

## Bio/Geo 250, Clokey: Syllabus

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**Title:** Ecology & Geology of Yellowstone National Park & Upper Great Plains, (Eco & Geo YNP & UGP)

**Dept. Prefix:** BIOLOGY 250 or GEOLGY 250

**Pre-requisite / Co-requisite:** Either MATH 139, MATH 140 or MATH 141 or consent of instructor

**Dates of Course:** 6/29/20 – 7/31/20. Travel dates 7/13/20 – 7/26/20. All other dates are on-line.

**Credits:** 4 cr. GL;

1) **All majors:** This course satisfies the University requirement for a General Laboratory (GL) course.

2) **Education majors:** This course satisfies the Conservation requirement.

3) **Biology, Geology or Environmental Sciences majors or minors:** If you wish to have a field experience in Yellowstone, you should consider Biology/Geology 451. If that is not possible, “personalization” arrangements may be made to count 3 credits of this course in the major. Permission (personalization) must be obtained, on an individual basis, prior to the course from your respective Dept. Chairs. An additional assignment or project will be required.

**Access to Canvas:** There are two parts of the course on-line. These sections are taught via the University’s Learning Management Tool, Canvas. Any computer or device that can link to Canvas will work.

**Registration: Students cannot add or drop the class on WINS.** To register for the course you MUST contact Ms. Kari Borne, 262-472-1003, 2010 Roseman Hall, [borne@uww.edu](mailto:borne@uww.edu) or [cetravelstudy@uww.edu](mailto:cetravelstudy@uww.edu).

**Office Hours:** Due to the nature of the course there are no regularly scheduled office hours. During the on-line portion of the course, you may contact me via email or phone listed above. During the travel portion of the course, you will be in contact with the Teaching Assistants (TA) and me all of the time while we are in the field. When not in the field, you can set up an appointment for non-urgent business. For urgent problems come to any of our motel rooms at any time or try my cell phone (we’ll give out cell phone numbers at the start of the course). If you need to contact me prior to the start of the course or after the course has finished I can be reached at my University office address listed above.

**Course Description:** The course consists of 3 sections:

**Section 1) On-Line Prep: 6/29/20 – 7/12/20:** This is the first on-line section held before the Fieldwork Section # 2 described below. There will be PowerPoint lectures, links to sites on-line, and material in the textbook.

**Section 2) Fieldwork: 7/13/20 – 7/26/20:** During this section, we will travel to Yellowstone National Park and engage in field studies in the Park and hands-on labs at sites outside of the Park. While in the field we will work for about 6-8 hours for a total of 65-75 hrs. class hours. You will be evaluated by exam 1, a practical exam, your field books, specimen collections and participation. Note: while we travel I lecture at times via CB radio about feature we see.

**Section 3) On-Line Wrap-up: 7/27/20 - 7/31/20:** Exam 2 is on-line after we return. It is the same format as exam 1 and is comprehensive. It can be taken any time during the open period from **9:00 am, 7/28/20 to 11:59 pm, 7/31/20**. The exam will be timed, once you open it you must finish it in 3 hours. If you start after 8:59 pm, 7/31/20 the exam will still close at 11:59. The test is open book so you will have access to all on-line material, the text, your collection and your field book.

**Course Objectives:** This is an introductory course suitable for all students with an interest in the sites covered. The course is designed to introduce the student to the natural history, geology and ecology of Yellowstone National Park (YNP), the upper Great Plains and the Black Hills. It will also provide an introduction to the concepts and techniques of biology, geology and field work. During the course students will explore some of the philosophies of conservation being applied to the regions of study and critically examine differing views on topics such as: 1) wolf re-introduction into YNP, 2) impact of global climate change, 3) resource use and conservation, 4) preservation vs. access etc. Upon satisfactory completion of this course, students will be able to: 1) Follow basic protocols for data collection in the field, 2) acquire a basic knowledge of several instruments and techniques used in field work, 3) understand proper collection methods for specimens, 4) describe the inter-relationships between life forms at a local and global level, 5) critically examine the pros and cons of several contemporary environmental issues, 6) understand how the fundamental principles of ecology and geology may impact their everyday lives.

Students will participate in fieldwork in ecology, geology and natural history and will:

1) Acquire a working knowledge of field geology and ecology techniques including but not limited to: data recording, use of GPS and maps, water sampling, vegetation and tree sampling, and use of dichotomous keys

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- 2) Acquire a working knowledge of field equipment including but not limited to: GPS, water chemistry equipment, water sampling devices, vegetation sampling devices, atmospheric sampling devices, USGS maps, and field radios
- 3) Learn to identify minerals, rocks and animals using keys and field guides
- 4) Learn basic petrology, mineralogy and geomorphology of the regions we visit
- 5) Learn the unique ecologies of the regions we visit
- 6) Learn basic statistical methods for analysis of the data we collect
- 7) Learn about resource acquisition, e.g. mining, forestry, and the impact that this has on the environment and people of the region
- 8) Learn safety in field study

### Course Textbook & Supplies:

- 1) "Yellowstone Resources and Issues", (YRI). You can purchase a hardcopy or download a free PDF or electronic version (<https://www.nps.gov/yell/learn/resources-and-issues.htm>).
- 2) Field Notebook will be distributed during the pre-trip meeting or the 1<sup>st</sup> day.
- 3) You must also purchase a plastic tackle or organizer box for specimen collection. A good box to buy is about 13" x 11" x 3" with movable partitions and costs about \$5. You may want two.
- 4) A dictionary of geologic terms is **recommended only**; I'll have a copy or two. "Dictionary of Geologic Terms", Bates and Jackson is available at the UWW bookstore or elsewhere.

**Grading Policy:** A, 90% and up; B, 80 – 89%; C, 70 – 79%; D 60 – 69%; F below 60%.

There will not be a curve, and there is no extra credit.

Assessment Type	% of Grade
Exam 1 is on 7/13/20* in the evening, format is short answer, short essay format, (during travel section)	30%
Practical Exam is on 7/25/20* in the evening, (during travel section)	20%
Notebook and Field Collections are due 7/25/20* in the evening, (during travel section)	15%
Exam 2 is open from 9:00 am, 7/28/20 to 11:59 pm, 7/31/20. It is on-line and timed (3 hrs.).	35%
Class participation grade (-2.5% to +2.5%)	
<b>Total</b>	<b>100.0%</b>

\* These are tentative dates and times and may be changed due to unforeseen circumstances.

### Notes on Assessment:

- 1) For the practical exam there will be a number of specimens on display. You will need to identify the specimens and answer questions about them. The exam is timed.
- 2) Compilation of a comprehensive field notebook (see the Notebook Instructions in Canvas) will be required of the students. Students will also assemble plant, rock and mineral collections from the study areas. The collections will be evaluated for completeness and used as a study aid for the practical exam and Exam 2. We will instruct the students as to what may be lawfully collected. We'll collect the notebook and collection on the return trip.
- 3) Class Participation is expected. It is imperative that you stay current with the information given. In other words if we tell you or show you something it is fair game for us to ask you about it later. You will also be asked to discuss and apply information from the assigned readings in the context of fieldwork activities. You also need to participate in all of the activities. If it looks like you don't know what is going on or you are not participating you may be marked down. Likewise if you show that you are up on the topics and are into it, you may be marked up.

**Attendance Policy:** For the travel part of the course attendance is mandatory at all times for all activities; this includes the first day on the UWW campus. This is a field course and you are required to participate in everything we do to the best of your abilities. Attendance will be part of your grade and missing anything may lower your grade. We can only accommodate absence for illness or injury that occurs during the trip; there will be no absence for University sponsored events since we are too far away from the University. While on the trip if you are injured or become ill you **must** inform the instructor immediately. We will transport you to medical facilities as appropriate. This applies to even minor problems since they can turn into major problems and we want you to be well.

For the on-line part of the course you are expected to meet the deadlines for each assignment. There will be ample time to complete them. I expect you to plan your schedule so that foreseeable events such as vacations, weddings etc. are accounted for and will not prevent you from completing your assignments on time. The **ONLY** exceptions to this rule are

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sudden and serious illness or death in the immediate family. You must provide a written doctor's note for a severe illness or a notice of death, e.g. an obituary, for death in the family.

**Students who use the Center for Students with Disabilities (CSD) for test taking assistance:** Since we are in the field, you will not have access to CSD during the Fieldwork Section (Sec. 2). Prior to leaving we will work something out with CSD so that accommodations can be made. Either one of the TAs or I can read the test, we'll give you extra time or whatever it takes, no worries. Section 1 & 3 will be conducted on-line and arrangements can be made with CSD if needed.

The University of Wisconsin-Whitewater is dedicated to a safe, supportive and non-discriminatory learning environment<sup>2</sup>. It is the responsibility of all undergraduate and graduate students to familiarize themselves with University policies regarding Special Accommodations, Academic Misconduct, Religious Beliefs Accommodation, Discrimination and Absence for University Sponsored Events (for details please refer to the Schedule of Classes; the "Rights and Responsibilities" section of the Undergraduate Catalog; the Academic Requirements and Policies and the Facilities and Services sections of the Graduate Catalog; and the "Student Academic Disciplinary Procedures (UWS Chapter 14); and the "Student Nonacademic Disciplinary Procedures" (UWS Chapter 17).

### On-Line Syllabus

Canvas Videos	YRI Topics	YRI pages
Introduction	Introduction	13-28
<b>Section I: Geology</b>		
Petrology	Basic Petrology	
Mineralogy	Basic Mineralogy	
Plate Tectonics I	Plate tectonics	107-124
Plate Tectonics II	Plate tectonics	107-124
Glaciation	Glacial Geology	124-126
<b>Section II: Ecology &amp; Natural History</b>		
	Greater Yellowstone Ecosystem	53-106
Eco II	Life in Extreme Heat	131-142
Eco. I, Succession & Fire	Vegetation: Intro., Forests & Invasive Plants	143-150, 157-158
Succession & Fire	Fire as part of an ecosystem	161-175
	Bears, Bison, Elk, Moose, Wolves, Coyotes, Beavers, Pika	Animals listed
Eco II	Wolves, Keystone & Foundation Species	216-223
Invasive Species	Native vs. non-native and invasive species	265-286

- 1) All page readings are in the Yellowstone Resources and Issues book (YRI). I suggest that you skim the book to become familiar with the terms. You should then look at the videos on Canvas for detail and finally re-read the book for points of which you are unclear.
- 2) The first exam will concentrate on the materials in the videos, especially the geology. I will also take materials on invasive species, fire ecology, and a little of the Park's history from YRI. Study both. Remember you will not have easy access to the internet as we travel.
- 3) The second exam will cover the entire course including what we see as we travel. You will have access to all on-line material.
- 4) For the animals, know at least the animals that are listed.

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### TENTATIVE COURSE TRAVEL ITINERARY, 7/13/20 – 7/26/20:

This is a field course and as such field events will determine to a degree what will be taught. We plan to teach numerous basic concepts but we will also rely on opportunities as they present themselves. Due to weather conditions or logistics we may not cover the topic on the day listed but we will try to cover all of the topics listed.

Date	Day	Activity
7/13/20	Mon	Travel to Mitchell, SD: As we travel, there will be a discussion via CB radio. Topics include WI and MN ecology, geology, vegetation and climate change. As opportunity presents we will discuss unique biomes we see such as oak savannas and unique fauna and their adaptations. Any rock, geologic formation, plant or animal that we point out should be recorded in your field notebook. This applies throughout the course. <b>Exam 1 in evening at motel.</b> *
7/14/20	Tue	Travel to Newcastle, WY: We'll tour Badlands Natl. Park and hike some of the trails. We'll discuss the geology and paleoecology of the Badlands and introduce the Laramide orogeny. We'll discuss the geology of the Black Hills and cover why the Hills have such unique biology.
7/15/20	Wed	Travel to Hulett, WY: We'll tour Jewel Cave (9:20-10:50 tour), the Black Hills, either a pegmatite mine or Mt. Rushmore and if time permits Devils Tower. We'll discuss the geology and ecology of these features and talk about fire regimes.
7/16/20	Thu	Travel to K-Z Guest Ranch, Cody, WY: We will travel across the Big Horn Mts. via Shell or Ten Sleep Canyon and stop at a dinosaur track site or fish hatchery if time permits. The K-Z Guest Ranch is our base of operation while in the Yellowstone region. When we arrive at the K-Z, we will unpack all equipment (this is a group effort).
7/17/20	Fri	K-Z: We will travel to Yellowstone National Park (YNP) to study the two major types of geothermal features found in the Park. These are represented by Norris Geyser basin and Mammoth Hot Springs. We will study fumaroles, hot springs, mud pots, geysers, travertine terraces and sinter deposits. We will explore the unique microenvironment created by the geothermal features and discuss the thermophilic bacteria and algae that live in these extreme environments. We will stop at the Golden Gate and if time permits, Obsidian Cliffs, to study petrology. We'll continue to explore the volcanic activity that produced the Park. While in the Park, as opportunity presents, we will observe the fauna; this may prevent us from following the schedule but we will eventually see all of the sites listed.
7/18/20	Sat	K-Z: We'll tour the region around the K-Z and conduct labs on mapping, vegetation analysis & water analysis.
7/19/20	Sun	Free day: We'll discuss possible activities. All extra costs are the responsibility of the student.
7/20/20	Mon	K-Z: We'll travel to Yellowstone to view Lower, Midway and Upper Geyser Basins. We'll compare these feature to those found at Mammoth.
7/21/20	Tue	K-Z: We'll leave the K-Z (ca. 4:30 am) to be on site in Lamar Valley at 6:00 am. Dr. Jim Halfpenny, wildlife biologist/naturalist, will talk on carnivore ecology of YNP and the reintroduction of wolves. This is an all-day exercise with Dr. Halfpenny and he will be conducting the study. He is an expert on large mammals and conducts research in the park. We will learn various field techniques for studying large carnivores and interpreting their behavior. We will learn tracking techniques and their interpretations. We'll try to view wolves (we have seen a pack every year we have been there) and any other large mammal we can find (coyote, pronghorn, bison, bear, etc.).
7/22/20	Wed	K-Z: We will view the Grand Canyon of the Yellowstone, Yellowstone Lake and the nearby geyser basins. We will discuss how the Canyon formed. We will see effects of hot springs on geology and ecology. At Lake, we'll discuss introduction of non-native species and the harm they cause to the ecosystem, specifically the introduction of the lake trout and its effect on the cutthroat trout population of the lake. We'll discuss foundation species, e.g. the cutthroat trout, and tropic level impacts when foundation species are decimated. If time permits, we'll stop at Tower Falls to discuss the caldera events that shaped Yellowstone. We will look at a basaltic lava flow and see paleosols.
7/23/20	Thu	K-Z: We'll cross the Beartooth Mountains to study alpine glacial processes and high altitude ecology. We'll stop at Beartooth Pass for tundra biomes and permafrost geology. We'll view adaptations that the various plants have that allow them to survive in the harsh environments found at elevation. Notebooks and collections are due.
7/24/20	Fri	Travel to Hulett, WY: We will travel across the Big Horn Mts. via Shell or Ten Sleep Canyon and stop at a dinosaur track site or fish hatchery if time permits.
7/25/20	Sat	Travel to Mitchell, SD: <b>Practical exam in evening, notebooks and collections due.</b> *
7/26/20	Sun	Travel to UWW: We'll leave early and arrive UWW in the late afternoon. We'll stop for calls for your ride. We need to unpack when we arrive at UWW and <b>everyone must help.</b>

\* These are tentative date and may be changed due to unforeseen circumstances.

You will have until 7/31/20 at 11:59 pm to complete Exam 2 on-line.