



# YELLOWSTONE FOREVER

## ROADSIDE GEOLOGY OF YELLOWSTONE COUNTRY

### Itinerary & Details

FIELD SEMINAR – SUMMER 2024

**INSTRUCTOR:** Rob Thomas, Ph.D

**INSTRUCTOR BIOGRAPHY:** Dr. Rob Thomas is a Montana Regents Professor in the Environmental Sciences Department at the University of Montana Western. He is a Fellow of the Geological Society of America and the 2009 Carnegie/CASE U.S. Professor of the Year. He has written ~75 publications, including Roadside Geology of Yellowstone Country and Roadside Geology of Montana, which received the High Plains Book Award.

**ACTIVITY LEVEL:** This course is activity level 1 and students enrolled in this course are expected to be active participants. Be prepared to hike up to 1 mile per day, comfortably, through relatively flat terrain on maintained trails.

*\*All field activities will be conducted as a group. If participants cannot meet the activity level expectations during the program, they may be restricted from participation in daily outings. Program itineraries or activities will not be altered to accommodate participants who cannot meet the expectations of the stated activity level.*

**LOCATION:** Lamar Buffalo Ranch – Yellowstone National Park, WY

**PROGRAM DATES & TIMES:** The program begins at 7:00 p.m. on Wednesday, June 26, 2024, and goes through Saturday, June 29, 2024, at 3:00 p.m.

**LODGING CHECK-IN & CHECK-OUT:** Lodging check-in begins at 4:00 p.m. on Wednesday, June 26, 2024 and lodging check-out is at 9:00 a.m. on Sunday, June 30, 2024.

**MEALS:** This course is not catered. Participants will need to bring their own food; lunch should be able to travel in the field.

**For general information about the facilities, preparation for classes, what to expect, cancellation policies, and more, please see the [Lamar Buffalo Ranch - Summer General Information](#) document.**

## PROGRAM ITINERARY

One of the best ways for you to understand the geology of the Yellowstone country is to follow the road system in and around Yellowstone National Park. Over the span of three full days, you will explore this rich and varied geologic history of the region and contemplate the potential impacts to humanity of the next eruption of the world's most violent volcano. This class is geared towards the layperson, so no prior geologic experience is necessary.

Within reach of the road system in and around Yellowstone National Park are rocks that record nearly the entire span of Earth's history. You will discover rocks that once formed in the core of Himalayan-sized mountains over 3.5 billion years ago, to mile-thick ice that covered the region as recently as 12,000 years ago. The Yellowstone country is one of Earth's greatest geological laboratories, and the centerpiece of the region is the Yellowstone Plateau volcanic field, produced by numerous volcanic eruptions, including three of the most violent eruptions ever on Earth. Geologists call the source of this anomalous volcanic activity the Yellowstone hot spot, a one-of-a-kind feature on the planet. In all recorded history, no human has experienced a volcanic eruption the size of the eruptions produced by the Yellowstone hot spot during the Quaternary Period (2.6 million to the present). These eruptions are so horrifying to contemplate that they have spawned several disaster films and countless apocalyptic websites with doomsday scenarios for the future of humanity. In recent human experience, volcanic eruptions range from placid tourist attractions like those on the Big Island of Hawaii to relatively minor events like the 1980 eruption of Mount Saint Helens in Washington. In contrast, a large eruption of the Yellowstone hot spot would likely cause global extinctions, climate change, and a significant reduction in the human population. The eruptions are so large that the popular science industry and the media have coined the term "supervolcano" to distinguish their destructive force from run-of-the-mill volcanoes. On days one and two of this program, you will see evidence for two of the three major eruptions that make up the Yellowstone Plateau volcanic field, as well as many of the smaller eruptions that filled in the eruptive centers or calderas that formed during the mega eruptions.

The geologic history of the Yellowstone country is much more than its recent volcanic history, however. These relatively recent eruptions blasted their way through nearly 4 billion years of geologic history that is well exposed around the margins of the Yellowstone Plateau volcanic field. Day three of your travels will take you to see the older geologic history of the Yellowstone country. In the Beartooth country, you will see Precambrian metamorphic and igneous rocks formed when continents collided, Paleozoic sedimentary rocks deposited in tropical oceans, and fossil forests that were buried by volcanic eruptions that preceded the Yellowstone volcanic field by nearly 50 million years. In addition, you will see how glaciers modified the landscape over the last 130,000 years and how continued climate change is impacting the Yellowstone geo-ecosystem and impacting land-management decisions that are crucial to maintaining the nation's first national park for future visitors. Most of your time will be spent traveling the road systems in and around the park, with frequent stops to discuss the geologic history. The class will start with an overview on the first morning and will be followed by three days of field excursions. You will start after breakfast, so be prepared to take lunch into the field. The first evening after dinner, you'll spend an hour or so discussing the geology of the Yellowstone country. While this class is being held in summer months, weather on the Yellowstone Plateau and surrounding areas can be quite variable. It is important to bring all gear listed in this letter as well.

The itinerary is designed to take advantage of the best opportunities in the park, but may be adjusted to adapt to weather conditions, wildlife activity, holidays, and road construction.

*The details and timing of the agenda are subject to change.*

**Day 1****Welcome**

The program starts with an evening orientation. You will get to know one another and be introduced to the program. Throughout the evening, the itinerary and seminar key concepts will be discussed, as well as what to expect to pack for the field each day.

**Day 2****The Yellowstone Caldera**

Meet in the classroom at the Lamar Buffalo Ranch after breakfast for a short overview and discussion of the plans for the day. The field day will begin with an overview of the Precambrian history of North America at the Lamar Canyon. Then it will continue to The Narrows and Tower Fall, where you will see and discuss the Cenozoic Absaroka volcanic rocks and several spectacular lava flows that were extruded downstream valleys that flowed out of the calderas that form the Yellowstone Plateau volcanic field. From Tower Fall, you will climb the northern margin of the Yellowstone caldera, which is the youngest of the three calderas that make up the Yellowstone Plateau volcanic field, forming only about 639,000 years ago. A stop for lunch and an overview discussion of the Yellowstone caldera will conclude the time in the field.

**Day 3****Outside of the Yellowstone Caldera**

The day begins by driving to Mammoth Hot Springs, one of the most spectacular travertine hot springs in the world. Along the way, there will be several stops to view volcanic flows outside of the Yellowstone caldera and a petrified tree. After a stop for lunch and ice cream in Mammoth, there will be a walk to an overview spot to see a spectacular angular unconformity (period of uplift and erosion) between Cretaceous sedimentary rocks and the overlying Huckleberry Ridge Tuff. Continuing south from Mammoth, there will be stops at the Golden Gate to see the Huckleberry Ridge Tuff up close, the obsidian deposit at Obsidian Cliffs, and eventually Norris Geyser Basin to explore one of the hottest and most active geyser basins in the world.

**Day 4****The Beartooth Country**

The day begins departing the Lamar Buffalo Ranch and heading northeast towards Cooke City, Montana. The first stop will be an overview of the Lamar Valley to discuss the tectonic origins of this drainage and see the evidence for active uplift along the frontal edge of the Yellowstone hot spot. The course will continue to Soda Butte, the eastern-most thermal feature in the park. At Silver Gate, Montana, there will be a stop at the geologically famous and enigmatic Heart Mountain Detachment, a mega landslide that occurred during the height of the Absaroka volcanic field around 50 million years ago. After a quick stop in Cooke City, the course will head up to Beartooth Pass, where we will discuss the origin of the flat surface of the Beartooth Plateau and view numerous alpine glacial features and tundra flora. It is truly the top of the world. From the pass the course will work our way back to the Lamar Buffalo Ranch with geology stops to look at Beartooth Butte, a gorgeous remnant of Paleozoic sedimentary rock resting atop the Precambrian basement rocks, and with a stop at an overview spot to look at glacial features in the Clarks Fork Valley and surrounding mountains.

**Day 5****Check-Out**

Check out of cabins by 9:00 a.m.

## PROGRAM EQUIPMENT

For a full list of what is included in this course, in addition to recommended equipment check out the [Lamar Buffalo Ranch - Summer General Information](#) document.

## RECOMMENDED READING

There are books and reference materials at the ranch for the class to enjoy during the stay. In addition to those materials, the following recommended readings are not required but may enhance the visit.

- Fritz, William J., and Robert C. Thomas. *Roadside Geology of Yellowstone Country*. Mountain Press Pub. Co., 2011.

## WHOM TO CONTACT

**For any questions, concerns, or additional information please contact the following:**

- Program itinerary, health forms, payment, and general program questions please contact Yellowstone Forever at [institute@yellowstone.org](mailto:institute@yellowstone.org) or 406-848-2400
- Road updates, park conditions, and general park information please contact Yellowstone National Park Service at <https://www.nps.gov/yell/contacts.htm>
- If running late for a program, please contact 406-848-2400.