GROSSMONT COLLEGE

 COURSE OUTLINE OF RECORD

Curriculum Committee Approval: 04/26/2022

GCCCD Governing Board Approval: 06/14/2022

GEOLOGY 230 – NATURAL DISASTERS

 1. Course Number Course Title Semester Units

 GEOL 230 Natural Disasters 3

 Semester Hours

 3 hours lecture: 48-54 hours96-108 outside-of-class hours144-162 total hours

2. Course Prerequisites

None

 Corequisite

 None

 Recommended Preparation

 None

 3. Catalog Description

This course examines the geological and meteorological principles underlying natural disasters such as earthquakes, landslides, flooding, volcanic eruptions, and severe weather phenomena. Students will explore how dynamic earth processes affect human activities and discuss options for mitigation of these natural phenomena.

 4. Course Objectives

 The student will:

1. Analyze the relationship of plate tectonic activity to the occurrence of volcanoes, earthquakes and tsunami.
2. Compare and contrast various weather-related disasters, such as floods, hurricanes, tornadoes, thunderstorms, and fires with respect to their causes, hazards, and geographical occurrence.
3. Describe the large- and small-scale implications associated with extraterrestrial impacts.
4. Summarize past extinctions throughout geologic time and predict the possible causes and effects of future extinctions.
5. Identify the various types of natural disasters and recognize the effect that these events have on human activities.
6. Evaluate the effects that human activities can have on geologic processes and apply basic concepts and principles of science in understanding, predicting and mitigating natural disasters.
7. Analyze the nature of scientific pursuit, especially the ways in which scientists collect data, develop explanations, and evaluate and communicate outcomes.

 5. Instructional Facilities

 a. Standard classroom for discussions of geologic maps, rocks, and minerals.

b. Lecture and lab rooms should have audiovisual equipment for use with slides, videos, and internet access.

 6. Special Materials Required of Student

1. Access to the internet outside of the classroom.
2. Electronic storage media.
3. Appropriate attire for the field.

7. Course Content

1. Introduction to natural disasters: frequency and occurrence
2. Basic geologic principles: structure of the Earth, plate tectonics, geologic time, internal processes, external (surficial) processes
3. Volcanoes: geologic formation, rock types, global distribution, types of volcanoes, volcanic hazards, historical volcanic events, and mitigation of volcanic hazards
4. Earthquakes: global distribution, earthquake geology, seismic monitoring, earthquake hazards, historic earthquake events, seismic regions of the United States.
5. Mass movement: types, triggering mechanisms, role of water, human impacts, remediation of slopes
6. Tsunamis: relationship to plate tectonic boundaries, triggering mechanisms, areas of risk
7. Floods: geographic occurrence, frequency, causes, types, human impacts (dam failure, urban development, agriculture), risk areas, mitigation
8. Hurricanes: formation, geographical occurrence, characteristics, classification (Saffir-Simpson scale), hazards, monitoring methods, mitigation
9. Tornadoes: formation, geographical occurrence, characteristics, classification (Fujita scale)
10. Thunderstorms: formation, geographical occurrence, types, characteristics, lightning formation and types, hazards
11. Fires: nature of fire, causes, spreading mechanisms, benefits of fire, fire suppression, hazards, mitigation
12. Extraterrestrial impacts: origin, types, historical impact sites, potential results of large and small impacts, hazards
13. Mass extinctions: past extinctions in the geologic record, current extinction rates, causes of extinctions, impact of mass extinction on global biosphere and humans

 8. Method of Instruction

1. Lecture and demonstrations.
2. Collaborative learning and group discussion.
3. Field study and observation.
4. Individualized instruction.
5. Online research and computer exercises.
6. Multimedia presentations.

9. Methods of Evaluating Student Performance

1. Examinations - combining objective and essay questions, including a final exam.
2. Participation on a discussion board.
3. Various written and computer-based assignments (e.g., assessing the potential for slope-failure based on variations in the dip of underlying units of sedimentary rock).
4. Final project/presentation based on a geologic process or province discussed in class.

10. Outside Class Assignments

 a. Weekend field trip(s) and written field trip reports.

 b. Required reading in texts.

 c. Assigned reading including papers from scientific journals and magazines.

 d. Written and computer based assignments covering geologic processes and principles.

11. Representative Texts

 a. Representative Text(s):

 Abbott, P. *Natural Disasters*. New York, NY: McGraw-Hill Publishing Co., 2020.

 b. Supplementary texts and workbooks:

 Appropriate papers, articles, and excerpts will be assigned for readings.

Addendum: Student Learning Outcomes

 Upon completion of this course, our students will be able to do the following:

Analyze and explain the processes that form geologic hazards