

The topics will be introduced through the lens of Hollywood movies, which often include incomplete or incorrect depictions of scientific concepts. Disaster movies have a long tradition in Hollywood film making, and although special effects significantly improved over the years much of the science remains flawed. You will learn to critically evaluate movies in light of basic scientific theory. For instance, we will discuss the mechanisms that lead to the formation of ocean tsunamis and contrast these with the depicted tsunami in the film “San Andreas” (2015). Other films that will be discussed are “Volcano (1997)”, “The Core (2003)”, and “2012 (2009)”.

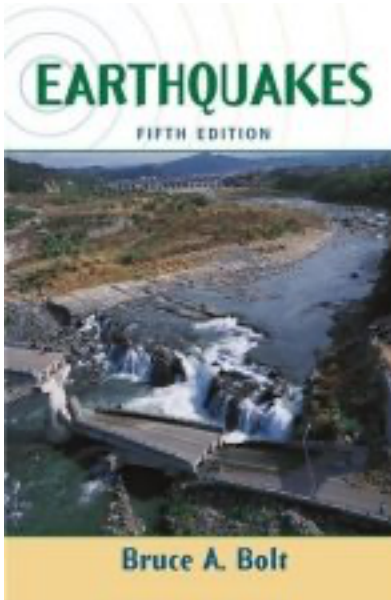
**After completing this class, you will be able to:**

<b>A.</b>	Describe earthquake types and mechanisms
<b>B.</b>	Determine earthquake magnitudes and locations
<b>C.</b>	Explain steps required for earthquake preparedness
<b>D.</b>	Identify areas with high tsunami and volcanic risks
<b>E.</b>	Evaluate the accuracy of scientific paradigms depicted in media outlets
<b>F.</b>	Understand fundamental Earth-processes

## **Required Textbook**

Bruce A. Bolt. "Earthquakes". *Macmillan, 5th ed.* 2006.

The fifth edition should cost between \$15 to \$20 for a used book and ~\$35 new. You do not need to purchase the much more expensive "2006 Centennial Update".



## **Assessment and Grading**

### **Grading Procedure**

- 40% Class projects
- 15% In-Class participation
- 15% Presentations on historic earthquakes
- 30% Final Exam (multiple choice)

## Grading Scale

A grade of "B" (3.0) is required for the students to earn honors credit

A:	95%
A-:	90 - 94%
B+:	86 - 89%
B:	82 - 85%
B-:	78 - 81%
C+:	74 - 77%
C:	70 - 73%
C-:	66 - 69%

## Class Schedule

The following class schedule is preliminary and may be subject to change

Week	Topic	Movie	Class Project/Activity	Reading
1 8/25	Where do earthquakes occur? / Types of faults	"Volcano" 19 – 23 min		Ch. 1-3
2 9/1	The San Andreas Fault system	"San Andreas"		Ch. 1-3
3 9/8	Geodetic measurements and elastic rebound		A1 - Iris Earthquake Browser	Ch. 4 p. 79 - 90
4 9/15	Seismic Waves and Earth Structure	"The Core"		Ch. 6, Ch. 1: p. 19-24
5 9/22	Plate tectonics, Mantle Convection and types of plate boundaries		A2 – Earthquake Locations	Ch. 5, p. 116 – 121, Ch. 7
6 9/29	Seismometers, Earthquake Magnitude	"San Andreas"	A3 – Earthquake Magnitude	Ch. 5, p. 108 - 116
7 10/6	The New Madrid Seismic zone Historic Earthquakes I		Student Presentations	
8 10/13	LACSC – guest lecture (Kiran & Roshan): Stick-slip as mechanism for earthquakes		A4 – Block-slider, earthquake slip and magnitude	

<b>Week</b>	<b>Topic</b>	<b>Movie</b>	<b>Class Project/Activity</b>	<b>Reading</b>
9 10/20	Focal Mechanisms		A5 – Focal Mechanisms	Ch. 4 p. 101 - 106
10 10/27	Tsunamis Historic Earthquakes II	“2012”, “San Andreas”	Student Presentations	Ch. 9, p. 195 - 209
11 11/3	Volcanoes Historic Earthquakes III	“Volcano” or “Dante’s Peak”	Student Presentations	Ch. 9, p. 182 - 195
12 11/10	Seismic hazard and risk Historic Earthquakes IV		Student Presentations	Ch. 11 & 12
13 11/17	Earthquake Preparedness and Earthquake Early Warning	“Earthquake” (1974)		Ch. 11, p. 252- 253, 260 - 267
14 11/24	Thanksgiving Day			
15 12/1	Earthquake Prediction, Earthquakes in the Lab	“San Andreas”	Visit Earthquake Physics Lab at CERI	Ch. 10, p. 210 - 227
16 12/8	Final Exam			

## Student presentations

The student presentations will focus on historic or more recent important earthquakes. A list of interesting events can be found below. These presentations are short 5-10 minute summaries of scientific facts about the event, the consequences (e.g. damage, destruction, societal cost) and whether the event impacted previous scientific paradigms.

You can present the scientific information summarized by the U.S. Geological Survey:

<https://www.usgs.gov/programs/earthquake-hazards/earthquakes>

Try to answer the following questions during your presentation:

1. What was the locations, type, depth, magnitude of the event?
2. Did the event happen on a plate boundary or inside of a plate?
3. Was the event expected? Why are why not?
4. How many earthquakes commonly happen in the area?
5. What was the societal impact, did the event generate a tsunami? Was there a lot of damage? What was the overall cost of earthquake damage?
6. Did the earthquake lead to a change in scientific paradigms? Where there new laws past after the events e.g. to change the construction of buildings?

### List of interesting earthquakes:

1. 1811/12 New Madrid, Missouri
2. 1886 Charleston, South Carolina
3. 2011 Magnitude 5.8 Mineral, Virginia
4. 1960 Magnitude 9.5 Valdivia, Chile
5. 1964 Magnitude 9.2 Prince William, Alaska
6. 2011 Magnitude 9.0 Tohoku Japan
7. 1906 Magnitude 7.9 San Francisco
8. 1994 Magnitude 6.7 Northridge, California
9. 2011 Magnitude 5.7 Prague, Oklahoma
10. 2016 Magnitude 5.8 Pawnee, Oklahoma
11. 2001 M 7.7 Bhuj, Gujarat, India
12. 2004 M 9.1 Sumatra-Andaman, Indonesia
13. 1999 M 7.6 Chi-Chi, Taiwan
14. 1989 M 7.1 Loma Prieta, California
15. 1992 M 7.2 Landers, California
16. 2010 M 7.0 Port-au-Prince, Haiti
17. 2011 M 6.2 Christchurch, New Zealand
18. 2017 M 5.3 Pohang, South Korea
19. 1985 M 8.0 Mexico City
20. 1975 M 7.3 Haicheng, China

## Plagiarism and Integrity

Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly, through participation or assistance, are immediately responsible to the instructor of the class in addition to other possible disciplinary sanctions which may be imposed through the regular institutional disciplinary procedures. Expectations for academic integrity and student conduct are described in detail on the website of the [Office of Student Accountability](#). Please read in particular, the section about "[Academic Misconduct](#)".

## Turnitin.com

Your written work may be submitted to [Turnitin.com](#), or a similar electronic detection method, for an evaluation of the originality of your ideas and proper use and attribution of sources. As part of this process, you may be required to submit electronic as well as hard copies of your written work, or be given other instructions to follow. By taking this course, you agree that all assignments may undergo this review process and that the assignment may be included as a source document in Turnitin.com's restricted access database solely for the purpose of detecting plagiarism in such documents. Any assignment not submitted according to the procedures given by the instructor may be penalized or may not be accepted at all.

## Library, Tutoring, and Other Resources

- The myMemphis Portal system, eCampus Student tab provides access to [University library](#).
- The tutoring link in the course navigation bar provides access to free online tutoring through UpSwing tutoring.

## Students With Disabilities

Qualified students with disabilities will be provided reasonable and necessary academic accommodations if determined eligible by disability services staff at the University of Memphis. Prior to granting disability accommodations in this course, the instructor must receive written verification of a student's eligibility for specific accommodations from the disability services staff. It is the student's responsibility to initiate contact with [Disability Resources for Students](#) (DRS) and to follow the established procedures for having the accommodation notice sent to the instructor.

## Sexual Misconduct and Domestic Violence Policy

This policy specifically addresses sexual misconduct which includes dating violence, domestic violence, sexual assault, and stalking. The policy establishes procedures for responding to Title IX-related allegations of sexual misconduct. Complaints can be reported to the Office for Institutional Equity (OIE). You may contact OIE by phone at 901.678.2713 or by email at [oe@memphis.edu](mailto:oe@memphis.edu). Complaints can be submitted online at [File a Complaint](#). OIE's office is located at 156 Administration Building.

## Non-Discrimination and Anti-Harassment Policy

University policy prohibiting discrimination and harassment based on protected characteristics and classes. Complaints of discrimination and harassment can be reported to the Office for



Institutional Equity (OIE). You may contact OIE by phone at 901.678.2713 or by email at [oie@memphis.edu](mailto:oie@memphis.edu). The full text of the policy can be found at [GE2030 - Non-Discrimination and Antiharassment](#).

## Technology Requirements

The following is a list of the minimum requirements to use our learning management system. Some courses will have more advanced requirements.

- Access to a reliable, high-speed Internet connection (DSL or Cable).
- Test your device to ensure it is compatible with our LMS (Learning Management System) using the [System Check Wizard](#).
- Open PDF files using the free downloadable PDF software.
- Access Flash-based content with [Adobe Flash Player](#) (free).
- Use Microsoft Office for document creation (available for students via <http://umapps.memphis.edu/>)

**Play media content with [Real Player](#) (free), [QuickTime](#) (free), or [Windows Media Player](#) (free).**

## Syllabus Changes

The instructor reserves the right to make changes as necessary to this syllabus. If changes are necessitated during the term of the course, the instructor will immediately notify students of such changes both by individual email communication and posting both notification and nature of change(s) on the course bulletin board.

## Technical Support

Call the Helpdesk: 901-678-8888

[Online Helpdesk](#)