**Biology 451/651, Geology 451, 3 Undergraduate or Graduate Credits**

Travel to the Black Hills in South Dakota, Makoshika State Park in Glendive, Montana, and the Yellowstone National Park in Wyoming. Participants will explore the Greater Yellowstone Ecosystem from ecological and geological perspectives. While on the road to and from Yellowstone, we will stay at local motels (multiple occupancy). The K Bar Z Guest Ranch in Cody, Wyoming, will be our group’s primary residence while in the Yellowstone area. Presentations on carnivore ecology, botany, mining and human environmental impacts, fire ecology, and paleontology will be offered on site. Students will have opportunities to use global positioning systems and other field survey equipment for the study of geology and ecology.

**What will I study?**

Plants, animals and their adaptations will be identified in a number of ecosystems. Students will participate in ecological data collection. We will visit a variety of biomes, from alpine meadows to rivers carving spectacular canyons to the fragile “badlands.” The environmental impacts of human activity and the current land use issues will be explored. In addition, we will have the opportunity to observe the aftermath of various forest fires in the Yellowstone area and see some of the best geology that the West has to offer. We will study present and paleoecosystems and visit geothermal sites, fossil beds, mines and caves.

**Who can come?**

It is open to all university students and anyone else who has serious interest in these topics.

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Mark your calendar and take this opportunity to experience the American West, to study ecology and geology, and to sample the spirit of this region of our country.
DAY 1 (Moorehead, MN)
We will depart Whitewater in the morning. As we travel, discussion will include unique features of Wisconsin geology. We will also discuss climate changes, unique vegetation and biomes. Throughout the trip ecology or geology stops may occur as opportunity presents.

DAY 2 (Glendive, MT)
Today we will travel to Glendive MT. We’ll work in the field for several hours in the evening.

DAY 3 (Glendive, MT)
We will leave the motel and work in the field for several hours. We will then tour Makoshika State Park where discussion will include extreme desert habitats as well as Cretaceous dispositional environments.

DAY 4 (Glendive, MT)
Next we will head to the Yellowstone River to cool off and look for specimens to analyze. During this time various stream sampling devices will be introduced and we will perform some basic water chemistry. Continuing on, we will look for fossils; study the stratigraphy of the Pierre Shale, Fox Hills Sandstone, and Hell Creek formations.

DAY 5 (Cody, WY)
Leaving in the morning, we will arrive in Cody at the K Bar Z Guest Ranch in the early evening. Upon arrival, we will establish a trap grid for small mammals.

DAY 6 (Cody, WY)
Today we will tour the region around K Bar Z Ranch and establish a trap grid for small mammals.

DAY 7 (Cody, WY)
We will take a hike around the K Bar Z Ranch to observe plant communities, local geology, biomes and the effects of forest fires on the ecosystems. We will also learn how to use GPS and engage in mapping work.

DAY 8 (Cody, WY)
We will check small mammal traps in the morning and evening but the rest of the day will be a free day to explore Cody, WY, visit a museum or go to a rodeo. There are also horseback trips and fishing offered by the K Bar Z Guest Ranch.

DAY 9 (Cody, WY)
We will begin our day by taking a short drive to Lamar Valley. Upon arrival Dr. Jim Halfpenny will speak on carnivore ecology of Yellowstone National Park and the reintroduction of wolves. We will learn various techniques for observing large carnivores and interpreting their behavior. We will also try to view a wolf pack. There will be a test in the evening.

DAY 10 (Cody, WY)
We will visit several sites associated with the New World mine. Discussion at the mine site will include the impact of the gold mines in the area, reclamation efforts, mineral collection at tailing pile and comparison of mined and non-mined areas.

DAY 11 (Cody, WY)
We will begin our day by crossing the Beartooth Mountains to Rock Creek overlook to study alpine glacial processes and ecology. In the afternoon, we will stop at Beartooth Lake to study landslides and ecologic disturbance and at Beartooth Pass to study tundra biomes and permafrost geology.
DAY 12 (Cody, WY)
After breakfast, we will view the Grand Canyon of the Yellowstone and the Tower Falls basalt flows. We will see effects of hot springs on geology and ecology. We will then take a hike in the forest and meadows at Mt. Washburn and Cascade Lake to study these two major ecosystems. We will also examine areas for fire destruction and recovery.

DAY 13 (Cody, WY)
We will be traveling to Yellowstone National Park to study the two major types of geothermal features found in the park (Norris Geyser basin and Mammoth Hot Springs). We will also stop at Obsidian Cliffs and the Golden Gate lava flows and to explore the volcanic activity that produced the park.

DAY 14 (Cody, WY)
Today there will be a lecture at Beartooth Lake about Devonian times. We will also hike from Clay Butte fire tower to fish fossil sites.

DAY 15 (Cody, WY)
Today will be a free day to explore the town, visit a museum or go to a rodeo. There are also horseback trips and fishing offered by the K Bar Z Guest Ranch.

DAY 16 (Hulett, WY)
We will take a trip to Sunlight Basin in the Absaroka Mountains to study stream orders, stream ecology and invertebrates. We will also take a look at White Mountain, a volcanic neck.

DAY 17 (Newcastle, WY)
Today we will travel to Spearfish. We’ll visit Jewel Cave, study the geology and ecology of the Black Hills, visit a feldspar mine and talk with Jace Decory on the importance of the Black Hills to American Indians.

DAY 18 (Newcastle, WY)
Today we will finish up with the Black Hills and travel to Hulett, WY. We will tour Devils Tower and discuss the formations of this feature.

DAY 19 (Mitchell, SD)
After breakfast, we will travel to Mitchell with stops along the White River for fossil collection from the Pierre Shale. There will be a test in the evening.

DAY 20 (Whitewater, WI)
We will depart in the morning and arrive in Whitewater in the evening.
Program Cost: $2,700 (estimate) which includes lodging, transportation, meal allowance, entrance fees and all instructional costs including three undergraduate or graduate credits. Financial aid may apply.