



UNIVERSITY OF CALGARY

DEPARTMENT OF GEOSCIENCE COURSE OUTLINE

1. **Course:** GLGY 449 / GOPH 449, Petrophysical Techniques

Lecture Section:

L01: MoWeFr, 08:00-08:50, ST 135

Lab Sections:

B01, B02, B03, B04, B05: Th, 08:00, 10:00, 12:00, 14:00, 16:00, ES 149 or ES 924 or EEEL 133

Instructors:

Dr. R. Meyer, Office: ES 110, Ph. 403-210-7848, rmeyer@ucalgary.ca, Office Hours: TBA, D2L website.

Dr. L. Lines, Office: ES 570B, Ph. 403-220-2796, lrlines@ucalgary.ca, Office Hours: TBA, D2L website.

Teaching Assistants: *to be determined*

D2L Course: GLGY/GOPH 449/649 L01 - (Fall 2014) - Petrophysical Techniques

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

2. **Prerequisites:** Geology 381 and Geophysics 351 or 355. See also Geology [Course Descriptions](#) of the University Calendar.

Antirequisites: Credit for more than one of Geology 449, 649, Geophysics 449, 649, will not be allowed.

Also known as: (Geophysics 449)

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:

Lab Assignments (seven)	36%	
Midterm test #1 - Mon Oct 6 (weeks 1-4)	9%	
Midterm test #2 - Fri Nov 14 (weeks 5-9)	15%	
Lecture Final exam (cumulative)	25%	
Summary poster & presentation on selected technical/scientific paper	10%	
Top Hat® classroom response system participation	5%	<i>[See Note below]</i>

- Distribution of Lab Assignments: three(3) two-week assignments at 8% each, three(3) one-week assignments at 3.5% each, one(1) demo-style lab at 1.5%.
- Due-dates for the lab assignments are specified with anticipation (see accompanying document "Course topics/schedule"); 25% per day will be subtracted from late submissions.
- The two-hour Lecture Final Exam is cumulative.
- The Top Hat® classroom response mark of 5% is based on participation only. Note that students don't have to be present for every question – a score of about 80% corresponds to a full mark. If you wish to opt-out of this mark the corresponding 5% will be added to the weight of the Final Exam.

► **To opt-out students must inform the instructor R.Meyer in writing (via email) by Friday September 19.**

Each piece of work (e.g. Lab assignments, Midterm tests, Final exam, Poster project, and Top Hat® participation) 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. The conversion between course percentage and letter grade is given below.

Letter Grade	Percent	Letter Grade	Percent
A+	95-100	C+	65-69
A	90-94	C	60-64
A-	85-89	C-	56-59
B+	80-84	D+	53-55
B	75-79	D	50-52
B-	70-74	F	0-49

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:** Lecture Midterm tests will be held outside of regularly scheduled class hours on:
Monday Oct 6, 2014, Time: 17:30-19:00, ES 162 & ST 135
Friday, Nov 14, 2014, Time: 17:30-19:00, ST 148

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:**
Textbook: The Geological Interpretation of Well Logs by Malcolm Rider (2011), 3rd Edition, available at the UofC Bookstore.
A list of reference textbooks covering topics in Petrophysics have been placed 'On Reserve' in the Gallagher Library.
7. **Examination Policy:** Unless otherwise explicitly stated on Exam coversheets, the only aids allowed during writing of any of the tests or exams are non-programmable calculators and a small ruler or straight edge. Students should also read the Calendar, [Section G](#), on Examinations.
8. Writing and the grading thereof will be a factor in the evaluation of student work. See also [Section E.2](#) of the University Calendar. list and description of approved optional and mandatory course fees.

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) **Academic Accommodation Policy:** Students with documentable disabilities are referred to the following links: [Calendar entry on students with disabilities](#) and [Student Accessibility Services](#).
- (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: 220-3911 Email: suvpaca@ucalgary.ca.
SU Faculty Rep. Phone: 220-3913 Email: sciencerep@su.ucalgary.ca; [Student Ombudsman](#)
- (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) 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.

The accompanying document ([Course Topics Schedule 449-649_F14](#)) provides a Schedule of Lecture and Lab topics.

Department Approval: ORIGINAL SIGNED

Date: September 3 2014

Associate Dean's Approval for
out of regular class-time activity: ORIGINAL SIGNED

Date: September 8 2014

COURSE TOPICS SCHEDULE*: GLGY/GOPH 449/649 – Petrophysical Techniques (FALL 2014)

	WEEK of:	LECTURES: MWF 08:00–08:50 Room ST 135	LABS: Thursdays in ES149, ES924, or EEEL133**
1	Sept 8	<u>Introduction</u> : overview, objectives, expectations, grading scheme, On the drilling process; drilling and logging environment	<i>NO LABS</i>
2	Sept 15	<u>Nuclear logs</u> : gamma ray (GR); use of the GR as a correlation tool	<u>LAB 1</u> : Correlation of GR log facies and associated fluid distribution (ES149)
3	Sept 22	<u>Porosity</u> : controls, types, measurement, typical values Nuclear logs: density, PE, neutron	<u>LAB 1 cont'd</u> : Correlation of GR log facies (ES149)
4	Sept 29	Density/neutron logs <i>cont'd</i>	<u>LAB 2</u> : Introduction to Powerlog® petrophysical analysis software: LAS files, logs, curves, formats (ES924) Lab 1 (GR correlation) Assignment DUE
5	Oct 6	Monday Oct 6: MIDTERM test #1 On permeability Resistivity and conductivity logs: principles, types of logs	<u>LAB 3</u> : Schlumberger® log equipment/ logging truck demo (meet in ES149) Lab 2 (Powerlog®) Assignment DUE
6	Oct 13	Monday Oct 13: THANKSGIVING DAY – NO CLASSES Resistivity and conductivity logs: calculation of fluid saturation; linkage between porosity and resistivity	<u>LAB 4</u> : Carbonate core description and evaluation of core analyses data (EEEL133) Lab 3 (logging tools) Assignment DUE
7	Oct 20	Clay / shale quantification and its impact on reservoir properties (porosity, fluid saturations, mineralogy, TOC)	<u>LAB 4 cont'd</u> : Carbonate core log analysis: lithology, porosity, permeability (ES924)

	WEEK of:	LECTURES: MWF 08:00–08:50 Room ST 135	LABS: Thursdays in ES149, ES924, or EEEL133**
8	Oct 27	Clay/shale petrophysics <i>continued</i> . Azimuthal logs: dipmeter, image logs; petrophysics of thin beds	<u>LAB 5</u> : Siliciclastic core description and evaluation of core analyses data (EEEL133) Lab 4 (Carbonate core) Assignment DUE
9	Nov 3	Guest lectures: logging-while-drilling (LWD) logs. Nuclear magnetic resonance (NMR) logs.	<u>LAB 5 cont'd</u> : Siliciclastic core log analysis: porosity, V-shale, presence of gas (ES924).
10	Nov 10	Mon-Tues: READING DAYS – NO CLASSES TBD (review?) Friday Nov 14: MIDTERM test #2	NO LABS (work on LAB 5 and/or Poster paper)
11	Nov 17	Acoustic techniques: sonic logs (compensated and dipole); P- and S-wave velocities; synthetic seismograms. Guest lecture: Development of sonic logs.	<u>LAB 6</u> : Synthetic seismogram calculations (ES924) Lab 5 (Siliciclastic core) Assignment DUE
12	Nov 24	Acoustic techniques <i>cont'd</i> : vertical seismic profiles (VSP), integration of VSP, surface seismic data and sonic logs; cross-borehole surveys.	POSTER PRESENTATIONS during Lab periods (ES149) Lab 6 (Synthetic seismogram) Assignment DUE
13	Dec 1	Acoustic techniques <i>cont'd</i> : acoustic borehole imaging; joint inversion of borehole and seismic data; case history. Friday Dec 5: Guest lecture (LAST DAY OF CLASSES)	<u>LAB 7 Assignment</u> DUE in lecture December 3: Computation of Velocities and Time-Depth Conversion Using Vertical Seismic Profiles (ES924)

* Coverage of topics is subject to slight changes.

** Lab Sections B01 to B05 for GLGY/GOPH 449 take place between 8:00am and 17:50pm. Barring time conflicts with other courses, graduate students enrolled in GLGY/GOPH 649 attend the weekly lab period on Thursdays 18:00-19:50.

*** The Final Lecture Exam is cumulative and takes place during the time period December 8-18, scheduled by the registrar.