

GEOL 383: Field Geology in the Northern Rockies

Department of Geological Sciences

Ball State University

Course Syllabus

Summer Semester, 2017

(Revised 9/21/2016)

I. General Information.

GEOL 383 is the capstone experience for departmental majors in Geology and Earth Science departmental majors. It has been a required part of the Geology major at Ball State since 1971. The course is run as a Summer Semester course over a 5 week period (usually during 1st Summer Session) and is taught in the Black Hills of South Dakota and the Bighorn Basin of Wyoming. The course is regularly attended by students from other universities to satisfy the capstone requirements of their own programs in Geology.

II. Course Rationale

GEOL 383 is a course designed to allow students to bring their classroom knowledge into a field setting. While field problems and demonstrations are a part of many of the Geology Foundation courses, GEOL 383 allows students to tie data collected at the beginning of the 5 week course to field work done at the end of the course. The course is taught away from the BSU campus so that students can concentrate entirely on the task at hand: solving geologic problems.

III. Catalogue Description

GEOL 383. Field Geology of the Northern Rockies (6 credit hours).

This is a capstone experience applying field techniques to the resolution of geologic problems. Group and individual projects include accumulation and interpretation of field observations and preparation of geologic maps, cross sections, and stratigraphic sections to answer geologic questions. Course includes application of GPS and GIS technologies to geological problems. Five-week summer course in the Rocky Mountains.

Prerequisites: GEOL 102, 220, 240, 308; or permission of the department chairperson.

IV. Learning Objectives

1. **Extend** individual skills in the field description of a geological site.
2. **Practice** standard field procedures at every site so meaningful comparisons of different localities can be made.
3. **Gain experience** in geologic mapping in different geologic settings.
4. **Learn** to manage time in the field so adequate data can be collected to complete a project.
5. **Develop** the ability to use surface geologic information to interpret subsurface geology.
6. **Produce** a final collaborative map with an independent interpretation of the subsurface geology.
7. **Demonstrate** an understanding of the geologic history and evolution of the Northern Rockies region by using data collected through the course.

V. Course Texts

Ball State University Field Camp Guidebook. This compilation contains literature readings, logistical information, and exercise directions. **Provided** to all registered students and staff.

Freeman, Tom, *Geology Field Methods*, Friendship Publications, Columbia, MO, 2010, 111 p. **Provided** to all registered students.

VI. Course Outline

Week 1. (May 14-20)

Travel to the field area.

Making Notebook Entries and descriptions: Palisades State Park, South Dakota.

Individual Project 1: Badlands National Park. Mapping Horizontal Sedimentary Strata.

Measuring Strike and Dip.

Field Description of Igneous Rocks and Outcrops.

Field Description of Metamorphic Rocks and Outcrops.

Regional Geology of the Northern Rockies I: The Black Hills and the Laramide Tectonic Event.

Field Description of Sedimentary Rocks and Strata.

Week 2 (May 21-27)

Individual Project 2: Whitewood Creek Canyon, Deadwood, South Dakota. Mapping faulted rocks.

Individual Project 3: Boulder Park, Sturgis, South Dakota. Mapping folded rocks.

Individual Project 4: Lookout Peak, Spearfish, South Dakota. Measuring and describing a sedimentary section.

Regional Geology of the Northern Rockies II: The Powder River Basin and the Bighorn Range.

Individual Project 5: Clarks Fork Canyon, Wyoming. Using field descriptions to identify strata.

Week 3 (May 28-June 3)

Regional Geology of the Northern Rockies III: The Bighorn Basin.

Team Project 1: Five Springs Canyon area, Wyoming. Large scale mapping folded and faulted rocks.

Week 4 (June 4-10)

Team Project 2: Elk Basin Oil Field, Wyoming and Montana. Large scale mapping of complexly folded and faulted strata.

Week 5 (June 10-17)

Regional Geology of the Northern Rockies IV: The Beartooth uplift and the Yellowstone volcanic area.

Regional Geology of the Northern Rockies V: The Teton Range and the Basin and Range Tectonic Event.

Return to Muncie.

VI. Student Evaluation

Student performance in the course will be evaluated by work done on each of the projects and writing assignments. The breakdown is as follows:

Individual Projects	35%
Project 1, Badlands	5%
Project 2, Whitewood	7%
Project 3, Boulder Park	8%
Project 4, Lookout Peak	7%
Project 5, Clarks Fork	8%
Team Projects	40%
Team 1, Five Springs	20%
Team2, Elk Basin	20%
Writing Assignments	25%

VII. Course and Instructor Evaluation:

Students will have an opportunity to participate in a formal evaluation of the course and all instructors' teaching performance at the end of the semester.

VII. Special Arrangements:

Students who need adaptations or accommodations because of a disability or have other health or medical concerns, especially a chronic medical condition which could become acute during the course should contact the director of the field course during planning stages (November-March) of the course. This information will be handled in strictest confidence.