

Geology / Hydrogeology Summer Field Course (G 406) Summer 2009

Thank you for your inquiry regarding the Southern Oregon University Summer Field Course in Geology and Hydrogeology. The information presented below should answer your questions about the field course.

Course Information and Registration: The field course is in session from June 16 to July 18, 2009 and carries 9 quarter (or 6 semester) credits. Registration will take place on Thursday, June 18 in Enrollment Services Center in Britt Hall (see enclosed map) from 9:00 am to 10:00 am. Students will next pay tuition and special fees in Churchill Hall. Students who arrive early may register on Monday, June 15 or Tuesday, June 16. For students who come from institutions other than Southern Oregon University (SOU), bear in mind that transfer of financial aid from your institution to ours may involve significant paperwork, signatures from loan officers on both campuses, and other unforeseen hurdles. To avoid financial aid problems, start the paperwork as soon as possible!

The deposit of \$160.00, which accompanies your application, will be credited toward your tuition payment.

Prerequisites: Three years of geology are required. Strongly recommended are courses in mineralogy, lithology, structural geology, stratigraphy, and some knowledge of hydrogeology. Students should know how to construct a topographic profile and a simple geologic cross section. Because student background is apt to be varied, a schedule of morning lectures concerned with different topics, including the writing of professional reports, will be presented. Basic field techniques such as the use of the geologic compass, measuring of a stratigraphy section, use of altimeters, location on field maps, use of Global Positioning System (GPS) receivers, aerial photo interpretation, and note-taking will be taught.

Geologic Setting and Course Emphases: The projects for the field course are strategically located in the Klamath Mountains Geologic Province (plutonic and metamorphic rocks) as well as the Western Cascade (Late Eocene to Miocene) and High Cascade (Pliocene to Recent) volcanic rocks. The rocks of the Klamath Mountains Province are overlain unconformably by a faulted transgressive sequence of Cretaceous marine sandstone and mudstone which, in turn, are overlain by mildly deformed non-marine Oligocene rocks of the Western Cascade Volcanic Series.

Three days will be spent learning the fundamentals of field mapping and will include: use of standard geologic tools; location on a map using geologic compass, altimeter, and GPS; plotting of data on a map; taking good field notes; and walking contacts.

A wide variety of continental margin rocks will be mapped in three major field areas. A faulted transgressive sequence overlying crystalline basement rocks and overlain by Oligocene volcanic rocks will be mapped in the first major field project. After mapping has been completed, students will prepare a professional report of that field area. The maps, sections, figures, and photos must be neatly and professionally done and the report will be printed through a word processing program. It is the philosophy of this course that professionalism applies not only to the acquisition of data from the field but interpretation of these data and the presentation of the results in a clear, concise format. The reports will be graded while the course is in session. Students will be invited to consult with an instructor regarding the strengths and weaknesses of their reports.

The second major field area is underlain by volcanic flow and volcanoclastic rocks. After the distribution of rock types is determined, the surface and ground water characteristics of the basin, a major water supply for the city of Medford, will be analyzed. Two written reports are required for this project.

The third field area, located in unstable volcanoclastic rocks, presents students with an opportunity to study soils and active landslide processes. A map, cross section, and short report will be required.

Field Trip: An overnight field trip to Crater Lake National Park is planned to allow students to study volcanic rocks in a recent caldera. The special fee includes a two-hour boat trip inside the caldera, conditions permitting. Students will be expected to keep a notebook, which shall be graded.

Evaluation: Evaluation will be done on a point basis with points and grades accrued from field exercises, field checks of maps and notebooks, formal written reports, and professionalism. Professionalism includes teamwork, professional attitude cooperation on academic and field course activities, promptness with regard to meeting vans, attending lectures, completion of assignments, promptly returning checked-out reading material, and participation in discussions during the field and class room activities.

Transportation: Transportation to and from the field areas will be provided; however, students are responsible for getting to and from the Science Hall pick-up area daily. Students are responsible for getting to Ashland prior to the first day of the course.

Lunches: Lunches are the responsibility of students.

Medical Considerations: Students are required to carry their own medical insurance, come to the field station with any special medications, and to inform instructors of any special medical conditions prior to acceptance in the field course. All participants must be physically able to negotiate rugged terrain. Each student must have a current tetanus shot prior to attending the course.

Restrictions:

- (1) Oregon law requires that no controlled substances (such as marijuana), alcohol, or firearms can be carried on a university vehicle or be stored or consumed on campus.
- (2) Due to liability insurance constraints, students who miss the van on any work day can not use their personal vehicles to meet their teams in the field areas.

Required Field Equipment: The Geology Department will provide geologic compasses, GPS units, tapes, rock color charts, Munsell soil color charts, and other major equipment needed for field work. All students are expected to furnish the following equipment: (The Medford-Ashland area has limited resources.)

- Watch - very necessary to coordinate van pick up times!
- Canteens - more than one is required. It can be hot during the early summer. Some plastic containers are available through the instructors (recycled Gatorade containers, etc.).
- Geology pick - the weight and design is up to you but a heavy pick, 16 oz. or more, with a pointed or chisel end is suggested.
- Small magnet
- Hand lens - preferably of good quality.
- Field notebooks - **at least three**. All will be of the water-proof variety; only waterproof notebooks are acceptable.
- A belt to hold equipment - **ALL** equipment borrowed from SOU which is intended to be worn on a belt (Brunton compass, radio, GPS receiver, etc.) will be worn on a belt.
- Map board - preferably one that has a cover to protect 8.5" x 8.5" aerial photos. You can make a cheap but serviceable substitute by purchasing a Masonite board, smooth on at least one side. Cut the Masonite into two 9" x 10" pieces and tape them together at a hinge. Universal duct tape will work. If it's good enough for Homeland Defense, it's good enough for us. (You may want to use something a little more durable, though). Maps and aerial photos can be attached to the smooth insides by means of rubber bands. The cover can be closed to protect those items.

- Pencils – the type which do not leave lines on paper that smudge readily; mechanical pencils are acceptable. One or two fine or extra fine point indelible ink pens may be used in lieu of pencils to make entries in the field notebook.
- Colored pencils - good quality.
- GPS (Global Positioning System) receiver - capable of UTM (Universal Transverse Mercator) measurement. This is **RECOMMENDED only, not required**. SOU has a limited number of GPS units, which can be checked out one per team; teams consist of two to four people.
- Small plastic bottle - for HCl (acid will be provided by department). Department has a small number of plastic bottles.
- Rapidograph-type pens - at least two, one for drafting faults, and another for contacts. Sizes 00 (0.3 mm width) OR 0 (0.35 mm) AND 2 (0.6 mm) are suggested. Cheaper disposable waterproof permanent ink pens are alternatives to Rapidograph pens as long as they do not "bleed" or leave weak lines. On your final maps, fault contacts should be at least three times as thick as lines which represent depositional contacts.
- "White-out" pencils or bottles - we all make mistakes.
- Triangles - we have a limited supply of T-squares.
- Rulers - 6" for field and 12" for drafting; inches in tenths plus cm scales; transparent variety.
- Protractors – two; one to carry in the field.
- Tracing paper - 10 or more sheets.
- Masking tape
- Graph paper - conducive for constructing cross sections at an approximate scale of 1:12000.
- 3.5" floppy disks – at least three for word-processed reports. Keep at least one back-up disk, or CD-Rs, or flash drives.
- Field boots - a good pair of **broken-in** boots; two pair, which can be alternated with one another every other field day, if you have them. You might want high top boots or some gators to cover low boots in order to keep out spears of fox-tail grass.
- Pocket knife
- Field pack - should be lightweight but durable to carry lunch, rocks, etc.
- Flashlight - for Crater Lake trip.
- Insect repellent, band-aids, poison oak soap, and sundries (there will be some poison oak), tick repellent (there may be some ticks), sunscreen (SPF 15 at least), chapstick.
- Hat or cap - broad brimmed hats are suggested.
- Safety glasses or sunglasses - to be used when breaking rocks.
- Rain gear
- Durable field clothing - some persons choose to wear shorts but be reminded that they offer scant protection in brush. If you insist on wearing shorts, bring duct tape to close wounds. Town clothes might include a light to medium weight jacket (nights are cool), moderately heavy coat for night at Crater Lake.
- Sleeping bag +/- small tent - for Crater Lake trip.
- Warm clothing - it can be quite cold at Crater Lake in the evenings! The boat ride can be cool when the boat accelerates.
- Hip waders - for in-stream work are recommended but not required; the department has access to a limited number of waders...which usually leak...
- **OPTIONAL:** The department has a limited number of computers to be used in the writing of word processed reports. Computers should be available at the Computing Services Laboratory during normal working hours (but rarely on weekends: the first project write-up days are on a weekend). Those computers will not be available during evening hours. If you have access to a laptop computer, please bring it. At this writing, the campus network has access to the word-processing program Microsoft Word. Computing Services supports IBM and some Apple computers.

Required Textbooks: Geology in the Field by R. R. Compton (Wiley & Sons, Publishers ISBN 0-471-82902-1) OR a similar substitute.

An abbreviated version of A Guide to the Writing of Geologic Reports by J. D'Allura. A free downloadable copy of the text can be found online at:

http://www.sou.edu/envirostudies/geology/fieldcamp/geol_field_abbreviated.pdf

If you can not download the copy, the cost will be about \$5.00 to photocopy and ship it to you once you contact us. This will be the guide for the first ("Hilt") project report.

Recommended Textbook: A Manual of Field Hydrogeology by L. L. Sanders (Prentice Hall).

Field Course Schedule 2009: The tentative schedule for the field course program appears below. This schedule may be modified slightly as circumstances dictate, but the principal elements of the schedule will be followed.

| DATE | DAY | EVENT |
|---------|-----|---|
| June 16 | Tue | Register and pay fees until 10:00. Check out equipment from 10-10:30, room 061 Science. Lecture begins at 10:30: class orientation; lunch at 12:00; at 1:00, will leave to learn how to locate in the field, use a geologic compass, use of GPS (satellite) receivers to mark locations in the field and to walk a marker bed. |
| June 17 | Wed | AM lecture: Sedimentary structures & approaches to compiling stratigraphic data; Field: measure stratigraphic section in Rocky Gulch Sandstone of the Hornbrook Formation. |
| June 18 | Thu | AM lecture; Hilt project orientation; begin mapping project in a large group; basic mapping techniques; use of aerial photographs. California-Oregon: faulted transgressive sandstone and mudrock deposited on crystalline basement; overlain by volcanoclastic rocks. |
| June 19 | Fri | Possible lecture in AM; report format including introduction, location map, regional geology, continue Hilt Mapping Project (HMP) ; walking contacts; unit descriptions. |
| June 20 | Sat | AM lecture: references; Descriptive Geology. Students are encouraged to write some of the report each evening; DUE: Introduction; draft of Regional Geology, HMP in field |
| June 21 | Sun | AM lecture: report writing to include structural geology, geologic history, and abstract; HMP |
| June 22 | Mon | HMP in field |
| June 23 | Tue | OFF |
| June 24 | Wed | HMP |
| June 25 | Thu | HMP |
| June 26 | Fri | Report Writing (note: if you have a laptop, you may consider bringing it). Paper supplied. |
| June 27 | Sat | Report Writing (no access to Computer Center on Saturdays or Sundays). |
| June 28 | Sun | Hilt report DUE at 8 AM; AM lecture: volcanoclastic rocks; field exercise: volcanoclastic rocks. Turn in field notebooks for grading purposes. |
| June 29 | Mon | AM lecture; Four Bit Springs (FBS) project: Hydrology and geology lecture in the field (leave SOU at 8:00). West flank of Mt. McLoughlin, Oregon: determining stream gain and loss from/to the groundwater table on Four-Bit Stream in the Big Butte Springs Basin, introduction to field mapping of volcanic rocks and related soils, relation to stream gain/loss. |

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| June 30 | Tue | FBS |
| July 1 | Wed | FBS |
| July 2 | Thu | FBS |
| July 3 | Fri | FBS |
| July 4 | Sat | OFF |
| July 5 | Sun | Report writing |
| July 6 | Mon | Report <u>DUE</u> at 8 AM. OFF |
| July 7 | Tue | AM lecture: landslides, aerial photo interpretation (various years, same landslide area); landslide project orientation & mapping; Cole landslide in the field. |
| July 8 | Wed | <u>DUE</u> at 8 AM: photo analysis. Cole Landslide project in the field; work on written report (note: only 1 day for report-writing on this project). |
| July 9 | Thu | Finish Cole landslide mapping project in the field; continue report writing. |
| July 10 | Fri | Report Writing |
| July 11 | Sat | Report <u>DUE</u> at 8 AM. Load vehicles and utility trailers; leave for Crater Lake at 9:00; set up camp; part of rim drive. |
| July 12 | Sun | Crater Lake; turn in notebooks on return to SOU. |
| July 13 | Mon | OFF |
| July 14 | Tue | South Fork Little Butte (SFLB) project; AM lecture in the field; field work. |
| July 15 | Wed | SFLB |
| July 16 | Thu | SFLB |
| July 17 | Fri | SFLB Report Writing. |
| July 18 | Sat | Report <u>DUE</u> ; presentation of SFLB Group Reports. End of course. |

Supplementary Reading Materials: Copies of these references will be available at the field station. They need not be read prior to the field course but if read, they will save the student precious time.

- (1) Bacon, Charles R., 2006, *Eruptive History and Geochronology of Mount Mazama and the Crater Lake Region*. Geological Society of Amer. Bulletin, v. 118 n. 11/12, p. 1331-1359 (information for Crater Lake field trip; not required).
- (2) Nilsen, Tor, 1993, *Stratigraphy of the Cretaceous Hornbrook Formation, Southern Oregon and Northern California*; US Geological Survey professional paper 1521. It comes with maps. Other articles on the Hornbrook Formation and the lower Western Cascade Volcanic Group in Northern California would be of interest. Of most relevance is the geology described near Hilt in the Cottonwood Creek Valley, California. This is the most important reference for your first field area (the "Hilt" project).
- (3) Any reasonable article regarding slump-type failures, their nomenclature, and underlying causes of movement. You should be somewhat familiar with the basic morphology, terminology, and failure mechanics of slumps and debris flows. We shall discuss basic field tests of soils and use a soils map during the landslide project but you are not expected to have an extensive background in soils.

(4) Manning, J. C., 1997, Applied Principles of Hydrology, 3rd Ed., Prentice-Hall. For general hydrogeologic information.

Current Address!!!: Often students move, change phone numbers or e-mail addresses after school ends and before the summer field course begins. If that is your case, PLEASE send us some message which will allow us to contact you if there is some last minute change or clarification needed from you.

For purposes of financial planning, the following information is provided (also appears on our poster):

Tuition and Special Fee:

Tuition: \$1,664

Special Fee: \$500

Total Cost: \$2,164

Approximate Room and Board Costs:

~\$ 1,113 (double occupancy; 35 days with a meal plan)

Note that you will be given money back if you do not stay the full 35 days (most people stay 32 or 33 days); single rooms will cost \$1,317 with a meal plan for 5 weeks. These costs are not absolute since at this writing (7 November); the final prices have not been set. Contact Jason Ebbeling, ebbelingj@sou.edu

Students are welcome to make alternate arrangements for room and board or with our housing and food service personnel. Names and phone numbers of housing and food service contacts will be provided for those persons who send in an application.

There may be slight adjustments to the costs listed above but, at this time, none are anticipated. Adjustments, if any, will be posted here.

IMPORTANT: Students are responsible for supplying their lunches. Grocery stores are within easy walking distance of the dormitories. It is very important that students eat a good breakfast (even if you "don't do" breakfast) and make a lunch to be carried to the field each work day. Lack of sufficient food will affect your performance in the field. Pack a nutritious lunch. Gatorade or other such drinks that replace electrolytes are effective on hot days.

If you have questions regarding the summer field course that have not been answered, please call, e-mail, or write. A registration mailing will be sent to successful applicants. In that mailing we will include information about the registration and fee payment process, living and eating accommodations (name and phone number + email address of contact person), parking, transportation to and from the airport (for those arriving by plane), and transcripts.

We look forward to an exciting and rewarding field season.

Dr. Jad D'Allura; Field Course Director
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Dr. William Elliott
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This will be your field course mailing address (note that campus mail is not delivered on weekends):
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