Course Instructor:
Jeremy Richards
ESB 3-02; Tel: 492-3430
e-mail: Jeremy.Richards@ualberta.ca

Lab Instructors:
Ali Imer
Tory 3-16
e-mail: Imer@ualberta.ca

Gideon Lambiv
Tory 3-4
e-mail: lambiv@ualberta.ca

Guillaume Lesage
ESB 2-04A
e-mail: glesage@ualberta.ca

Course Objectives:
To gain an awareness and appreciation of:
- The minerals industry, its economic basis, and impacts.
- The variety, form, and global distribution of a range of important metalliferous mineral deposit types;
- Their regional geological and tectonic context;
- Their geochemical and geophysical signatures, as applicable to mineral exploration;
- A basic understanding of mineral exploration practices.

To gain a practical knowledge of:
- Common ore and alteration minerals in hand specimen and polished section, and the interpretation and description of their textures;
- Suites of ore and alteration minerals associated with different mineral deposit types.

Course Philosophy:
Despite current popular beliefs, the maintenance of modern civilization is dependent on the affordable and plentiful supply of raw materials and energy. Banning mining is not a realistic option for the modern world. Nonetheless, many of the concerns of environmentalists are valid, and must not be ignored. Thus, one of the challenges facing the extractive minerals industry today is how to find and recover these raw materials with the least environmental and social impact. We will approach the subject of the origin of and exploration for mineral deposits with this challenge in mind.

The study of mineral deposits is a particularly satisfying one for the geologist because it draws upon all aspects of the geological sciences, and often other sciences too. Thus, you will find aspects of mineralogy and geochemistry particularly applicable, but also paleontology and sedimentology (in dealing with sediment-hosted mineral deposits), igneous and metamorphic petrology (intrusive-hosted and metamorphic deposits), and even remote sensing and physical geology (field exploration). A key characteristic of the successful exploration geologist is a lively but realistic imagination, and the ability to extrapolate useful information and make accurate predictions from limited available data. This expertise will come with experience, but the basic facts and current theories required for making informed judgements will be reviewed here.

Course Texts
Required:
[QE 390 E92]

Recommended:
Course Timetable and Content:

Lectures are from 9.00 to 9.50 a.m., Monday, Wednesday, and Friday, ESB 2-35. Labs will be held in ESB 3-07 in several sections; the groupings and timings will be arranged in the first week of term.

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Lecture (ESB 2-35)</th>
<th>Lab (ESB 3-07)</th>
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<tbody>
<tr>
<td>Wed</td>
<td>6</td>
<td>Role of minerals in society</td>
<td></td>
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<tr>
<td>Fri</td>
<td>8</td>
<td>No class: WIUGC</td>
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<tr>
<td>Mon</td>
<td>11</td>
<td>The minerals industry</td>
<td>Introduction to ore microscopy</td>
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<tr>
<td>Wed</td>
<td>13</td>
<td>Mine life cycle</td>
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<tr>
<td>Fri</td>
<td>15</td>
<td>Distribution of elements</td>
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<tr>
<td>Mon</td>
<td>18</td>
<td>Oxides and native metals</td>
<td>Oxides and native metals</td>
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<tr>
<td>Wed</td>
<td>20</td>
<td>Oxides and native metals cont.</td>
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<tr>
<td>Fri</td>
<td>22</td>
<td>Sulfides</td>
<td></td>
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<tr>
<td>Mon</td>
<td>25</td>
<td>Sulfides cont.</td>
<td>Sulfide minerals I</td>
</tr>
<tr>
<td>Wed</td>
<td>27</td>
<td>Arsenides, antimonides, sulfosalts, tellurides</td>
<td></td>
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<tr>
<td>Fri</td>
<td>29</td>
<td>Arsenides, antimonides, sulfosalts, tellurides cont.</td>
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<tr>
<td>Mon</td>
<td>1 Feb</td>
<td>Ore textures</td>
<td>Sulfide minerals II</td>
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<tr>
<td>Wed</td>
<td>3</td>
<td>Ore textures cont.</td>
<td></td>
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<tr>
<td>Fri</td>
<td>5</td>
<td>Alteration mineralogy</td>
<td></td>
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<tr>
<td>Mon</td>
<td>8</td>
<td>Alteration mineralogy cont.</td>
<td>Ore textures and paragenesis</td>
</tr>
<tr>
<td>Wed</td>
<td>10</td>
<td>Alteration mineralogy cont.</td>
<td>Alteration minerals</td>
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<tr>
<td>Fri</td>
<td>12</td>
<td>LECTURE MID-TERM EXAM</td>
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<td></td>
<td>15–19</td>
<td>READING WEEK</td>
<td>LAB MID-TERM EXAM</td>
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<td></td>
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<td>(in your normal lab period)</td>
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<tr>
<td>Mon</td>
<td>22</td>
<td>Orthomagmatic oxide/sulfide deposits</td>
<td>Orthomagmatic deposits</td>
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<tr>
<td>Wed</td>
<td>24</td>
<td>Orthomagmatic oxide/sulfide deposits cont.</td>
<td></td>
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<tr>
<td>Fri</td>
<td>26</td>
<td>Pegmatite, greisen, skarn deposits</td>
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<tr>
<td>Mon</td>
<td>1 Mar</td>
<td>Pegmatite, greisen, skarn deposits cont.</td>
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<tr>
<td>Wed</td>
<td>3</td>
<td>Diamonds and the diamond industry</td>
<td>Orhomagmatic deposits</td>
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<tr>
<td>Fri</td>
<td>5</td>
<td>Diamonds and the diamond industry cont.</td>
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<tr>
<td>Mon</td>
<td>8</td>
<td>Porphyry deposits</td>
<td>Magmatic-hydrothermal deposits</td>
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<tr>
<td>Wed</td>
<td>10</td>
<td>Porphyry deposits cont.</td>
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<tr>
<td>Fri</td>
<td>12</td>
<td>Porphyry deposits cont.</td>
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<tr>
<td>Mon</td>
<td>15</td>
<td>Epithermal deposits</td>
<td>Epithermal deposits</td>
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<tr>
<td>Wed</td>
<td>17</td>
<td>Epithermal deposits cont.</td>
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<tr>
<td>Fri</td>
<td>19</td>
<td>Epithermal deposits cont.</td>
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<tr>
<td>Mon</td>
<td>22</td>
<td>Mesothermal deposits</td>
<td>Mesothermal deposits and VHMS</td>
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<tr>
<td>Wed</td>
<td>24</td>
<td>Mesothermal deposits cont.</td>
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<tr>
<td>Fri</td>
<td>26</td>
<td>Stratiform &amp; stratabound deposits: VHMS</td>
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<tr>
<td>Mon</td>
<td>29</td>
<td>SEDEX Pb-Zn deposits</td>
<td>Sediment-hosted deposits</td>
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<tr>
<td>Wed</td>
<td>31</td>
<td>MVT Pb-Zn deposits</td>
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<tr>
<td>Fri</td>
<td>2 Apr</td>
<td>Sediment-hosted Cu deposits</td>
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<tr>
<td>Mon</td>
<td>5</td>
<td>EASTER MONDAY</td>
<td>LAB FINAL EXAM</td>
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<tr>
<td>Wed</td>
<td>7</td>
<td>Uranium deposits</td>
<td>(in your normal lab period)</td>
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<tr>
<td>Fri</td>
<td>9</td>
<td>Placer deposits, residual deposits and weathering</td>
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<tr>
<td>Mon</td>
<td>12</td>
<td>Residual deposits and weathering cont.</td>
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</table>
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Examination Times
Final Exam is scheduled for Monday 26 April, 2010, from 09:00–11:00, in ESB 2-35.

Deferred Exams
- Deferred Lecture Midterm: Students who are granted permission to sit a deferred mid-term must do that exam on: Wednesday February 24, 2010, from 10:00–10:50, in ESB 3-02.
- Deferred Lecture Final: Students who are granted permission to sit a deferred final exam must do that exam on: Monday May 3, 2010, from 09:00–11:00, in ESB 3-02.

Assessment
Marks and Grading:
Lecture Midterm Exam ................................................................. 20%
Laboratory Midterm Exam .............................................................. 20%
Laboratory Exercises ...................................................................... 10%
Laboratory Final Exam ................................................................. 20%
Lecture Final Exam ........................................................................ 30%

Note that a letter grading scheme will be used for the final evaluation of course performance, but individual pieces of work will each be marked out of 100%. Because the relationship of marks to grades is not fixed, histograms of class performance will be provided periodically so that individuals can measure their relative successes.

- Lecture Midterm (50 minutes) will consist of a limited choice of short-answer questions relating to topics covered in the lectures.
- Laboratory Midterm (2 hours) will consist of hand samples and polished sections for identification and description.
- Laboratory Exercises will consist of the preparation and submission of mineral, rock, and ore suite descriptions (in hand specimen and polished section). A nominal mark of 1% (course total) per lab will be given for attendance and submission of work, and feedback will be provided.
- Laboratory Final Exam will consist of hand samples, polished sections, and sample suites for identification, description, and genetic interpretation.
- Lecture Final Exam (2 hours) will consist of short-answer questions and an essay question with a choice of topics. Questions in the Final may be asked relating to all aspects of the course, including laboratories. Information gained from suggested readings may enhance your grade.

Example questions for the midterm and final exams will be reviewed in class in the week before the exams.

GFC Policy on Course Outlines
“Policy about course outlines can be found in Section 23.4(2) of the University Calendar.” (GFC 29 SEP 2003)

Academic Standards
“The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.” (GFC 29 SEP 2003)

Specialized Support and Disability Services
Students who require accommodations in this course due to a disability affecting mobility, vision, hearing, learning, or mental or physical health are advised to discuss their needs with Specialized Support and Disability Services, 2-800 Students’ Union Building, 492-3381 (phone) or 492-7269 (TTY). Web site: www.ualberta.ca/ssds
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EAS 368: Bibliography

Web Sites
General Mineralogy:  http://web.wt.net/~daba/Mineral/
INFOMINE:  http://www.info-mine.com/
Society of Economic Geologists:  http://www.segweb.org/
Geological Assoc. Canada, Mineral Deposits Division: http://www.sfu.ca/mdd/

Course Texts

Additional Ore Microscopy and Alteration References

General References

Journals
Economic Geology [QE 1 E19] [Online]
Mineralium Deposita [QE 351 M664] [Online]
Exploration and Mining Geology [TN 26 E96] [Online]
Mining Magazine [TN 1 M66]
Northern Miner [Shelved by title in Cameron]