

## University of Western Ontario – Department of Earth Sciences

### Earth Science 4451Y: Southern Ontario Geophysical Field School (Offered together with GP 9509):

#### Calendar description

An off-campus Geophysical field school providing an introduction to geophysical techniques, including gravity, magnetic, seismic and electromagnetic methods. Classroom lectures, with accompanying outdoor sessions and field exercises. Offered in co-operation with other Universities, with participation from geophysical contractors. The course meets professional registration requirements for Field Techniques (Geophysics).

**Instructors:** Western: Dr. Gerhard Pratt [gpratt2@uwo.ca](mailto:gpratt2@uwo.ca), Dr. Sheri Molnar [smolnar8@uwo.ca](mailto:smolnar8@uwo.ca); TA: Shaun Hadden [shadden2@uwo.ca](mailto:shadden2@uwo.ca) ; Queen's: Alexander Braun [braun@queensu.ca](mailto:braun@queensu.ca)

**Field trip (absence from Campus):** The course takes place during a ten day period in early September in the Calabogie and Admaston areas south and east of Ottawa (roughly eight hours drive from London). Classes begin on Friday, August 28<sup>th</sup> at 8 am on campus. We depart on Monday, August 31<sup>st</sup>, 2015, and we will drive back on Monday, Sept 7<sup>th</sup>.

**Start Date: Friday, August 28<sup>th</sup>, 2015 8 AM Western Campus, BGS 0184**

**Departure to Renfrew: Monday, August 31<sup>st</sup>, 2015 7:45 AM, Western Campus, BGS 0184**

**Return to Campus: Monday, Sept 7<sup>th</sup>, 2015 approximately 6 pm**

#### Field Safety

Students are expected to be familiar with and comply with the University Off-Campus Activity Safety Policies. A safety plan will be prepared by the students in consultation with the instructors prior to any field work.

#### Equipment

Students will make use of Geophysical Equipment belonging to Western and to Queen's University, and may further be using equipment loaned to us by local geophysical companies. All of this equipment is expensive, repairs are costly and often take more time than the duration of the field school. Students are expected to treat all equipment with the utmost care. Students are allowed to sign out equipment for additional work, design projects etc only after they have received training through this course or equivalent.

**Learning Outcomes:** Students completing the course will

- Be able to operate proficiently basic geophysical instrumentation
- Be able to design and carry out geophysical surveys to meet industry needs in mineral exploration, environmental engineering and petroleum exploration
- Be able to reduce and interpret data arising from such surveys
- Be able to communicate the results of the surveys through professionally written reports and presentations

## Evaluation (subject to minor changes on site):

- 1: 10% Written lab reports on field testing of geophysical instruments, teams of three (first three days)
- 2: 10% Field work design at Calabogie and Admaston field sites (team marks will be assigned).
- 3: 15% Participation and professionalism during field trip
- 4: 10% Classroom deliverables, punctuality
- 5: 10% Final Oral presentation (team marks will be assigned)
- 6: 15% Oral exam
- 7: 20% Final fieldwork reports – primary site (to be handed in on the evening before departure)
- 8: 10% Executive summary – secondary site

## Reporting

### 1. Individual reports on field testing of instruments (5% per report, teams of three)

The objective is produce a report on the proper functioning of each instrument, and to make recommendations for field procedures to be used during the Calabogie and Admaston field trip. The field test data should be quantitatively compared with expected geology and anomalies in the area to document the correct instrument response. Reports on the following instruments are required:

**Report 1:**      Magnetics

**Report 2:**      Seismic refraction or Electrical resistivity / IP (randomly assigned)

Students must submit each report before they will be permitted to participate in the next field test exercise. These reports are to be individually, although collaboration with other teams on base maps and data plotting is encouraged. The field tests must be fully documented, all data must be reduced and quantitative interpretations and/or conclusions must accompany the reports. A *brief* discussion of the instruments used (name and model), where and why the exercise was done, and how the data were collected is required. Conclusions should be written with regard to the functioning of the instrument and any recommended field procedures to be used.

Field test reports are to be approximately 750 words per instrument used. Excessive length will be penalized! The field data should be clearly represented in the form of graphs, figures or tables, as appropriate. Base maps need to be detailed, legible and should clearly show the location of each survey, as well as be annotated with any anomalies located. Maps must have a legend, a scale and a North arrow.

*It is not necessary to reproduce all data in the form of tables, your graphs will be sufficient.*

A *suggested* format for the field test reports is:

**Objectives:** Discussion of where and why survey was performed

**Instruments:** Instruments used, operating principles and what exactly is measured (be brief)

**Procedure:** Brief review of survey procedure (specific to each geophysical method), including setup

**Results:** Show and describe your primary data (graphs, images, etc). Brief discussion of results, addressing sources and magnitude of errors and limitations

**Data analysis and interpretation:** This is where you describe what you think your data mean (refer back to the objectives)

**Conclusions and recommendations:** I don't mind if this is very brief, but it must be suitable

**Bibliography:** Include a correctly formatted reference to the manual, and any other material you used.

**Standards/Assessment of reports** Professional standards in written work are critical in this course.

- Your reports are expected to be clearly written to a high standard.
- Figures are expected to be of a high quality, numbered and captioned below, and *included* within the text.
- You must refer to each Figure at least once in the text to provide context.
- Maps are essential: they must be legible, with a legend, scale, North arrow etc.
- Appendices are allowed for presentation of large volumes of data, but must be summarized within the text.
- A bibliography is always required, and correct referencing style is expected.
- Any formulas are to be treated as a part of the text, and punctuated accordingly *and numbered*.
- Formulas must be either derived or properly referenced, and any previous results (mathematical, geophysical, or geological) must be referenced.

## **2. Design proposal for fieldwork at the Calabogie the and Admaston sites (10%)**

One single proposal is expected from groups for each of the two field sites, in response to a "Request for Proposal". Students are expected to organize themselves as a "design team" to prepare these proposals. The proposals should consist of at least:

- ii) Proposed field layouts for each survey type (magnetic, gravity, EM, resistivity, radar, seismics, ...).
- iii) A preliminary itinerary with daily timetables and team assignments

Careful attention must be paid to prepare a proposal that can be carried out in the time available. The resulting proposal will serve as a field guide on the field locations. We will discuss and build the proposal together at the motel - students should be prepared to defend the proposal and modify accordingly.

## **3. Participation and professionalism (10%)**

This mark will be assigned in consultation between all instructors, on the basis of:

- Initiative, enthusiasm, professionalism
- Respect for colleagues, instruments and sites
- Safety consciousness
- Equipment management and cleanliness
- Field notebook

## **4. Classroom deliverables (10%)**

As data are collected each day, students will be expected to prepare figures representing the data, and representing the field layouts on a timely basis.

## **5. Final oral presentations (10%).**

All students must participate in this group exercise equally. This should include at least: visual summaries of the data collected (maps, representative profiles) preliminary evaluation of the data with

regard to the fieldwork proposals detailed plan for follow-up work (data reduction, geophysical modelling). Students will give one presentation (i.e., on a particular site, as assigned).

These are presentations to management on the success (or otherwise) of the field excursion, and a specific proposal for data reduction, geophysical modelling and final reporting. A management board will be appointed, to be made up of instructors and industry personnel present. Student marks will consist of two components: presentation and content.

## **6. Oral exam (10%)**

Students will be given an oral exam on the final day of the course, designed to test general levels of knowledge and insight into any of the methods covered by the course, and any of the field operations conducted.

## **7. Final fieldwork reports (25%) – deliverable prior to departure from Renfrew**

One single report is required on your “primary” site (as assigned, either Admaston or Calabogie), written for the “client” (see the earlier “Request for Proposals”). Each student must prepare their reports individually, although students are encouraged to organize the tasks of data processing, and data modelling in such a way as to equalize the workload amongst them. Nevertheless, *all written work submitted will be considered to be the independent work of the student who submits it.*

Reports should contain approximately 3000 words *per site*. Insufficient or excessive length will be penalized. It is suggested your reports follow this format:

- Abstract
- Table of contents
- Introduction
- Geological setting
- Geophysical survey methods
- Data reduction
- Results
- Integrated interpretation**
- Conclusions / recommendations**
- Bibliography
- Appendices

*Figures should appear within the body of the text.* Appendices may be used to present large volumes of data without interrupting the flow of the report.

## **8. Executive Summary (10%) – deliverable one week after return from the field site.**

A 600 word summary report on the secondary site assigned to the student written for the “client”, containing information on the number and type of surveys conducted, the quality of the data, any major difficulties encountered, the processing attempted, and a summary of the integrated interpretation with the major conclusions.

*Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.*

*Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea, a graphical image, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).*

*If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed.*

*In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. For further information please see:  
<http://www.uwo.ca/univsec/handbook/appeals/medical.pdf>*

*A student requiring academic accommodation due to illness, should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here:  
[https://studentservices.uwo.ca/secure/medical\\_document.pdf](https://studentservices.uwo.ca/secure/medical_document.pdf)*

#### *Accessibility Statement*

*Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x.82147 for any specific question regarding an accommodation.*