Mt. San Jacinto College
Integrated Course Outline of Record

Form B

Submitted by: Patrick Smith **Date:** 10/08/2020

Department	Subject	Course Number	Title
Geology	Geology GEOL	103	Environmental Geology

Units/Hours

Each lecture unit requires 1 hour per week of class time, and 2 hours per week of study outside of class.
Each laboratory unit requires 3 hours per week of class time.
Each activity unit requires 2 hours per week of class time and 1 hour per week of study outside of class.

Lecture Units	Total Units
3.00	3.00
Lecture Contact Hours	**Total Contact Hours**
48.00 - 54.00	48.00 - 54.00
Lecture Homework Hours	
96.00 - 108.00	

Stand Alone:

Program Applicable

AA/AS Degree General Ed Breadth Area(s):

A NATURAL AND PHYSICAL SCIENCES

General Education Justification:

This course examines complex issues such as plate tectonics in relationship to normal faulting and basement extension, and discovers the connections and correlations among ideas in Earth sciences (GELO1). It uses analysis to explain issues in quantitative terms using college-level mathematical concepts (equivalent to math 96) and methods including rates and motions on tectonic plates, fault rate calculations, and recurrence intervals (GELO4). Students are required to apply their theoretical knowledge and skills to real-world field geology exposures and situations (GELO5). Students will be exposed to the use of topographic and geologic maps and learn current geologic mapping techniques (GEL06).

Maximum Enrollment: 40

Maximum Enrollment Justification: Justification:

Grading Method: Letter Grade or P/NP

TOP code: 1914.00

Can be Taken 1 **time(s) for credit** (max 4)

- [ ] - Visual or Performing Arts course that is required to meet major requirements for UC/CSU
- [ ] - Intercollegiate athletics course
- [ ] - Academic/vocational competition course

Catalog Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course).
(**75 words** or less in gray box below).

This course will explore disasters such as earthquakes, hurricanes, landslides, volcanoes, floods, tsunamis, and asteroid and comet collisions of asteroids with earth. Emphasis will be placed on the causes and effects of natural hazards, and the dramatic impact of such events on humans, as well as the role of humans in exacerbating the dangers of the natural world.

Schedule Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course).
(**25 words** or less in gray box below).

This course will explore disasters such as earthquakes, hurricanes, landslides, volcanoes, floods, tsunamis, and asteroid and comet collisions of asteroids with earth.

Need for the course:

This course is meant to provide an in-depth understanding of the physical properties, processes and interpretation of the geologic environment with regards to human interaction for students interested in fulfilling their science breadth requirement, whether transferring to a UC or CS University or for those with professional or personal interest. This course meets a need in the curriculum that no other course fulfills, and provides a better understanding of the expanding research, development, and future prospects in these areas. This course include Active awards for ENVS, Liberal Arts - Math/Science and AA-T GEOG degrees, and it satisfies General Education Requirements for California State Universities and Colleges Transfer Plan Areas B1, IGETC Area 5, and MSJC AA/AS Area A.

Prerequisite(s):

Prerequisites go through a separate approval process. See Forms E1-E6 for details.
(For further clarification, contact the Prerequisite Subcommittee)

-none-

Corequisite(s):

Corequisites go through a separate approval process. See Forms E1-E6 for details.

-none-

Recommend Preparation:

Recommended Preparation goes through a separate approval process. See Forms E1-E6 for details.

- College level reading skills

Other Enrollment Criteria:

-none-

Learning Objectives:

(please number each objective and express in behavioral terms)

Upon the completion of the course the student will be able to do the following:

1. Discuss plate tectonics and physical hazards, comparing and contrasting divergent, convergent, and transform plate boundaries, and interpret how movement of these boundaries affects human life.
2. Explain earthquake waves, and summarize and differentiate between intensity scales, and integrate that information with a discussion about ground liquefaction, and damage control possibilities.
3. Assess earthquake prediction methods, possible precursors, and the tectonic environments associated with major earthquakes, including the make-up of the San Andreas Fault.
4. Evaluate volcanoes, with emphasis on differentiating between types of volcanoes, and inferring relationships between their locations, magma types, and tectonic volatility.
5. Compare and contrast mass wasting types including slumps, slides, flows, and creep, and show risks to humans building in areas prone to danger.
6. Assess sinkholes, land subsidence, and swelling soils, and mining groundwater while integrate these explanations with estimations of future human-related geologic alterations.
7. Examine global warming, atmospheric cooling, and climatic cycles in relationship to storm surge, rainfall variations, and hurricanes.
8. Describe streams and flood processes classifying stream types, and the effects and hazards of human development on natural floodplains
9. Discuss coastal erosion integrating waves and longshore drift, including an assessment of human impact on beach erosion and replenishment in relationship to artificial barriers.
10. Evaluate asteroid and comet collision with earth examining meteorite, asteroid and comet types and speeds, and the evolution and predict the consequences of such disasters.

Course Content:

(please number the outline of main topics and subtopics)

Lecture and Discussion Topics

1. Catastrophic Events in Nature
    1. effect on Humans
    2. causes
    3. recurrence Intervals
    4. minimizing risks
2. Plate Tectonics
    1. divergent plate boundaries
    2. convergent plate boundaries
    3. transform plate boundaries
    4. effects of movement
3. Earthquakes
    1. damages
    2. waves
    3. seismographs
    4. causes
    5. locations
    6. characteristics
    7. intensity scales
    8. liquefaction
    9. damage control
4. Earthquakes
    1. prediction methods
    2. possible precursors
    3. tectonic environments associated with major earthquakes
    4. San Andreas Fault

5. Seismic Sea Waves
    1. identifying generation
    2. wave velocity and height
    3. coastal effects
    4. vulnerabilities
6. Volcanoes
    1. types of volcanoes
    2. relationships between locations and tectonic activity
    3. magma chambers
    4. relationship between volatility and viscosity
    5. lahars and ash.
7. Volcanoes
    1. basaltic
    2. andesitic
    3. rhyolitic
    4. stratacones
    5. behavior
    6. risk factors
8. Landslides and Other Downslope Movements
    1. slope material
    2. water content
    3. triggers
    4. slumps, slides, flows, creep
    5. building in areas prone to danger
9. Sinkholes, Land subsidence, and Swelling Soils
    1. karst topography
    2. mining groundwater
    3. California's San Joaquin Valley
    4. Denver's soils
    5. future human-related geologic alterations
10. Climate and Weather
    1. global warming
    2. atmospheric cooling
    3. climatic cycles
    4. basic elements of weather
    5. El Nino
    6. oscillation patterns
    7. wind generating factors
11. Streams and Flood Processes
    1. stream types
    2. sediment transport processes
    3. hydrograph
    4. floods
    5. recurrence rates
    6. human development of floodplains
12. Flood Danger to Humans
    1. stream behavior
    2. stream control measures
    3. levees
    4. dams
    5. successes and failures
    6. effects of logging, over grazing, mining, dams
13. Coastal Erosion
    1. waves

2. longshore drift
3. beach slope
4. rip currents
5. rocky coasts
6. human impact
7. artificial barriers and sand supply
8. barrier islands and dunes.

14. Hurricanes and Nor'Easters
    1. hurricane scale
    2. formation
    3. storm surge
    4. wave, rainfall, and wind damages
    5. warning and prediction systems
    6. dangers of such storms in developed and developing countries
    7. building modifications and restrictions.
15. Asteroid and Comet Collision with Earth
    1. meteorite identification
    2. evolution of impact craters
    3. collision courses
    4. odds of major impacts
    5. consequences
16. Attitudes Toward Future Disasters
    1. human factor in increasing hazards
    2. disaster assessment
    3. mitigation
    4. outcomes for poor areas and developing countries
17. Hurricane Katrina
    1. levee information
    2. previous warnings
    3. disaster preparedness
    4. disaster response

Methods of Instruction:

Methods of instruction may include, but are not limited to the following:

- **Method:** Lecture
  Integration: Class lecture with whiteboard illustrations and PowerPoint presentations on chapter-assigned topics. These work well to show the internal dynamics of the earth and plate boundaries, as well as water table levels.
- **Method:** Activity
  Integration: Distribution of outline worksheet for each class lecture, to be filled in by the student during class discussion. The topics are listed on the worksheets helping the students to better correlate the lecture and textbook data. For example, atmospheric terminology can be correlated with an understanding of storm surges.
- **Method:** Discussion
  Integration: Daily instructor-guided analysis and discussion of chapter and course content. During the lecture, the instructor will discuss studentsâ€™ questions. For example instructor guided questioning and student discussion can help students understand and analyze the rationale behind the frequently misunderstood topic of global warming.
- **Method:** Multi-Media
  Integration: Videos, films, slides, charts, graphs, and maps presented in class as visual aids can be used to discuss atmospheric disruptions and patterns, as well as geologic evidence of past earthquake activity and the mineralogy of volcanoes.
- **Method:** Field Trips
  Integration: Field trips at the instructorâ€™s discretion. For example, field trips can be used to examine

earthquakes, was fault lines, and their damage, evaluate volcanoes in relationship to their tectonic occurrence, and examine landslides and other forms of down slope movement.

Methods of Evaluation:

A student's grade shall be determined by the instructor using multiple measures of performance related to the course objectives. Methods of evaluation may include but are not limited to the following:

- **Method:** Written Examinations
  Integration: Written examinations in a mixed format that includes multiple-choice, true/false, fill in the blank, and short answer questions. Examination questions test both the studentsâ€™ knowledge of subjects dealing with environmental geology and their ability to analyze and evaluate selected topics.
- **Method:** Short Answer Papers
  Integration: Short answer papers written in a concise format addressing directed questions. The papers will express a synthesis of information obtained from lectures, the textbook, videos, graphs, etc. The papers can range from having students describe how changing continental plate locations affect volcanic occurrences, to explaining the behavior of earthquake waves as they pass through various materials and describing ground liquefaction.
- **Method:** Research Paper
  Integration: Multiple page research paper including abstract, literature review, discussion/conclusions, and references in scientific citation style on pertinent topics such as analyzing the types conditions required for the formation of hurricanes or associating human activity with water table changes and major events of land subsidence. Grade for paper will be based on content, proper use of standard academic English, and proper use of scientific citation style.
- **Method:** Projects
  Integration: â€¢ Projects, notebooks, and presentations as deemed appropriate by the instructor. For example, a presentation on the estimated effects of global warming on hurricane development, would demonstrate student understanding of storm formation. Grade for projects, notebooks, and presentations will be based on content, proper use of standard academic English, and proper use of scientific citation style (citations only when applicable).

Examples of Assignments:

Students will be expected to understand and critique college level texts or the equivalent. Reading and writing, as well as out of class assignments are required. These assignments may include but are not limited to the following:

Examples of assignments may include short answer papers written in a concise format and addressing specific questions as directed by the instructor, homework problems, research papers, etc. Short answer papers should express a synthesis of information obtained from lectures, textbook, videos, lab assignments, graphs, etc. The following are examples of short essay questions:
Compare and contrast the qualities of rhyolitic, andesitc, and basaltic volcanic eruptions and list supporting reasons for your conclusions about their volatility (objective 4).
What are the major distinguishing features between P waves and S waves, and how are seismographic recordings used to calculate earthquake location? (objective 2).

Textbooks:

- Donald Hyndman and David Hyndman (2016). *Natural Hazards and Disasters (or equivalent)* Cengage Learning. ISBN: 10 0538737522
- James W. LaMoreaux (2019). *Environmental Geology* Springer US. ISBN: 1493987860

Other Resources:

- Jack W. Travis . Environmental Geology Workbook. Waveland press, inc. , 01-01-2019.

Minimum Qualification

- Earth Science (Masters Required)