Course Description: Our primary goals in this course will be to understand how altitude affects the structure, function and evolution of alpine and sub-alpine plants and animals, and to create ways to bring this understanding into the grade 6-12 classroom. A major theme of this class is *constraint*, which is really the theme of all ecology. Constraints are things that limit distribution and abundance of living things. We will explore and gather data describing the biotic (living) and abiotic (non-living) constraints of sub-alpine and alpine environments to infer how these factors affect the form, abundance and niches of a variety of plants and animals.

Through a mix of online, class and field work, students will move rapidly from basic concepts, to hands-on field work and data collection, to the synthesis and presentation of those data. In the field, students will collect data that can in turn be analyzed and interpreted later by their own students. During nightly break-out sessions, students will work on ways to integrate the material we gather in the field into multimedia presentations that can be used in teaching modules. Students will present and share data and teaching module components with each other on the last day of class.

For us to progress smoothly during the class week based out of MSU, 4 weeks of background reading and study are necessary. Pre-class week materials, including homework assignments, will be posted on the course’s *Desire to Learn* (D2L) website beginning June 15th.

Field class will be based out of Bozeman. During the day, students will work cooperatively to gather data, photos and (optional) video clips in the field, then in the evenings will work together to link visual materials back to the data. The goal here is to create a virtual field trip for primary and secondary level students, illustrating every aspect of a simple descriptive natural history study, from initial observations, to hypothesis generation, to data gathering, to data summary and finally to drawing overall conclusions.

Field Trips: We will spend all or part of 5 days in the field (M-F) regardless of weather. During these trips, students will study field craft, generate and test hypotheses, gather data, and take digital photographs and video be used in teaching models to illustrate the process of doing science, and basic ecological concepts.

Grading: Grades will be based on a combination of pre-class homework (1/3); mid-class progress and discussion (1/3); final wrap-up discussions and presentation of teaching module components (1/3).

Readings and Online Material: Reading assignments, exercises and supplemental materials will be posted on the class D2L website beginning June 15th, and provided during class week at MSU.

Course Schedule. Online portion of the class, June 15 to July 15: Online portion of the class. Visit the course website on Desire2Learn (D2L) for specific assignments and deadline dates.

Field portion of the class. Days will be devoted to field work and discussions in the field. Evenings will consist of break-out group work.
**Physical Requirements.** Field days will be long (up to 10 hours) and sometimes strenuous. Students must be prepared to spend the better part of 5 days hiking and doing field work in rugged terrain at high elevations (7000 to 9000’+). Those coming from low elevation areas are encouraged to arrive 7 to 10 days early and spend that time at or above 5000’ to acclimatize before class begins. (Most of Yellowstone Park is above 6000’.)

Students must carry and know how to use, the following field gear:

- A Loud whistle
- A light, comfortable day pack into which all this gear will fit.
- Bear repellant – immediately accessible in a holster on your pack belt (some repellant is available through the MSSE program).
  - **Comfortable, all-weather, sturdy, above-the-ankle hiking boots – no tennis shoes!**
- Light weight rain gear, preferably breathable.
- Mid weight fleece or wool pullover or sweater
- Hat and Sun screen. Take this seriously! UV radiation at high elevation is much more intense than at sea level.
- High energy snack food and a lunch to keep you going for a full day in the field.
  All food should be double-bagged in zipper-style bags.
- 1 or 2 1L water bottles, or a Camel-back style bladder with drinking hose.
- First aid kit.
- Headlamp or flashlight with spare batteries.
- Binoculars.
- Field notebook and pencils. Rite-in-the-Rain, or similar notebooks are best. Usually available at the MSU bookstore.
- Compass, and if you have one, a GPS.
- Personal toiletry and first aid kit containing any necessary medications.