Syllabus (tentative)

Instructor: Dr. George Clokey
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Title: Ecology & Geology of Yellowstone National Park & Upper Great Plains, (Eco & Geo YNP & UGP)
Dept. Prefix: BIOLOGY 250 or GEOLOGY 250
Pre-requisite / Co-requisite: MATH 140 or MATH 141 or consent of instructor
Dates of Course: 7/1/15 to 7/30/15. Travel dates 7/13/15 - 7/27/15. All other dates are conducted on-line.
Credits: 4 cr. GL; General Laboratory (GL) course offered to all students.
1) Education majors: This course satisfies the Physical Science requirement (PI-34) and satisfies the K-12 Conservation requirement (for applicable majors).
2) Environmental Sciences majors: This course satisfies the travel study requirement for the major but requires “personalization”. For personalization see the Environmental Science Coordinator prior to taking the course.
3) Biology or Geology major or minors wishing to have a field experience in Yellowstone 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 the respective Dept. Chairs. An additional assignment or project will be required.

Registration: Students cannot add or drop the class on WINs. To register for the course you MUST contact the travel study office at 262-472-1003 or 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 (see above) or D2L. During the travel portion of the course you will be in contact with the Teaching Assistant (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 either of our motel rooms at any time (please knock) 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; 7/1/15 - 7/12/15: This is an on-line section (D2L) held before the fieldwork section (see below). There will be lectures, videos, and links to pertinent sites. You will need to complete on-line worksheets and Exam 1 will be on this material. There will be due dates for the worksheets and the exam but as long as you meet them, the work can be done at your pace. You will need the textbooks listed below for the readings in this section.

Section 2) Fieldwork; 7/13/15 - 7/27/15: During this section we will travel to Yellowstone National Park and engage in field studies in the Park and at sites along the way. You will also learn more material in this section by lectures and hands-on labs. While in the field we will conduct labs and lectures for about 6-8 hours each day and work for about 12 days (total 65-75 hrs.). There will be graded worksheets associated with some of the labs. I also will test you on specimens that we have seen with a practical exam and I will also grade you on your field books, specimen collections and participation. Note: while we travel I lecture at times for urgent problems come to either of our motel rooms at any time (please knock) or try my cell phone.

Section 3) On-Line Wrap Up and Final Exam; 7/28/15 - 7/30/15 at 11:59 PM: The final exam is on-line after we return. During this on-line section you will be given a chance to prepare for the on-line final exam. There will be review material and you will have access to the first on-line section. You’ll also have your field book to help you review. There will then be a comprehensive final consisting of essay and short answer. The exam will be timed, once you open it you must finish it in 3 hours and you will not be allowed to access other sites. It will be open at 8:00 am, Tuesday, July 28th and close at 11:59 pm, Thursday, July 30th. That means that the latest you can start the exam is 8:59 pm, July 30th. It can be taken any time during the open period.

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
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, 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", 2014 edition (YRI). Please pick it up at my office (311 UH) before leaving for summer break. If you are from another school we’ll send it to you so contact us with your mailing address.
2) Baron, D.; 2005; The Beast in the Garden; W.W. Norton & Co., New York, NY. Please pick it up at my office (311 UH) before leaving for summer break so that you can read it prior to the trip. If you are from another school we’ll send it to you so contact us with your mailing address.
3) 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.
4) You must also purchase a plastic tackle or organizer box for specimen collection. A good box to buy is about 12 in. x 9 in. x 3 in. with movable partitions and costs under $10.
5) Field Notebook will be distributed during the 1st day.

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.

<table>
<thead>
<tr>
<th>Assessment Type</th>
<th>% of Final Grade</th>
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<tbody>
<tr>
<td>1 Exam 1, Monday, 7/13/15, covers on-line material (held @ UWW)</td>
<td>25%</td>
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<tr>
<td>2 1 Practical exam (during travel section)</td>
<td>20%</td>
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<tr>
<td>3 Notebook and Field collections (during travel section)</td>
<td>10%</td>
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<tr>
<td>4 Various worksheets from the field labs (during travel section)</td>
<td>10%</td>
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<tr>
<td>5 Final Exam, on-line, must be completed by 11:59 pm, 7/30/15</td>
<td>35%</td>
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<tr>
<td>6 Class participation grade (fudge factor) (-2.5% to +2.5%)</td>
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<tr>
<td>Total</td>
<td>100.0%</td>
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Details of Grading:
1) Exam 1 covering on-line material will be multiple-choice, true-false and short answer. It will be help on the UWW campus in a class room.
2) 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 will be given during the return trip and it is timed.
3) Compilation of a comprehensive field notebook (see "Notebook" handout) 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 practical, field exams and the final exam. We will instruct the students as to what may be lawfully collected. We’ll collect the notebook and collection on the return trip.
4) Worksheets will consist of short question sheets and data collection and analysis sheets. These are short assignments and can usually be done in the field or when you return to the camp. Some math and statistics is involved but we will show you what is needed. You should bring a calculator (phone calculators are good enough).
5) The final on-line written exams will be short answer / essay. It will be given on D2L when we return to UWW.
6) 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 you 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 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. 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

<table>
<thead>
<tr>
<th>PowerPoint/Video Lecture Topics</th>
<th>Readings</th>
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</thead>
<tbody>
<tr>
<td>Introduction to YNP, Basic Petrology &amp; Mineralogy, Plate Tectonics &amp; Hot Spots</td>
<td>YRI¹: p 3-34</td>
</tr>
<tr>
<td>Use &amp; Environmental Issues, Mapping, Use of Compass &amp; GPS</td>
<td>YRI: p 57-66</td>
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<tr>
<td>Greater Yellowstone Ecosystem (GYE), Life in Extreme Conditions, Micro-Habitats</td>
<td>YRI: p 35-41, p 57-66</td>
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<tr>
<td>YNP Vegetation and Wildlife, Management Issues, Fire; History in YNP, Management of</td>
<td>YRI: p 67-74, p 75-96, 89-137</td>
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<tr>
<td>Fire, Effects on Ecosystem, Dichotomous Keys</td>
<td>YRI: p 139-181</td>
</tr>
</tbody>
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Notes:
1) YRI stands for the Yellowstone Resources and Issues book.
2) The Baron book, *The Beast in the Garden* should be read prior to the trip as it will be discussed during the trip.
3) There will be material on D2L such as links to other sites and reading assignments.

COURSE TRAVEL ITINERARY (tentative):

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. A more detailed description of the labs is included in the handout titled “Labs”.

At any time during the course you will be expected to participate in discussions and answer questions on previously presented material or material from the reading. You will be graded on your response. For more detail see “Grading Policy” above.

Monday, 7/13/15: Class on UWW campus; meet and greet @ 9:00 am, Upham Hall. We’ll introduce field techniques, mapping and equipment. We will learn how to use GPS, read USGS quadrangle maps and determine position by compass and GPS. Students will be required to verify the location of sampling sites, locate their position and participate in a “treasure hunt” using the GPS, compass and USGS maps. The first exam, covering on-line material, will be given this day. We will pack as much as possible to get an early start on Tuesday.

Tuesday, 7/14/15: UWW to Mitchell, SD; meet, Lot 14, Upham Hall @ 6:30 am, pack and leave UWW by 7:00 am. Throughout the trip we’ll make ecology and/or geology stops as applicable. Topics will be changes in rainfall and agriculture as we move westward. We’ll also discuss alternative energy sources.

Wednesday, 7/15/15: Mitchell, SD to Hot Springs, SD; we’ll tour Badlands Natl. Park and discuss their formation including the Laramide orogeny. We’ll visit the Mammoth Site in Hot Springs and learn paleontological techniques. We’ll discuss the geology of the Black Hills and cover why the Hills have such unique biology. We’ll discuss the conflict that the development of the Black Hills has generated with resource preservation and the American Indian culture.

Thursday, 7/16/15: Hot Springs, SD; we'll tour the Black Hill for wildlife, pegmatites and the geology of the Hills. We’ll then split into 2 groups, some doing The Fairgrounds tour and others the Wild Cave tour of Wind Cave Natl. Park. Both groups will discuss cave geology.

Friday, 7/17/15: Hot Springs, SD, to K-Z, Cody, WY; we’ll cover alpine glaciation and desert climates. If time permits we will stop at a fish hatchery and discuss an invasive species’ impact on the Yellowstone ecosystem.

Saturday, 7/18/15: K-Z; we’ll leave the K-Z at 5:00 am to study wolf ecology with Dr. Halfpenny in Yellowstone National Park (YNP). We’ll try to find and cast tracks from several species.

Sunday, 7/19/15: K-Z; this is a free day. There are no class activities planned so you are on your own but we can cart you around within reason, e.g. we can offer a van to Yellowstone for sightseeing or to Cody for the museum, etc. There are also horseback rides, trips on the lake and fishing offered by the K-Z. All extra expenses are the responsibility of the student.
Monday, 7/20/15: K-Z; we will travel to Yellowstone National Park to study the two major types of geothermal features found in the Park. These are represented by Mammoth Hot Springs and Norris Geyser Basin. We will study fumaroles, hot springs, mud pots, geysers, travertine terraces and sinter deposits. We will explore the unique micro environment created by the geothermal features and discuss the thermophilic bacteria and algae that live in these extreme environments. We will discuss two different formations represented by the Golden Gate and Obsidian Cliffs. While in YNP we will observe the flora and fauna.

Tuesday, 7/21/15: K-Z; we will continue our study of the geothermal feature of the Park by visiting: Artists’ Paint Pots, Grand Prismatic Springs, and the Upper Geyser Basin (Old Faithful).

Wednesday, 7/22/15: K-Z; lab day (depending on weather). We’ll split into 2 groups and each group will run both labs. Groups will switch off at lunch (lunch @ K-Z)
1) Stream Analysis: We will visit Swamp Lake for work on water chemistry and biology. You will learn techniques such as chemical analysis and identification of organisms using keys. You will get wet.
2) Vegetation Analysis by Plot & Plot-Less Methods: We will learn several sampling techniques for vegetation. We will analyze the data using various statistical methods.

Thursday, 7/23/15: we will view the Grand Canyon of the Yellowstone and the Tower Falls basalt flows. We will discuss how the Canyon formed and the formation of Yellowstone Falls. We will see effects of hot springs on geology and ecology in the Canyon. We will discuss the 3 caldera events that shaped Yellowstone. We will look at a basaltic lava flow and see paleosols at Tower Falls. We will examine areas for fire destruction and recovery and discuss the adaptations that allow the flora and fauna to survive periodic fires. Ecologic succession will be explained and viewed at Mt. Washburn. We will discuss the problems of introduced species at Yellowstone Lake.

Friday, 7/24/15: K-Z; we will cross the Beartooth Mountains to Red Lodge, MT to study alpine glacial processes and high altitude ecology. We’ll stop at Beartooth Lake for landslides and the ecologic disturbance they cause and at Beartooth Pass for tundra biomes and permafrost geology. We will view adaptations that the various plants have that allow them to survive in the harsh environments found at elevation. We will see unique micro ecosystems such as “pink snow”. We will pack the vehicles as time permits.

Saturday, 7/25/15: K-Z to Hulett, WY; we’ll leave the K-Z and travel to Hulett, WY. We’ll travel through Shell Creek Canyon, visit a dinosaur track site and a coal strip mine if time permits. Along the way we will review material for the next exam. We’ll make a stop at Devils Tower and discuss the formation of this feature. There are several unique Mesozoic, oceanic fossils that we will attempt to find and examine. We will look at a lower elevation pine forest and compare it to the higher elevation forests near Yellowstone. We will observe behavior of a prairie dog community. We’ll discuss the significance of the Black Hill to the Lakota Sioux.

Sunday, 7/26/15: Hulett, WY to Mitchell, SD; we will finish Devils Tower if need be. We’ll review during the drive. The practical exam will be given at the motel in Mitchell. Notebooks and collections are due right after the exam.

Monday, 7/27/15: Mitchell, SD to UWW; we’ll leave Mitchell, SD in the early AM and arrive UWW in the late afternoon. We’ll stop along the way for contact calls for your ride. We need to unpack when we arrive at UWW and **everyone must** help.