

GEOLOGICAL FIELD METHODS

Geo-Sci 231 - Spring, 2011

Pre-field Meeting: Tu 1:00-1:50 (Room 225) - 10848

Field: Th: 1:00-5:00 or so (the Pioneer Valley region) - 10849

PRIMARY INSTRUCTOR

Professor Richard Yuretich

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Office Hours: M 1:30- 2:30, Tu 11:00-12:00, and by appointment

Other Geosciences faculty members will participate in the instruction and evaluation of the various field exercises.

Teaching Assistant: TBA

COURSE PHILOSOPHY AND ORGANIZATION:

Geology is a subject that, even in today's electronic and computer age, relies heavily on some very fundamental and low-tech methods of **observation, data collection and interpretation**. Even though the speed and precision of field methods can be improved with sophisticated apparatus, the accuracy and correct interpretation of the data won't happen unless the investigators know the **fundamental principles** underlying their measurements. In this course, you will have the opportunity to learn and apply these fundamental principles. You will begin to be able to evaluate how field data are used to construct the knowledge we have about the Earth and its long geologic history.

Specifically, we expect to achieve the following goals:

- Develop skills in surveying and measurement;
- Use and interpret geologic maps;
- Produce professional-quality geological maps and stratigraphic sections;
- Use outcrop observations and measurements to deduce regional interpretations;
- Interpret geologic history from rock descriptions, geologic relationships, and measured sections;
- Explain the logic of your deductions to your peers;
- Solve geological and environmental problems using a variety of field data;
- Learn more about the geology of the Pioneer Valley;
- Gain additional life skills, including critical-thinking, problem-solving, team-work, scientific writing, and professionalism;
- Realize that field work is not only important, but also fun!

This course is designed to acquaint you with basin field methods used in geology and related fields. Most of our time will be spent outside learning the techniques for making maps or collecting other types of geological data, which can be used in a wide variety of applications. The long Thursday class meeting is intended for this purpose; **YOU SHOULD ALWAYS BE PREPARED TO GO INTO THE FIELD EVERY THURSDAY (IN OTHER WORDS, DRESS APPROPRIATELY AND HAVE YOUR FIELD GEAR WITH YOU)**. Vans will depart promptly at 1:00 pm on field days. Be forewarned that we will not wait for stragglers, so **BE ON TIME!**

There are usually **no ways** to make up missed work, so you must be dutiful in attending all sessions. The projects are organized to build upon the skills necessary for subsequent exercises.

All assignments must be turned in on time. They will be graded and returned quickly so that feedback will benefit your next project. As a general rule, all projects will be due on the Tuesday following the Thursday field day of its completion. **THERE WILL BE A FIRM PENALTY OF 10% PER DAY FOR LATE REPORTS.**

MEETINGS

There are two class meetings each week:

- Tuesday, 1:00-1:50 pm, Morrill 225 - informal lecture, prepare for field work
- Thursday, 1:00-5:00 (or 5:30) pm - usually in the field. Note that 1:00 PM represents the vans' departure time for the field. In other words you should get to the assembly points 10 minutes beforehand.

ATTENDANCE

Attendance at all classes is mandatory. It is very difficult to make up a missed day in the field. Obviously, if you have a serious medical problem, a contagious illness, or another emergency, do not come, but realize that you will most likely not be able to complete the project.

IN THE FIELD

Be ready to **leave promptly at 1:00 pm**. Gather in the back of Morrill Science Center near the red vans 10 minutes prior to departure time.. **Sturdy water-resistant field boots** are a must; don't rely on sneakers. **Dress for the weather**. Layers are best, which will allow you to adapt to changing conditions. Don't forget a **hat and gloves**. Keep a **rain jacket or poncho** in your **day pack**. Carry a **bottle of water** and a **snack** to see you through. **Sun protection** is a good idea, and **insect repellent** can be helpful later in the spring.

MATERIALS YOU WILL NEED

Field Manual (required)*: **Geology Field Methods**, by T. Freeman (2010), Friendship Publications – 111 p.

Field Kit (required): each kit contains:

- Weatherproof notebook,

- Covered clipboard
- 10x hand lens,
- mechanical pencil with 2H lead,
- pocket scale (mm and inches divided into tenths),
- protractor,
- colored pencils

You will find these tools extremely useful for many of your geoscience courses. These kits are \$40 payable to the *Geosciences Department*.

In addition to the items mentions above, the following materials are recommended:

- Geologic hammer
- calculator
- Pocket knife
- 4-color pen
- *Plenty of good humor*

We will issue a **BRUNTON COMPASS**, which you will keep for the semester. You will be responsible for the cost of a replacement (~\$300) if lost or damaged.

GRADES

This is a project-based course. **THERE ARE NO EXAMS**. Many of the projects will be done with partners, or in groups, but each person will hand in their own final piece of work. Most projects will be graded using a rubric, and will take into account not only **accuracy and thoroughness of field data**, but also **neatness, completeness, and presentation** (i.e., **PROFESSIONALISM**). Final grades will be calculated on the following basis:

2-week projects: **15% each x 3 (45% total)**:

- Pace and compass map
- Mt. Toby map
- Mt. Tom map

1-week projects: **7% each x 6 (42% total)**

- Taking bearings and angles
- Intro to topographic maps
- Working with geologic maps
- Dino footprint map
- Turners Falls stratigraphic section
- Environmental map (Davis Mine or Lawrence Swamp)

Field Notebook: **13% total**

- Rock descriptions,
- Entries in notebook for individual projects (quality and organization of observational data, accuracy of geological data)

PRELIMINARY SCHEDULE

Please note: This course is often weather dependent! ***We will not be deterred by light rain or cold temperatures.*** However, we may have to rearrange the schedule due to heavy rain or snow-covered rocks. We will hope for sunny, warm Thursdays, but will deal with whatever comes!

Dates	Project
Jan. 18, 20	Introduction to the course. Using the Brunton compass to take bearings and elevation angles.
Jan. 25, 27	<i>Introduction to topographic maps (indoors)</i>
Feb. 1, 3	Pace and compass mapping I: east side of the Campus Pond
Feb. 8, 10	Pace and compass mapping II
Feb. 15, 17	<i>Working with geologic maps (indoors)</i>
Feb. 24 (Thurs. only)	<i>Rock descriptions; introduction to the stratigraphic column of the Pioneer Valley (indoors)</i>
Mar. 1, 3	Measuring strike and dip: Dino footprints, Connecticut River
Mar. 8, 10	Measuring a stratigraphic section: Turners Falls
Mar. 15, 17	SPRING BREAK
Mar. 22, 24	Mapping groundwater characteristics: Lawrence Swamp
Mar. 29, 31	Making a geologic map: Mt. Toby I
Apr. 5, 7	Mt. Toby II
Apr. 12, 14	Making a geologic map: Mt. Tom I
Apr. 19, 21	Mt. Tom II
Apr. 26, 28	Pioneer Valley Geology Synthesis Trip
May 3	Final Thoughts and Checkout

Other possible labs: cross-sections, subsurface geology