

Course discipline/number/title: ESCI 1004: Earthquakes and Volcanoes

A. CATALOG DESCRIPTION

1. Credits: 3
2. Hours/Week: 2 lecture, 2 lab
3. Prerequisites (Course discipline/number): None
4. Other requirements: None
5. MnTC Goals (if any): Goal 3/Natural Sciences, Goal 10/People and the Environment

B. COURSE DESCRIPTION. This course examines the causes and effects of earthquakes and volcanic activity. It also covers the impacts of earthquakes and volcanic eruptions, including secondary effects such as landslides, mudflows, and tsunamis; climatic effects; energy/mineral resources; and social disruption. Additionally, the mitigation of effects of natural disasters will be included.

C. DATE LAST REVISED (Month, year): November, 2021

D. OUTLINE OF MAJOR CONTENT AREAS:

1. Introduction to plate tectonics
  - a) Historical development of the theory
  - b) Plate dynamics
  - c) Plate boundaries
2. Earthquakes
  - a) Basic definitions
  - b) Earthquake damage
  - c) Locating epicenters
  - d) Seismographs
  - e) Reading seismograms
  - f) Magnitude scales
  - g) Mercalli intensity
  - h) Mitigating earthquake damage
  - i) Earthquake Forecasting
  - j) Historic earthquakes
  - k) Tsunami
3. Volcanoes
  - a) Types of volcanoes
  - b) Types of eruptions
  - c) Volcanic Rocks and Lava types
  - d) Causes of damage
  - e) Forecasting eruptions
  - f) Magma formation and movement
  - g) Historic eruptions

E. LEARNING OUTCOMES (GENERAL): The student will be able to:

1. Defend the Theory of Plate Tectonics using scientific evidence.
2. Assess the hazards related to earthquakes and volcanoes.
3. Discuss and question theories relating to plate tectonics, earthquakes and volcanoes.
4. Use seismic data to determine the location, size and depth of earthquakes.
5. Demonstrate ability to gather and use data to solve problems or answer questions about earthquakes and volcanoes.
6. Describe and defend their position on issues related to earthquake preparedness policies.
7. Demonstrate awareness of social issues surrounding earthquakes and volcanoes.

F. LEARNING OUTCOMES (MNTC):

- Goal 3/Natural Sciences: The student will be able to:
1. Demonstrate understanding of scientific theories.

- F. LEARNING OUTCOMES (MNTC): Continued. . .
2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
  3. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

Goal 10/People and the Environment: The student will be able to:

1. Discern patterns and interrelationships of geo-physical and socio-cultural systems.
  2. Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems and institutions.
  3. Propose and assess alternative solutions to environmental problems.
  4. Articulate and defend the actions they would take on various environmental issues.
- G. METHODS FOR EVALUATION OF STUDENT LEARNING. Methods may include but are not limited to:
1. Written exams
  2. Term Papers
  3. Lab exercises
  4. Homework exercises
- H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s):  
Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.
- I. SPECIAL INFORMATION (if any): None