

University of Montana

ScholarWorks at University of Montana

University of Montana Course Syllabi

Open Educational Resources (OER)

9-2003

GEOL 437.01: Seismology and Magnetism

Steven D. Sheriff

University of Montana - Missoula, steven.sheriff@umontana.edu

Follow this and additional works at: <https://scholarworks.umt.edu/syllabi>

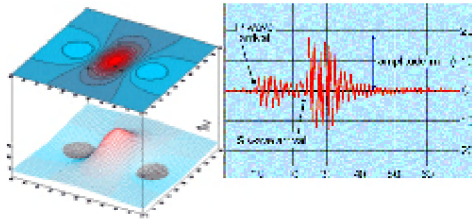
Let us know how access to this document benefits you.

Recommended Citation

Sheriff, Steven D., "GEOL 437.01: Seismology and Magnetism" (2003). *University of Montana Course Syllabi*. 3488.

<https://scholarworks.umt.edu/syllabi/3488>

This Syllabus is brought to you for free and open access by the Open Educational Resources (OER) at ScholarWorks at University of Montana. It has been accepted for inclusion in University of Montana Course Syllabi by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.



Seismology and Magnetism - Geology 437

Professor: [Steve Sheriff](#)

Grading: Based on [exams](#), [problem sets](#), [project reports](#), participation (on [grading papers](#))

Fall 2003 - [Syllabus](#), followed by what's going on:

- **9/3:** Intro to course, principles of waves, terminology, and a couple warm-up [problems](#).
- **9/8:** Go over problems, [least squares](#)(2) constraints, [Huygens principle](#)
- **9/10:** Laws of [reflection & refraction](#), Figures(1, 2), 2-layer refraction equations.
- **9/15:** [Problem set #2](#), multiple layers, [applet](#), dip, velocity problems, qualitative refraction interpretation.
- **9/17:** [Haeni/USGS paper](#) (8.5mb) Geometrics [applications](#), should make sense, sampling ideas, automation of interpretation, [terminology](#), [arrivals](#), equipment considerations
- **9/22:** Meet at the [play field](#) north of the football stadium (unless it rains) to conduct refraction experiments ([Smartseis manual](#), [quick sheet](#), [Geometrics](#)).
- **9/24:** Meet at the [play field](#) north of the football stadium (unless it rains) to conduct refraction experiments so you can proceed with the [seismic field assignment](#).
- **9/29:** refraction [problem](#), [Geomagnetism](#), [declination](#), [inclination](#), [magnetic elements](#)
- **10/1:** [Frozen flux theory](#), [spherical coordinates](#), [dv](#), equation for [uniformly magnetized sphere](#)
- **10/6:** Uniformly magnetized sphere, Dipole equation, paleolatitude, rotations and translations, [spherical trig](#)
- **10/8:** Excel's [Solver](#) ([help](#)), [pole calculations](#), [apparent polar wander](#), and [fluxgate magnetometers](#).
- **10/13:** Another fluxgate and proton precession magnetometers (1, 2), mag anomalies vs latitude, (1, 2, 3, 4), [DNAG mag](#), [US aeromag maps](#), [Magcad](#) (save model(delete crashes)), and sampling theory
- **10/15:** [Problems](#), [SIPwin](#) (history -3mb pdf), mag anomalies vs latitude, (3, 4), dipole [applet](#), environmental scale: Philippines figures: 1, 2, 3, total field anomalies and magnetic gradient.
- **10/20:** Aeromag maps, NOAA [Geomag](#) site, [auroras](#) ([Lorentz force](#)), and the [GEM magnetometer](#). The [quick sheet](#) presents the basics of operation; the [complete document](#) provides more detail.
- **10/22:** [Magnetic field assignment](#), Canadian magnetic [applications](#), [java map](#), [Blakely's Puget Sound](#) work, [sampling](#) and reconstruction, [continuation](#)
- **10/27:** **Midterm exam**
- **10/29:** [Surfer](#), gridding & presenting x, y, z data with examples: [Contouring is Interpretation!](#), Goodnews figures (1, 2, 3) and [my report](#)
- **11/3:** Start rock magnetism, [hysteresis](#) (from [Butler](#)), and [Curie temperature](#)
- **11/5:** Magnetic [minerals](#), [Download data](#) from the gradiometer

Here's how the course went during fall 2002:

- **9/4:** Intro to course, principles of waves, terminology, and a couple warm-up [problems](#).
- **9/9:** Go over problems, [Huygens principle](#), laws of [reflection & refraction](#), Figures(1, 2).
- **9/11:** [Problems](#)(revised numbers - originals work too) for 9/16, 2 & 3 layer refraction equations, [ray tracing](#). [Haeni/USGS paper](#) (8.5mb).
- **9/16:** Qualitative refraction interpretation, [terminology](#), equipment considerations, picking [arrivals](#) on the [EG&G](#) seismograph, [setup and operation of the Smartseis](#).
- **9/18:** Meet at the [Riverbowl field](#) (unless it rains) to conduct refraction experiments so you can proceed with the [seismic field assignment](#). Everything worked great except the final printout from the SIPQC software on the Smartseis. My current guess is the program picks a printer scale as a function of the geophone numbers (like ~1,000 from our origin) instead of the distances (ours were ~ 1-10 meters).
- **9/23:** A [refraction problem](#) using last week's [data](#) and another session in the field with the Smartseis. Everything worked fine, use small numbers for small experiments and the software seems to be happy.