



UNIVERSITY OF CALGARY

DEPARTMENT OF GEOSCIENCE COURSE OUTLINE FALL 2015

1. Course: GLGY 527, Ore Deposits

Lecture Sections:

L01: MoWeFr, 09:00-09:50, ICT 114

For a listing of all lab sections corresponding with this course, please see the following link:

http://geoscience.ucalgary.ca/geoscience_info/courses/f15

Tutorials:

To be arranged with TAs

Dr. Dave (Prof. David RM Pattison), Office: ES 154, Ph. 403-220-3263, pattison@ucalgary.ca, Office Hours: Open-door policy or by appointment

Geoscience Department ES 118, 403-220-5841, geoscience.ucalgary.ca, geoscience@ucalgary.ca

2. Prerequisites: Geology 431 and 433; or Geology 443. See also Geology [Course Descriptions](#) of the University Calendar.

3. Grading: The University policy on grading and related matters is described in sections [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Lab Assignments (11)	40%
Lab Final	30% (W/Th Dec. 2/3, 2015, ES 050 TBA)
Final Examination	30% (To be scheduled by the Registrar)

The lab final will involve examination of minerals, rocks, polished mounts and thin sections. It is an open book exam. The lecture final will consist of written long-answer questions.

Each piece of work (laboratory report, examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade. Letter grade conversions are listed below. The Instructor may shift the numerical cut-off levels down, based on how hard the TAs mark, how hard the exams are, etc., but they will not be shifted up.

Letter Grade	Percent	Letter Grade	Percent
A+	90-100	C+	66-68.9
A	82-89.9	C	62-65.9
A-	79-81.9	C-	59-61.9
B+	76-78.9	D+	56-58.9
B	72-75.9	D	50-55.9
B-	69-71.9	F	0-49.9

4. Missed Components of Term Work: The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize himself/herself with these regulations. See also [Section E.6](#) of the University Calendar.

5. Course Materials:

Textbooks: There is no required textbook for this course, although all students should have a set of mineral identification tables for both the hand sample component and reflected light microscopic component (especially) of the course. Your Glgy 311 text (Nesse) is a good start for the first. The books listed below are recommended.

Lab: Spry, P.G. & Gedlinske, B.L., 1987. Tables for the determination of common opaque minerals. *Economic Geology Publishing Co.*, New Haven CT, 52 pp.

New for 2015! The excellent textbook *Craig, J.R. & Vaughan, D.J. (1994) Ore microscopy and ore petrography* (Wiley), ideally suited for the microscope labs, is available for **free** on-line, courtesy of Mineralogical Society of America. Download it! The web link is:
http://www.minsocam.org/MSA/OpenAccess_publications.html?p=Craig_Vaughan This book also has reflected light mineral identification tables, although students seem to like the Spry & Gedlinske tables.

Lecture: Ridley, J., 2013. Ore deposit geology. *Cambridge University Press*: Cambridge.
Roberts, R.G. & Sheahan, P.A., 1988. Ore deposit models. Vol I. *Geoscience Canada Reprint Series 3*.
Sheahan, P.A. & Cherry, M.E., 1993. Ore deposit models. Vol. II. *Geoscience Canada Reprint Series 6*.
Goodfellow, W.D. (ed.) 2007. Mineral deposits of Canada. *Geological Association of Canada Mineral Deposits Division Special Publication 5*, 1061 pp with DVDs.

Ridley's recent book is the best single ore deposits text I have seen, and will be useful for this course and as a general reference beyond your BSc program. The two 'Ore Deposit Models' softback books are very good and are good value. For the Canadian slant, Goodfellow '07 is a comprehensive review that is good value in addition to including a DVD of all diagrams, maps and papers.

Resource Materials: A list of books on reserve in the Gallagher Library is appended separately.

6. **Examination Policy:** Written Final, aids allowed: non-programmable calculator and, if needed, a ruler. Students should also read the Calendar, [Section G](#), on Examinations.
7. **Writing across the curriculum statement:** In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also [Section E.2](#) of the University Calendar.

8. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **Academic Misconduct:** (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties
- (b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- (c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf. Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Geoscience, Dr. E.S. Krebs by email krebs@ucalgary.ca or phone 403-220-5850.
- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also <http://www.ucalgary.ca/secretariat/privacy>.

- (f) **Student Union Information:** VP Academic Phone: 403 220-3911 Email: suvpaca@ucalgary.ca
SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403-220-6420 Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- (h) **U.S.R.I.:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference – please participate in USRI Surveys.

Department Approval: ORIGINAL SIGNED

Date: August 20, 2015

Tentative Lecture-Lab schedule for GLGY 527 Fall 2015

Week	Lec date (M-W-F)	Topic	Lab (Thursday)
1	Sep 7	Labour Day – no classes.	1. Minerals and rocks in hand specimen
	Sep 9	Introduction to course.	
	Sep 11	Steps to establish mine.	
2	Sep 14	Factors of ore - geological.	2. Mineral chemistry; grade and tonnage estimate
	Sep 16	Factors of ore – economic. Ores as concentrations	
	Sep 18	Ore fluids: pH, redox, Eh-pH diagrams.	
3	Sep 21	Eh-aO ₂ , complexes, S species.	3. Introduction to reflected-transmitted light microscope
	Sep 23	Deposition. Boiling.	
	Sep 25	Physical aspects of fluids.	
4	Sep 28	Modern ore fluids. Ore classification.	4. Ultramafic Cr- PGE ores; anorthosite Fe-Ti-V oxide ores
	Sep 30	Ultramafic chromite-PGE 1.	
	Oct 2	No lecture – Pattison on Glgly 707 field trip.	
5	Oct 5	Ultramafic chromite-PGE 2.	5. Gabbroid-associated Ni-Cu-Fe-PGE sulphide ores
	Oct 7	Podiform Cr. Anorthosite Fe-Ti-V.	
	Oct 9	Mafic Fe-Ni-Cu-S ores.	
6	Oct 12	No lecture – Thanksgiving.	6. Cu-Mo porphyry ores
	Oct 14	Mafic Fe-Ni-Cu-S ores 2.	
	Oct 16	Felsic intrusion-assoc hydrothermal ores (granites).	
7	Oct 19	Cu-Mo porphyry 1.	7. Skarn Cu-Fe ores; Mesothermal Au-Cu ores
	Oct 21	Cu-Mo porphyry 2. Climax Mo, Greisen.	
	Oct 23	Skarn. Vein ores – zoning.	
8	Oct 26	Vein ores – zoning, Cl/HS, mesothermal veins.	8. Epithermal Au-Ag ores; Archean lode Au ores
	Oct 28	Vein ores – epith; invis gold.	
	Oct 30	Epith veins – Carlin.	
9	Nov 2	No lecture – Pattison at GSA.	9. 'VMS' Cu-Zn-Pb-Ag ores; 'Sedex' Zn-Pb-Ag ores
	Nov 4	Vein ores – Archean.	
	Nov 6	Archean veins 2.	
10	Nov 9	Volcanic-hosted Cu-Zn-Pb-Ag ores.	No lab – Reading Days
	Nov 11	No lecture – Reading Days	
	Nov 13	No lecture – Reading Days	
11	Nov 16	VMS2. Sedex ores.	10. Fe-formation; Paleoplacer Au ores; 'MVT' Zn-Pb ores
	Nov 18	Sed ores. Banded Iron Formation I.	
	Nov 20	BIF 2.	
12	Nov 23	Paleoplacer Au-U.	11. Diamonds, kimberlites and mantle xenoliths
	Nov 25	MVT 1.	
	Nov 27	MVT 2. Diamonds 1.	
13	Nov. 30	Diamonds 2. Uranium.	Lab final W/Th Dec. 2/3, 2015
	Dec 2	Uranium 2. Supergene processes. Metamorphism.	
	Dec 4	Metallogeny – tectonic controls in space and time.	
14	Dec 7	Bre-X lecture. End of term.	
	TBA	Final exam	Scheduled by Registrar