

**University of Manitoba**  
**2015 Geophysics Field School**  
**GEOL 4740 & 4260**

**Syllabus & General Information**

**Objective:**

This courses will provide experience in geophysical survey design, survey procedures, field instruments, data processing, analysis and interpretation, and project report writing. The course commences with basic field exercises similar to geophysical laboratories. It proceeds on to a series of projects involving real geological and environmental targets. Throughout the courses students will contribute increasing input to survey planning and design and field decisions.

**Calendar Entry (for 4740):**

Three weeks of making geophysical surveys. Starts immediately following April examinations. Maps and reports to be submitted at the end of the three-week period. Students are responsible for costs of room and board during the field course. Not to be held with GEOL 4260. Prerequisite: GEOL 3810 (C), or consent of department. 6.0 Cr. Hr.

**Students are required to have current standard first-aid certification or higher in order to take GEOL 4740. There are no exceptions.**

**Instructors:**

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- Ademola Adetunji, Wallace 233, 474-7343, [ademola.adetunji@umanitoba.ca](mailto:ademola.adetunji@umanitoba.ca)
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**Teaching Assistants:**

- Taras Zaporozan (first half)
- Reid Campbell (second half)
- Patrick Duncan (entire course)

**Dates:**

The course will run: Tuesday, April 28<sup>th</sup> through May 18<sup>th</sup> or 19<sup>th</sup> (inclusive; the 19<sup>th</sup> is a reserve day) with a one day break on Sunday, May 10<sup>th</sup>.

## Venues and times:

The field school will be based out of the Department of Geological Sciences, University of Manitoba. Approximately six days/nights will be spent away from the university at locations in southern Manitoba, during which time we will be based in hotel or field-school accommodation. A course outline listing planned projects is attached.

For the initial projects you will complete field projects during the days and analysis and interpretation of data during evenings. Each day will be roughly divided into three segments:

- Morning: 8:30-12:30:
- Afternoon: 1:30-5:00:
- Evening: 7:00-10:00

We recognize the need for time for students to arrange personal affairs (e.g., laundry) when based in Winnipeg (*cf.* the Geology Field School at Star Lake) and so have scheduled several free evenings throughout the field school.

## Important issues:

- **Drop-off policy:** All projects start and finish at the Department. No *en route* pickups and drop-offs are possible.
- **Parking:** If required, you must sort out car parking arrangements ahead of field school.
- **Preparation/purchase of equipment, lunches etc:** You must be ready at the start of all days and projects. Vehicles will leave on time for the field and late arrivals will be lose field marks.

## Grading

The marks assigned for the course will be based on both field activities and data analysis and interpretation. Some activities will be performed in a group, others must be performed individually. There are five total projects as outlined below. Each will contribute equally to the final mark.

The division of marks each project (Birds Hill, Selkirk, Virden, Gundy Road, FLIC) is

- |  |     |
|--|-----|
| 1. Field procedure, coordination, data quality, effort, attitude | 50% |
| 2. Data reduction and data analysis                              | 25% |
| 3. Interpretation and project reports                            | 25% |

Note the following regarding grading:

- a) An important part of the field mark is based on acceptable behavior while in the field. Unprofessional misbehavior (including undue noise at accommodations in Virden or Star Lake) will not be tolerated and will result in the loss of a high component of the field mark for that project.
- b) *Use, or possession, of field school projects from previous years is not allowed and is regarded as cheating.* As required by Student Discipline guidelines cheating will be reported to the Head of Department and may result in loss of marks or more serious penalties.
- c) An important part of the field work is the maintenance of equipment. Students are expected to contribute to the loading and unloading of equipment from vehicles, the recharging of batteries, and in later projects,

the preparation of lists of equipment required for the projects. Aspects such as careful loading and unloading of equipment from vehicles will count towards the final grades. Students are also expected to keep interiors of vehicles clean and tidy.

- d) Another important component of the field work is maintenance of field log books containing full survey information including survey date, operator, instrument configuration, survey lay-out *etc.* It is recognized that the information is recorded in the field rather than the laboratory but all information must be clearly legible.
- e) An important component of the project report phase is data archiving. Each group involved in a project is expected to maintain a jump drive containing the raw field data and any analyses of that data. The files should be organized into directories, named sensibly, and columns should be headed appropriately.

The first category (Field procedure, coordination, data quality, effort, attitude) will be assessed by all of the instructors and by examination of the field log books and data collected. Aspects that will be included are: effort in the field, organization in the field, ability to work with geophysical and survey instruments, ability to record data and survey details under field conditions, initiative and the ability to deal with unforeseen events arising during the field work (*e.g.*, broken instrument, need to modify a survey design), ability to work in a team and to display team leadership at appropriate times, ability to follow instructions, integration of geophysical knowledge from previous geophysics courses, and general attitude to the work. We do not expect everyone to be expert in all aspects of field work from the first day of the field school: the projects are designed so that you will play an increasing role in survey planning and design as time progresses. We do expect you to learn as you go along and for you to develop in your abilities. We also recognize that everyone makes mistakes but you must ensure you learn from these mistakes.

Marks for data analysis and reduction and for interpretation and project reports will be based on the project reports submitted. We will try and complete the marking as the field school progresses but, because of time constraints, there may be some delays in returning work.

You must be familiar with the University of Manitoba Policies on plagiarism and cheating described in the Calendar ([http://www.umanitoba.ca/student/resource/student\\_advocacy/cheating\\_plagiarism\\_fraud.shtml](http://www.umanitoba.ca/student/resource/student_advocacy/cheating_plagiarism_fraud.shtml)). **The possession and/or unauthorized use of field school reports from previous years is regarded as cheating.**

**Late submission of material is not permitted.** You must hand in what you have completed at the assigned deadlines and you will receive zero marks for any late material. If you become ill during the field school and miss more than a single morning or afternoon you must provide a doctor's certificate. If you miss a complete project you will be required to complete it at a subsequent field school in order to complete the course.

## **Group Work:**

Group work is an important component of the field school and contribution to the team work is a component of the assessment. Students will also take turns as acting as organizational leaders for their groups. Some student choice will be permitted in the setting up of the groups. Much of the geophysical surveying will be performed using groups. Within each group it will be necessary to share all aspects of the work: planning, carrying equipment, surveying, measurement, note-taking, and data downloading. Data analysis will be performed in smaller groups and written reports for the various projects will be prepared as groups of two students and individually. In order to maximize the background skills, geophysics and geology students, and second, third and fourth year students will be distributed evenly between the two field groups. Where possible we will use a cooperative approach in order to obtain maximum information about the survey targets.

Group work is designed:

- To ensure all students are properly assessed in terms of their field ability, and their ability at data reduction and analysis, and report writing under field-project type conditions.
- To expose students to the professional experience of working in groups, working under a leader, and leading groups and to examine their ability at these tasks.
- To provide peer learning and peer teaching.
- To maximize the quality and quantity of geophysical data collected, as well as the quality of the analysis and the reports.
- So that no student will be disadvantaged because of the group they are in, nor should they feel that they will disadvantage a group.
- So that group leaders will help the coordinate the work not perform it individually. They are not responsible for disciplinary matters.

## Expectations

Some of the expectations of students are as follows:

- Safety has paramount importance
- Professional conduct and responsibility for your actions
- Common sense, initiative and thoughtfulness
- Punctuality and preparation, particularly when in the field
- Effective team work both leading and following

## Health and Safety

- Personal responsibility
- Hazards: geophysical equipment, road-side work, oil-field and quarry work, hot, cold, forest, bears
- Reasonable physical fitness
- Personal protection equipment (PPE): match to particular setting, safety vests, boots, safety whistle
- Sensible clothing, water, hydration, sunscreen
- Bear awareness
- Tick awareness
- Alcohol

## Equipment and other items required

You will need to have the following equipment/items for field-school.

### A. Fieldwork-related

- a. *Physics-type hard-cover log book* (alternating graph pages would be useful) (**compulsory**)
- b. Selection of pencils and pens for recording field data (plus erasers, sharpeners *etc*)
- c. Clip board and bull-dog clips for work in the wind
- d. Calculator
- e. *USB flash drive* for storing and transporting electronic data and reports

- f. Roll of transparent tape
- g. Hand lens, magnet, geological hammer (if available),
- h. Marker pens
- i. Sturdy ruler
- j. A pack of foam ear-plugs for hammer seismic work (and snoring room-mates).

#### B. Clothing

- a. *Sturdy boots* for work at Virden, the Precambrian shield, and on uneven terrain (steel-toed boots are a problem for magnetic surveys)
- b. Boots for working in wet or muddy conditions
- c. Clothing for temperatures between -5° and 35°
- d. Clothing for light rain conditions and snow conditions
- e. Hat (for sun protection and/or warmth depending on conditions)
- f. Gloves for warmth and gloves for protection (e.g. work or gardening gloves).
- g. Sunglasses
- h. Toiletries and any medications required.
- i. Small pack or suitcase for two to three day trips

#### C. Personal equipment

- a. Insect repellent and sunscreen
- b. *Watch* (with a seconds display)
- c. Pack for day work
- d. Water bottle and/or thermos flask for day work
- e. Sleeping bag or bedding for shared hotel and field school accommodation
- f. Lunches/snacks on days we leave from, or are based in, Winnipeg
- g. Pocket first aid kit
- h. Pocket knife or equivalent
- i. Cash to pay for meals

#### D. For work in Winnipeg

- a. Introductory Geophysics textbook
- b. Basic geology texts
- c. GEOL 2060 notes and GEOL 3810 notes and laboratories

### Star Lake Field School

At the Star Lake Field station you must conform with “field-camp protocols” followed by all of the students. We will have a number of people in a relatively small space and it is important to use common sense and to be respectful towards others.

- All students (and instructors) will be rostered onto a clean-up schedule for evening dish-washing and kitchen cleaning. The expeditor will provide instructions.
- There is a limit of one shower per day and this may be at an allocated time.
- Each morning work will commence with a classroom meeting at 8:00 AM (or other specified time) followed by equipment preparation and packing and then departure. You will be left behind if you are not present and ready.

- You should be ready for meals at their scheduled times. It is very important to be courteous towards the cooks – do not enter the kitchen area unless invited to do so. When serving your meal be respectful of the others behind you in the queue – don't waste food or drinks.
- Keep the kitchen area and classrooms clean and tidy.
- You are not permitted to leave the camp without permission of an instructor.

## **Geophysics Field School Projects and Schedule**

### **1. Birds Hill Park**

Bird's Hill Park and adjacent areas, 3 days. Introduction to instrumentation techniques, and geophysical investigation of an esker delta complex. Methods will include FEM, TEM, magnetic, GPR, hammer seismic, DC resistivity, gravity and an elevation survey. Evenings will involve data processing and analysis of the results.

### **2. Selkirk (Golden Boy)**

Golden Boy project, 4 days (2 days in the field, 2 days of analysis). The Golden Boy anomaly is a major gravity and magnetic feature in the vicinity of Selkirk, Manitoba, believed to represent a greenstone belt concealed beneath sedimentary cover. You will characterize this feature using magnetic and gravity surveys over a large area; data analysis will be more sophisticated, involving computer modelling, and your first full report will be written.

### **3. Virden Saline Contamination Survey**

Virden Saline contamination project, 5 days including travel. You will characterize saline contamination and shallow soil features at a site near Virden, Manitoba. We will stay overnight for two nights due to the distance. Methods used will include EM, hammer seismic, soil augering, DC resistivity, and detailed elevation mapping. The report will be in the form of an environmental consulting report and should be of a professional standard.

### **4. Whiteshell Projects: Gundy Road**

Gundy Road Project. This will be a 4-day project (2 days in the field, 2 days of analysis) in the Canadian Shield, based out of the Star Lake Field Station. We will conduct a detailed survey of a sheared iron formation in western Ontario, using various EM techniques, magnetics, and radiometrics. Observation of outcrop and integration of geological information will be crucial.

### **5. Whiteshell Projects: Falcon Lake Intrusive Complex (FLIC)**

FLIC Project. In this four day project (2 days in the field, 2 days of analysis) we will investigate the geometry and internal structure of the FLIC using gamma-ray spectrometry, magnetics, and gravity.

## Schedule for 2015 GEOL 4740 Geophysics Field School (4260 ends on May 9)

Day #	Date	Morning	Afternoon	Evening	Accommodations
1	Tue, Apr 28, 2015	Birds Hill field	Birds Hill field	Birds Hill analysis	Winnipeg
2	Wed, Apr 29, 2015	Birds Hill field	Birds Hill field	Birds Hill analysis	Winnipeg
3	Thu, Apr 30, 2015	Birds Hill field	Birds Hill field	Birds Hill analysis	Winnipeg
4	Fri, May 1, 2015	Selkirk field	Selkirk field	Free	Winnipeg
5	Sat, May 2, 2015	Selkirk field	Selkirk field	Selkirk analysis	Winnipeg
6	Sun, May 3, 2015	Selkirk analysis	Selkirk analysis	Selkirk analysis	Winnipeg
7	Mon, May 4, 2015	Selkirk analysis	Selkirk analysis	Free	Winnipeg
8	Tue, May 5, 2015	Virден travel	Virден field	(Planning/free)	Virден
9	Wed, May 6, 2015	Virден field	Virден field	(Planning/free)	Virден
10	Thu, May 7, 2015	Virден field	Virден travel	Free	Winnipeg
11	Fri, May 8, 2015	Virден analysis	Virден analysis	Virден analysis	Winnipeg
12	Sat, May 9, 2015	Virден analysis	Virден analysis	Virден analysis	Winnipeg
13	Sun, May 10, 2015	One-day break			Winnipeg
14	Mon, May 11, 2015	Star Lake travel	Gundy field	(Planning/free)	Star Lake
15	Tue, May 12, 2015	Gundy field	Gundy field	(Planning/free)	Star Lake
16	Wed, May 13, 2015	Gundy field	FLIC field	(Planning/free)	Star Lake
17	Thu, May 14, 2015	FLIC field	FLIC field	Star Lake travel (?)	Winnipeg
18	Fri, May 15, 2015	Gundy analysis	Gundy analysis	Gundy analysis	Winnipeg
19	Sat, May 16, 2015	Gundy analysis	Gundy analysis	Free	Winnipeg
20	Sun, May 17, 2015	FLIC analysis	FLIC analysis	FLIC analysis	Winnipeg
21	Mon, May 18, 2015	FLIC analysis	FLIC analysis	Free	Winnipeg
22	Tue, May 19, 2015	(Reserve day)			