

Modular Course in Exploration Geophysics

GEOL 5956

December 8-17, 2011

Department of Earth Sciences
Laurentian University

Course Description: 10-day intensive course in geophysical methods as they are applied to mineral exploration is being offered by the Department of Earth Sciences (DES) and the Mineral Exploration Research Centre (MERC) at Laurentian University. The course will be classroom based with lectures in the morning and early afternoon and laboratory exercises in the late afternoon. Topics to be covered include the physical properties of rocks and how these can be inferred from geophysical data. The role that geophysics plays in mineral exploration programs will also be discussed. The course is structured such that each day will cover one of the methods used in mineral exploration. In each case, the material will be presented by an academic or industry expert in that method. The specific methods covered are magnetic methods; gravity methods, electrical and induced polarization methods, electromagnetic methods, gamma-ray spectrometry, reflection seismology, borehole methods and Airborne methods. There will also be talks from industry representatives discussing the importance of geophysical methods in exploration, and how borehole EM is used in the search and delineation of conductive ore. The final day will be a presentation by staff from the Ontario Geological Survey on the role that public domain data can have in the mineral exploration process. A regional interpretation of public domain data will also be undertaken. The course does not rely heavily in mathematics, but attempts to impart an understanding of the basic scientific principles. There is a strong emphasis on case studies.

Prerequisites: Advanced undergraduate-level courses in *Geology*. **Course Format:** lectures, laboratory practicals, and problem sets. **Course Credit:** 3 credits, applicable toward thesis-based or coursework-based MSc programs and PhD program; also applicable toward continuing education and professional development requirements for Professional Registration. **Grading:** Laboratory practicals and problem sets 100%.

Course Coordinator: *Richard Smith (DES/MERC)*.

Course Costs for Professional participants: CDN\$2250 (CDN) + GST for the entire course (including all course notes, materials etc) or CDN\$270 per day for individual course days (including relevant course notes). For more details see the registration form (see **Registration** section below for how to request a registration form).

All participants are responsible for their own travel, lodging, and meals.

Registration: Ms. Roxane Mehes, Department of Earth Sciences, Laurentian University, 935 Ramsey Lake Road, Sudbury, ON P3E 2C6 Canada, Tel: +1 (705) 673-6575, Fax: +1 (705) 675-4898, e-mail: rmehes@laurentian.ca

Further information may be found at: <http://earthsciences.laurentian.ca/> under Modular Courses. For other information about the course please contact: rsmith@laurentian.ca

Tentative schedule

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Day 1 – Thursday 8 December 2009

0900-0915 *Course Logistics – Richard Smith*
0915-1030 *Role of geophysics in exploration – Richard Smith*
1100-1230 *Rock properties and an overview of geophysical methods – Richard Smith*
1330-1500 *Modelling and inversion of geophysical data – Richard Smith*
1530-1700 *Importance of geophysics in exploration – Ben Polzer*

Day 2 – Friday 9 December 2009

0900-1030 *Gravity methods, theory and instrumentation – Richard Smith*
1100-1230 *Gravity methods: Applications – Richard Smith*
1330-1500 *Gravity methods: Applications – Richard Smith*
1530-1700 *Gravity methods **Lab Exercise** – Richard Smith*

Day 3 – Saturday 10 December 2009

0900-1030 *Electrical and IP methods, theory and instrumentation – Rob Hearst*
1100-1230 *Electrical and IP: Applications – Rob Hearst*
1330-1500 *Electrical and IP: Case Studies – Rob Hearst*
1530-1700 *Electrical and IP methods **Lab Exercise** – Rob Hearst*

Day 4 – Sunday 11 December 2009

0900-1030 *Magnetic methods, theory and instrumentation – Richard Smith*
1100-1230 *Magnetic methods: Applications – Richard Smith*
1330-1500 *Magnetic methods: Applications – Richard Smith*
1530-1700 *Magnetic methods **Lab Exercise** – Richard Smith*

Day 5 – Monday 12 December 2009

0900-1030 *Electromagnetic methods, theory and instrumentation – Richard Smith*
1100-1230 *Electromagnetic: Applications – Richard Smith*
1330-1500 *Electromagnetic: Case Studies – Richard Smith*
1530-1700 *Electromagnetic methods **Lab Exercise** – Richard Smith*

Day 6 – Tuesday 13 December 2009

0900-1030 *3D EM modelling software introduction – Richard Smith and Bob Lo*
1100-1230 *3D EM modelling software **Lab Exercise** – Richard Smith and Bob Lo*
1330-1500 *Airborne methods (AFMAG, gravity, gravity gradiometry) – Bob Lo*
1530-1700 *Airborne methods **Lab Exercise** – Bob Lo*

Day 7 – Wednesday 14 December 2009

0900-1030 *Seismic methods, theory – Gerhard Pratt*
1100-1230 *Seismic methods: data acquisition – Gerhard Pratt*
1330-1500 *Seismic methods: Processing and case histories – Gerhard Pratt*
1530-1700 *Seismic methods **Lab Exercise** – Gerhard Pratt*

Day 8 – Thursday 15 December 2009

0900-1030 *Borehole methods, magnetic, electrical, seismic – Chris Drielsma*
1100-1230 *Borehole methods: gamma-ray spectrometry – Chris Drielsma*
1330-1500 *Borehole methods: susceptibility, conductivity, density – Chris Drielsma*
1530-1700 *Borehole methods **Lab Exercise** – Chris Drielsma*

Day 9 – Friday 16 December 2009

0900-1030 *Gamma-ray spectrometry methods, theory and instrumentation – Richard Smith*
1100-1230 *Gamma-ray spectrometry methods: Applications and case studies – Richard Smith*
1330-1500 *Gamma-ray spectrometry methods: Case studies – Richard Smith*
1530-1700 *Gamma-ray spectrometry methods **Lab Exercise** – Richard Smith.*

Day 10 – Saturday 17 December 2009

0900-1000 *Public domain geophysics and its application – Desmond Rainsford*
1030-1130 *Interpretation of regional geophysical data sets, background – Desmond Rainsford and Tom Muir*
1130-1500 *Interpretation of regional geophysical data sets **Lab Exercise** – Desmond Rainsford and Tom Muir*
1500 *Close*

Laurentian University

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Université Laurentienne

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LOGISTICS

Timing: Please arrive a few minutes prior to 9:00 am, as we will start promptly at 9:00 am.

Location: The course will be presented in Room B8045, the Paleo Lab on the 8th floor of the Willet Green Miller Centre (WGMC). The address of the WGMC is 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6B5. The address is for the rear (north) entrance, to get to the front entrance, turn right at the lights on University Drive, the WGMC is the first building on the right. See building #25 on the map on the following page.

Parking: Payment is required for all campus parking at \$2/hour or \$8 per day. At parking lot 4 you can pay an attendant for entry in the morning only. There are other metered lots around campus. Some accept credit cards; all accept \$2 and \$1 coins. Look for the blue "Pay here for parking" signs. The attached map shows the meter lots A, B, C and D as orange. Budget some time to find a lot on campus and walk to the Willet Green Miller Centre (WGMC). Start saving your loonies and twonies now!

Coffee: Will be available on the 8th floor. Coffee breaks are 1030 to 1100 and 1500 to 1530.

Lunches: Will be available for purchase in the Great Hall (#3 on map), except on weekends. Tim Horton's (#5 on map) also serves lunch and is open 1000 to 1500 on weekends. Packed lunches are available from some local hotels, restaurants, and grocery stores.

What to Bring: Bring a pen and paper for making notes etc. Bring a laptop if you have one.

Computers: Some of the laboratory exercises require computers. We have reserved a computer laboratory, but you may wish to bring a laptop if you have one.

Travel and Accommodation: Please make your own plans for travel and accommodation. The closer hotels to campus are the Travelway Inn, Paris St; The Travelodge, Paris St; The Holiday Inn, Regent St. These hotels are a twenty or twenty five minute walk to the WGMC. There are many other hotels in Sudbury.

Course notes: Students must purchase the course notes for \$85 during or after the course. The notes are primarily small black and white images of each powerpoint slide. The course notes are included in the cost of the registration for the industry participants. *NOTE: The notes for this course remain the intellectual property of the presenter and may contain unpublished and/or confidential information and copyrighted figures. The notes must not be copied under any circumstances and extra copies will not be sold to anyone except registered course participants.*

MERC graduate student subsidy: Graduate students coming from outside Sudbury qualify for a subsidy to partially reimburse them for their out-of-pocket expenses. The maximum reimbursement is \$495, but depends on the number of days that the student was present at the course. Forms will be distributed to qualifying students during the course and the reimbursements will come approximately two month after the final form has been returned.

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