UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF GEOSCIENCE
COURSE OUTLINE
WINTER 2016

1. **Course:** Geology 505, Contaminant Hydrogeology

   Lecture Sections:

   L01: TuTh, 14:00-15:15, TRB 102
   For a listing of all lab sections corresponding with this course, please see the following link:
   http://geoscience.ucalgary.ca/geoscience_info/courses/w16

   Instructor, Dr. Cathyrn Ryan, Office: ES 268, Tel. No. 403-220-2793, e-mail address, cryan@ucalgary.ca.
   Office Hours: 1530-1630 Thursdays

   Course website or Desire 2 Learn (D2L) GLGY 505 Contaminant Hydrogeology
   Geoscience Department ES 118, 403-220-5841, geoscience.ucalgary.ca, geoscience@ucalgary.ca

2. **Prerequisites:** Geology 401 or 601; and Geology 403 or 503. See section 3.5.C in the Faculty of Science section of the online Calendar (www.ucalgary.ca/pubs/calendar/current/sc-3-5.html)

   Antirequisites: Credit for both Geology 505 and 609 will not be allowed.

3. **Grading:** The University policy on grading and related matters is described 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:

Assignments & Labs (7)	30%	
Project	15%	
Midterm test	20%	(Feb 23, 2016)
Final Examination	35%	(To be scheduled by the Registrar)

All lecture exams are mostly short answer type questions including numerical calculations from the lab. Note that all the materials covered in the labs are fair game for the lecture exams. **Students need to successfully complete (obtain >50%) all components (lab and lecture) to get a passing grade.**

Each piece of work (laboratory report, exam) 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, bearing in mind that an F grade will result if the student does not pass the Final Examination. The conversion between course percentage and letter grade is given below.

Minimum Percentage	Grade
95	A+
85	A
82	A-
78	B+
75	B
72	B-
68	C+
65	C
60	C-
55	D+
50	D

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. **Scheduled out-of-class activities:** N/A

   REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

6. **Course Materials:**
   On reserve in Gallagher Library: Appelo and Potsma (2005) Geochemistry, Groundwater and Pollution; Hiscock (2005) Hydrogeology: Principles and Practice; Domenico and Schwartz (1998) Physical and Chemical Hydrogeology

   Available online at library.ucalgary.ca: Hiscock (2005) Hydrogeology: Principles and Practice

7. **Examination Policy**: Non-programmable calculators will be needed for examinations. Students should also read the Calendar, Section G, on Examinations.

8. **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.

9. **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. Krebes by email krebes@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 (FOIPP). 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: JANUARY 5 2016

GLGY505 LECTURE - LAB SCHEDULE
WINTER 2016
SUBJECT TO CHANGE (last edit Jan 5, 2016)

Dates		Labs/Tutorials (Mon 8am or 11am, ES254)	Lecture topics (Tue, Thu @ 2pm, TRA 101)	Lab	Assignments[a]	
				Location	Distributed	Due
11-Jan	Mon	No lab				
12-Jan	Tues		Intro to Course (1)			
14-Jan	Thur		Review of GW flow (2)			
18-Jan	Mon	Prob Set 1 - Site characterization		ES254	Prob Set 1	--
19-Jan	Tues		GW contaminant sources & regs (3)			
21-Jan	Thur		GW contaminant sources & regs, plumes (4)			
25-Jan	Mon	Laboratory 1 - Coliform Enumeration (Malekani)*		EEEL215	Lab 1	Prob Set 1
26-Jan	Tues		Transport processes - Overview (5)			
28-Jan	Thur		Transport processes - Plumes; lab review (6)			
01-Feb	Mon	Laboratory 2 - Column breakthrough experiment		ES920	Lab 2	Lab 1
02-Feb	Tues		Dispersion in plumes (7)			
04-Feb	Thur		Advection-dispersion equation (8)			
08-Feb	Mon	Laboratory 3 - Model Column breakthrough, Ogata Banks		ES254	Lab 3	Lab 2
09-Feb	Tues		Non-ideal plumes (9)			
11-Feb	Thur		Midterm Review			
15-19 Feb		Reading Week				
22-Feb	Mon	Laboratory 4 - Literature search		ES254	Lab 4	Lab 3
23-Feb	Tues		Midterm Exam			
25-Feb	Thur		Reactive transport - sorption (10)			
29-Feb	Mon	Problem Set 2 Landfill Transport		ES 254	Prob Set2	Lab 4
01-Mar	Tues		Reactive transport - redox rxn (11)			
03-Mar	Thur		Reactive Transport - redox and dn (12)			
07-Mar	Mon	Problem Set 3 Org Cont'n, NAPLs & multiphase flow		ES254	Prob Set 3	Prob Set 2
08-Mar	Tues		Reactive transport - biodegradation (13)			
10-Mar	Thur		NAPLs (14)			
14-Mar	Mon	Problem Set 3 (Continued)		ES 254	n/a	n/a
15-Mar	Tues		Non-organic contaminants (15)			
17-Mar	Thur		Catchup, Case History, or Guest Lecture TBA (16)			
21-Mar	Mon	Problem Set 4 Site Investigation Design		ES254	Prob Set 4	Prob Set 3
22-Mar	Tues		Hydraulic fracturing and gw quality (17)			
24-Mar	Thur		Fractured rock (18)			
28-Mar	Mon	Presentations		ES254		
29-Mar	Tues		Site investigation and monitoring techniques (19a)			
31-Mar	Thur		Site investigation and monitoring techniques (19b)			
04-Apr	Mon	Presentations		ES254		
05-Apr	Tues		Remediation methods (20)			
07-Apr	Thur		Catchup, Case History, or Guest Lecture TBA (21)			
11-Apr	Mon	Presentations		ES254		
12-Apr	Tues		Exam Review			

Final Exam on material from full term - TBA (scheduled with Registrar's office)

* Please bring safety glasses and lab coats if possible.

[a]All assignments will be available on D2L and usually due at the beginning of the subsequent lab period