UNIVERSITY OF BRITISH COLUMBIA
EOSC 331 Introduction to Mineral Deposits

Instructors: **Dr. Ken Hickey**
Dr. James Scoates

Fall 2018

See UBC CANVAS (www.canvas.ubc.ca) for all course materials[a]

Course Outline (September 6, 2018) – *subject to change*

Week	Class Topics[b] (EOSM 135)	Labs (EOSM 101)
Week 1	Sept 6: Introduction: source-transport-trap	**No Lab**
Week 2	Sept 11: Overview of ore deposit types Sept 13: Magmatic: titanium-vanadium	**Lab 1**: Review of minerals and rocks
Week 3	Sept 18: Magmatic: chromium Sept 20: Magmatic: nickel	**Lab 2:** Magmatic: titanium + chromium
Week 4	Sept 25: Magmatic: platinum group elements Sept 27: Magmatic: diamonds	**Lab 3:** Magmatic: nickel sulphide + PGE
Week 5	Oct 2: Granites & pegmatites Oct 4: Synthesis: magmatic ore deposits	**Lab 4:** Granites & pegmatites
Week 6	Oct 9: Magmatic-hydrothermal transition Oct 11: Magmatic-hydrothermal: porphyry + skarn 1	**Lab 5:** Alteration
Week 7	Oct 16: Magmatic-hydrothermal: porphyry + skarn 2 Oct 18: **MIDTERM**	**Lab 6:** Porphyry deposits
Week 8	Oct 23: Magmatic-hydrothermal: epithermal Oct 25: Hydrothermal: Carlin gold	**Lab 7:** Skarns
Week 9	Oct 30: Hydrothermal: orogenic gold Nov 1: Hydrothermal: volcanogenic massive sulphide	**Lab 8:** Epithermal deposits & veins
Week 10	Nov 6: Sedimentary rock-hosted Pb-Zn, Cu: #1 Nov 8: Sedimentary rock-hosted Pb-Zn, Cu: #2	**Lab 9:** Orogenic Au
Week 11	Nov 13: Synthesis: hydrothermal processes Nov 15: Deposits restricted in time: uranium	**Lab 10:** VMS + SEDEX/MVT
Week 12	Nov 20: Deposits restricted in time: iron formations Nov 22: Synthesis: Archean to Phanerozoic deposits	**Lab 11:** Poster forum & review session
Week 13	Nov 27: Synthesis: deposits in space and time Nov 29: Review: mineral deposits in space and time	**LAB FINAL: ROCKS!**

a. To access online course content, login to CANVAS using your Campus-Wide Login (CWL) and then click on EOSC 331. If you do not have a CWL, go to http://www.it.ubc.ca/cwl and request one.
b. The class meets Tues-Thurs 10:00-10:50 pm in EOSM 135 and you must be enrolled in one 3-hour weekly lab section.

1. Course learning goals:

Sustaining human society is a complex interdisciplinary challenge. New sources of metals are required to meet society's current and future needs and yet exploration for new mineral resources is increasingly difficult as fewer and fewer mineral deposits remain to be found exposed at the Earth's surface. Future mineral exploration will require a greater scientific understanding of the spatio-temporal distribution of mineral deposits and how they may best be found at depth in the subsurface.

The overall goal of the course is to provide students with a basic scientific framework for understanding the origin and distribution of mineral deposits on planet Earth. By the end of the course students will be able to:

1. Use basic hand-specimen description of rocks to identify the mineralogical, chemical, structural and paragenetic character of mineral deposits and their associated host rocks.
2. Describe the essential geological setting (mineralogical, geochemical, structural, tectonic, temporal) of the main mineral deposits types that provide the majority of the metals required by human society (e.g., Ti, V, Cr, Ni, PGE, Cu, Mo, Au, Ag, Pb, Zn, U, Fe).
3. Discuss the key geological processes responsible for mineral deposit genesis.
4. Describe how these deposits are distributed throughout geologic time (Archean to Cenozoic) and in space (e.g., mid-ocean ridge, continental arc, back-arc basin).
5. Develop a conceptual Source-Transport-Trap (STT) model for understanding the genesis of mineral deposits on Earth and their relationship to plate tectonics in time and space.

Note that this course does not cover industrial minerals (gravel, sand, potash, etc.) or fossil fuels (coal, natural gas, oil).

2. Required textbook:
"Ore Deposit Geology" by John Ridley, published by Cambridge University Press (2013, ISBN 978-1-107-02222-5) – can be purchased at UBC Bookstore. See separate handout in class for specific readings for each class.

Highly Recommended Free Books:
"Future Global Mineral Resources" by Nicholas T. Arndt *et al.*, published in Geochemical Perspectives (April 2017, v. 6, no. 1). Download here at: http://www.geochemicalperspectives.org/online/v6n1
"Geology of Canadian Mineral Deposit Types" edited by O.R. Eckstrand, W.D. Sinclair & R.I. Thorpe, published by Geological Survey of Canada (1995, Geology of Canada, No. 8). Download here at: http://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/fulle.web&search1=R=207944

3. Required lab materials:
(1) Simon & Schuster's "Guide to Rocks and Minerals" (purchase at UBC Bookstore) – any rock and mineral guide will do.
(2) "Ore Mineral Atlas" by Dan Marshall, C.D. Anglin & Hamid Mumin, published by the Geological Association of Canada (2004, ISBN 0-86491-243-9) – can be purchased at UBC Bookstore.
(3) "First-year lab kit" (purchase from Dawson Club during first two weeks of class) – you must have a hands lens, magnet, scratcher, and scratch plate to complete the labs.

4. Apps you will want to use:
"Mineral Database" app by TasaGraphics (purchase from iTunes or Amazon – essential for lab)

5. Criteria for assessing student comprehension of course material (i.e., grades) are listed below:

Weekly Labs	20%
Final Lab Exam	15%
Lecture Midterm	10%
Synthesis Activities*	5%
Poster Project	15%
Lecture Final Exam	35%
TOTAL	**100%**

*There are 4 synthesis classes in this course and all are mandatory – a sign-in sheet will be distributed at the beginning of each synthesis class. These 50-minute exercises are designed to summarize course content and serve as preparation for the exams.

6. Registered A&D students: Please let the Instructor know if you require that a lecture exam be written at A&D. **Lab exams** cannot be written at A&D due to the materials involved. If you want accommodation for lab exams, you will need to arrange well in advance with the Head TA and A&D, so that the lab exam can be taken here in the department.

7. Makeup of graded exam(s) that are missed due to illness or other reasons is solely at the discretion of the instructor. It is each student's responsibility to inform the instructor as soon as possible if/why they cannot take an exam at the scheduled time or if/why they missed an exam(s), so that the instructor can decide if and/or how the exam(s) will be made up. *EXCEPTION: Specific UBC Academic Concession regulations apply to the final lecture exam; if you miss or will miss a final lecture exam due to illness, conflict with a religious holiday, or other reasons, see a Faculty Advisor.*

8. Instructor contact information: Please write 'EOSC 331' in the subject line of your email or it may go astray. Inquiries related to course administration (registration, A&D forms, conflicts, absences, etc.) should be directed to the Lead Instructor (Ken Hickey: khickey@eoas.ubc.ca). Inquiries related to the labs should be directed to the TAs.

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