

New Mexico Part 2 – Santa Fe, Chaco, El Malpais Petroglyphs

Colorado School of Mines – Melanie Phelps

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2 graduate semester hour credit Cost: \$355. With credit. \$260. Without credit.

Does not include motel cost. Does include camping at Chaco Canyon fees.

Day 1: We will begin class in Santa Fe, New Mexico studying the history of the Santa Fe Trail and the US Mexican War of 1846-1848, when Mexico was forced to secede Texas, New Mexico, California, and part of Colorado to the United States. Touring the historic end of the trail at the Santa Fe Plaza, we will learn the history of this famous trade route that ran from Franklin, Missouri to Santa Fe. We will also tour the oldest church in the United States, the San Miguel Mission Church.

After driving to Albuquerque, we will study the geology of the Rio Grande Rift and the volcanoes that have their origin deep within the earth's mantle as a result of the spreading rift. In Petroglyphs National Monument, we will hike 2.2 miles of the Rinconada trail to explore how the Puebloan ancestors chiseled their life stories into stone in over 200 petroglyphs. Track the lizard tail trails through the basalt sand to explore the ecology of the High Mountain Desert surrounding Albuquerque. Gaze in wonder at the distant Sandia Mountains and learn the fascinating geologic history of how the rift movement has pushed the mountains skyward. The volcanoes around Albuquerque display many classic volcanic features, such as cinder cones, dikes, scoria cones, and fissure eruptions. A fissure eruption is a "curtain of fire" along a seam where lava rose through vertical cracks. The ALB Volcanic Field is very young geologically, only 140,000 years old and lies along another zone of weakness, the Jemez Volcanic Lineament. Will the volcanoes of New Mexico erupt again?

View the classic film "Volcanoes of New Mexico" to learn more about the very widespread volcanism caused by the Rio Grande Rift and the geology of the different volcanic landforms in New Mexico. We will spend this night in Grants, to get an early start on our exploration of El Malpais.

Day 2: Near Grants we will see some of the most phenomenal volcanism in New Mexico at El Malpais National Monument, which was still erupting only 3900 years ago. Native legends from the area refer to the times of the "fire rivers." El Malpais, Spanish for the Bad Country, covers an area of 2460 square kilometers and contains lava tubes, cinder cones, craters, calderas, maars, spatter cones, squeeze ups, collapse pits, pahoehoe and a'a flows of the McCarty's Lava Flows. "Stretching 90 kilometers long and 1 to 35 kilometers across, it covers an area of 2,460 square kilometers with a composite thickness of 20 to 60 meters of lava. Between 62 and 123 cubic kilometers of lava was erupted from 74 vents that tend to be aligned along faults and fissures."

http://vulcan.wr.usgs.gov/Volcanoes/NewMexico/description_new_mexico_volcanics.html

We will hike and explore the amazing volcanic terrain along the pathways of the "fire rivers" to learn volcanic geomorphology. Please wear very good hiking shoes and tread carefully. El Malpais is the next

best thing to being in Hawaii. We will also explore Bandera Volcano and Ice Cave, where you will hike into the crater of a phenomenal cinder cone and trek downwards into an ice cave where the temperatures keep the ice frozen year around. Visit the historic Ice Cave Trading Post to see amazing pottery and artifacts from ancient locals.

Day 3: Continue our exploration of El Malpais by hiking along a sandstone escarpment at the edge of the lava flow. Beautifully carved into the delicate sandstone is La Ventana Arch. Learn the geology of arch formation and take a photographic hike to the base of the arch. Cave exploration within El Malpais is currently closed due to a fungus that is killing populations of bats across the U.S. How is it spread, how can it be controlled, and what damage is it doing to bat populations? If bat populations plummet, what will be the effects on insects and human agriculture?

Learn how scientists date volcanoes using radiometric dating techniques and find out the current predictions for when the next New Mexico Volcano will blow. “**New Mexico** has the *largest number, range of ages, diversity of types, and range of preservation*, and some of the *best type examples of volcanoes* in the North American continent”

<http://www.nmnaturalhistory.org/volcanoes-of-nm.html>

Drive to Chaco Canyon National Historic Park, home of the Ancient Pueblo people from 850 to 1250 A.D.

Tonight we will study an overview of the history of Chaco Canyon and be treated to a ranger led night sky lecture, far from any light pollution of surrounding villages. Chaco Canyon was the mecca of trade and ceremonies for the Ancestral Pueblo Indians from AD 850 to 1250 and includes many fascinating and elaborate buildings. Some of the most elaborate and scientifically accurate astronomical observations are encased in stone with the alignments of the buildings and the famous Sun Dagger petroglyph that marked solstices and equinoxes.

Day 4: Today’s adventure begins at the Chaco Canyon Visitor Center where we will learn more of the history of the Ancient Pueblo people. Where did they come from? How long did they live here? How extensive was the city and how wide was the trade area. We will then be treated to a ranger led tour through the ruins of Chaco Canyon. A nine mile paved loop road will give us access to five Chacoan sites, where we will take short hikes along the trails to view the ruins. Class will end here but your curiosity, wonder and questions about the volcanoes and ruins of New Mexico will just begin.