DEPARTMENT OF GEOLOGY
Southern Illinois University at Carbondale
Geology 454 - Field Geology
Academic Requirements and Grading
Summer 2008

Course Rationale

The summer course in field geology offers students the opportunity to apply what has been learned in the classroom to real geological problems. Unless you already have fairly extensive field experience you should emerge from the course with a much deeper and more realistic appreciation of problems attending the collection, analysis, interpretation, and synthesis of geological information.

In the field, rocks look different than they do in textbooks or on lab benches. A valuable aspect of the field course is practice in approaching an outcrop and knowing what to do next. Even an incorrect solution to a field problem or faulty interpretation of a geological event is of value because it prepares the way for a better solution or interpretation next time. As you get better at your job through practice, you gain confidence in your abilities. For this reason, a field course must stress individual effort and personal initiative. Students usually work in teams, primarily for safety, and we all realize that a good deal of learning can be derived from discussing ideas with classmates. But it is your own interpretation of the geology, developed from your own investigation that will be of most value.

Travel

One of the aims of the course is to show you as much geological variety as feasible in a six-week period. There will probably be few, if any, times in the future when you will be able to see such a broad spectrum of the science in so limited a period of time.

Instruction and familiarization with the use of maps begins on the trip from Carbondale to Red Lodge. On the way, we will look at rocks of many types and discuss broad, regional events as well as more local phenomena: paleo-environments, tectonics, stratigraphy, and structural styles.

Long periods of driving between stops can be dull, but there are things you can do to offset inactivity.

1. **Keep alert.** That stuff passing by the windows of the van is geology. You have paid big bucks to see it.

2. **Follow our route** on the state geological maps and AAPG highway maps provided in each vehicle. Learning to read geological maps is vital.

3. **Read ahead** in the field course guides so that you will know what to expect when we make geological stops.

4. **Memorize the stratigraphic section of the Red Lodge area**. You should be familiar with formation names and broad lithologic characteristics of the section by the time we visit the Black Hills, where many of the units can be correlated with rocks of the Beartooth Range and the Bighorn Basin farther west.

Field Exercises

Field exercises begin with examination of an assigned area and result in geologic maps, cross-sections, and in specific cases, reports that synthesize your observations and interpretations. These field problems comprise the most important parts of the course and will teach you more about practical, nuts and bolts geology than anything else that you do this summer.

Examinations and Reports

In addition to the Carbondale-Red Lodge trip we will be on the road for a relatively extended period on one other occasion. During a trip to western Montana we will examine evidence of a tectonic style much different from that of the Red Lodge area. We will also examine metamorphic rocks, valley glaciation, and volcanic and plutonic igneous rocks. There will be an examination at the end of each of the longer trips (Carbondale-to-Red Lodge and western Montana). Both exams and will be based on what the group has seen and discussed so take good notes.

A **comprehensive** report on the geology of the Beartooth Mountain front and surrounding areas will accompany the maps and cross-sections that you prepare during the third week of the course.

Grades

Your grade for the course will be calculated from the points you earn on field problems, reports, and examinations. The point value of each element of the course is listed below together with due-dates and times.

Exercise:	**Examination/Graded Exercise on Carbondale-to-Red Lodge trip**
Date:	June 21
Hand in:	Exam book (provided)/Exercise
Date Due:	June 21
Point Value:	50

Exercise:	**Clarks Fork Canyon**
Dates:	June 23
Requirement:	Describe and learn Paleozoic and Mesozoic stratigraphic section.
Date Due:	June 23
Point Value:	None. Must have rock descriptions for later work.

Exercise:	**Gypsum Creek**
Date:	June 24
Hand in:	Geologic map, cross-section
Date Due:	June 24 - before leaving field
Point Value:	100

Exercise:	**Line Creek measured section**
Date:	June 25
Hand in:	Field notebook with columnar section (pencil) and rock descriptions, Schmidt net.
Date Due:	June 26, ~ 9:00 a.m.
Point Value:	None. Satisfactory or do over.

Exercise:	**Elk Basin**
Dates:	June 26 - June 28
Hand in:	Geologic map, 2 cross-sections, Schmidt net (with explanation).
Date Due:	June 30, 10:00 p.m.

Point Value: 300

Exercise: **South Fork of Grove Creek**
Dates: June 30
Requirement: Describe and learn Paleozoic stratigraphic section. Introduction to aerial photographs.
Date Due: June 30
Point Value: None. Must have rock descriptions for later work.

Exercise: **Little Bear Creek**
Date: July 1
Hand in: Geologic map (on air photo) and cross-section.
Date Due: July 1 - before leaving field.
Point Value: 100

Exercise: **Beartooth Front mapping**
Dates: July 2, 3, 5, 7, 8 (office day)
Hand in: Geologic maps, 3-4 cross-sections, comprehensive report.
Date Due: July 8, 10:00 p.m.
Point Value: Maps and cross-sections: 400
Report: 100

Exercise: **Stillwater Complex**
Date: July 9, 10
Hand in: Quiz on identification of Stillwater rocks
Date Due: July 9 - after return to camp
Point Value: 50

Exercise: **Glacial and surficial deposits**
Dates: July 11 - 12
Hand in: Geologic map and event chronology
Date Due: July 12, 10:00 p.m.
Point Value: 150

Exercise: **Block Mountain**
Dates: July 18 - 20
Hand in: Geologic map and cross-section.
Date Due: July 20, 10:00 p.m.
Point Value: 400

Exercise: **Bitterroot Shear Zone**
Date: July 23 - 24
Hand in: Summary of strain measurements.
Date Due: July 24, at end of field work.
Point Value: 100

Exercise: **Examination on western Montana trip**
Date: July 28
Hand in: Exam book (provided)
Date Due: July 28 - *en route* to or at Red Lodge
Point Value: 50

TOTAL POINTS: 1800

Note:

Unless otherwise specified, each map and cross-section will be inked and colored.

Maps will include a north arrow, scale, stratigraphic sequence, and a legend explaining the symbols used.

Cross-sections will include azimuth (direction) indicators and scale. **Vertical exaggeration will not be necessary.**

Comprehensive Report on the Beartooth Front

Unless otherwise specified, the report that accompanies the Beartooth front maps and cross-sections should be organized as follows:

Introduction
Include the geographical and geological settings and the purpose of the report.

Stratigraphy
Describe the stratigraphic section in order from oldest to youngest units; include contact relationships between units and environments of deposition where appropriate.

Regional Structure
An account of the structural style of the northeastern Beartooth Mountains and relationship to the general structural style of other ranges in the Rocky Mountain foreland (Wyoming Province).

Local Structure
Specifics of the structural geology of the mapped areas - from your observations.

Erosional and Pleistocene Geology
An account of Pleistocene history and features in the map area and elements of the erosional history of the Beartooth front *developed from observations during excursions and exercises.*

Economic Geology
Significant mineral, industrial rock and mineral, and hydrocarbon deposits in the northern Beartooth Mountains and neighboring Bighorn Basin.

References Cited
Citations should follow the standard GSA format; for journal papers:

Berry, M., and Blum, M., 1993, Increased use of combustion-generated aerosols and highly-polished reflecting surfaces in modern geomorphic interpretations: Geological Society of America Bulletin, v. 97, p. 233-254.

For citations of books, the format is slightly different:

Utgaard, J. E., 1987, Fenestrate bryozoan perthotaxis in a small perched-reef complex, central Kalahari Desert: New York, Ferbisher Press, 678 p.

Return of exercises

All exercises, reports, and examinations except the Stillwater rock quiz will be graded and temporarily returned to you for explanation and examination while the course is in session. In order to ensure the integrity of future courses, graded exercises will be collected and held by the faculty after you have had the opportunity to look them over. In most cases it will be possible for you to obtain your completed exercises after the course terminates. We will brief you on this policy in Red Lodge.