



UNIVERSITY OF CALGARY  
FACULTY OF SCIENCE  
DEPARTMENT OF GEOSCIENCE  
COURSE OUTLINE  
WINTER 2015

1. **Course:** Geophysics 457, Physical Properties of Rocks

Lecture Sections: L01: MWF, 11:00-11:50, KNB 133

Instructor, Dr. J. Bancroft, Office ES 108, Tel. No. 403-220-5026, e-mail address, [bancroft@ucalgary.ca](mailto:bancroft@ucalgary.ca),

Office Hours: 1:00 to 2:00 pm

D2L Course: GOPH 457

Geoscience Department ES 118, 403-220-5841, [geoscience.ucalgary.ca](http://geoscience.ucalgary.ca), [geoscience@ucalgary.ca](mailto:geoscience@ucalgary.ca)

2. **Prerequisites:** Geophysics 355; 351 or 359; Mathematics 331 and Physics 321.

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](http://www.ucalgary.ca/pubs/calendar/current/sc-3-5.html))

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 and Quizzes	20%
Laboratory experiments	30%
Midterm test	20%
Take-home test	20%
Final Examination	10%

Letter Grade	Percent
A+	95-100
A	86-94
A-	80-85
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	55-59
D	50-54
F	<50

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

6. **Examination Policy:** No electronic or written aids (eg. cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of any exams. Non-programmable calculators will be permitted to answer quantitative questions on exams, if applicable, and permission to do this will be clearly indicated on the examination paper.

Take-home exams or quizzes are open book.

Students should also read the Calendar, [Section G](#), on Examinations.

## 7. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **Misconduct:** 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: Students with Disabilities: <http://www.ucalgary.ca/pubs/calendar/current/b-1.html> [B.1](#) and Student Accessibility Services: <http://www.ucalgary.ca/access/>.
- (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: 220-3911 Email: [suvcaca@ucalgary.ca](mailto:suvcaca@ucalgary.ca).  
SU Faculty Rep. Phone: 220-3913 Email: [sciencerep@su.ucalgary.ca](mailto: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) **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](http://www.ucalgary.ca/usri)). Your responses make a difference - please participate in USRI Surveys.

Department Approval: Original Signed

Date: January 16, 2015

Associate Dean's Approval for  
Alternate final examination arrangements: Original Signed

Date: January 16, 2015

# Lectures for GOPH 457 Rock physics 2015

12 January 2015

Lec. 1	M 12 Jan	Intro, Earth science vs Geophysical tools
Lec. 2	W 14 Jan	Error analysis
Lec. 3	F 16 Jan	Scaling problems, Rocks: igneous, sedimentary, metamorphic
Lec. 4	M 19 Jan	Density, Porosity, Lithology, Packing
Lec. 5	W 21 Jan	Surface tension, Laplace's eqn., Young's eqn., raindrops
Lec. 6	F 23 Jan	Oil formation, stress strain, traction, Hook's law, elastic behaviour
Lec. 7	M 26 Jan	Elastic parameters, Fractures, Coulomb failure, Amontion's 2 <sup>nd</sup> law
Lec. 8	W 28 Jan	Fault mechanisms, Mohr's diagram, type of fractures, poor press.
Lec. 9	F 30 Jan	
Lec. 10	M 2 Feb	Permeability, Darcy's law,
Lec. 11	W 4 Feb	
Lec. 12	F 6 Feb	
Lec. 13	M 9 Feb	Stress strain, poroelasticity, effective pressure, fluid properties, fracing
Lec. 14	W 11 Feb	Mhor's Coulomb-Navier theory, induced seismicity, Griffith theo. frac
Lec. 15	F 13 Feb	Fluid properties, SI units,
	MWF	<b>Reading week, Family day</b>
Lec. 16	M 23 Feb	Waves, velocity, seismic rock properties, Birch's law, Gardner's law
Lec. 17	W 25 Feb	Tomography fluid types?
	F 27 Feb	<b>Midterm</b>
Lec. 18	M 2 Mar	Elastic moduli, Vp Vs, Poisson's ratio, acoustic prop., seismic prop.
Lec. 19	W 4 Mar	porous mediums, Structure and composition
Lec. 20	F 6 Mar	
Lec. 21	M 9 Mar	Seismic prop, vel and temperature, attenuation, geometric spreading, Q
Lec. 22	W 11 Mar	Ground motion earthquakes, anisotropy, Hook's law, isotropic medium
Lec. 23	F 13 Mar	Shear wave spltnng, electrical properties, Archie's law, Resistiv. surveys
Lec. 24	M 16 Jan	Contamination surveys
Lec. 25	W 18 Mar	
Lec. 26	F 20 Mar	
Lec. 27	M 23 Mar	Resistivity measures, Laplace's eqn, analogy to heat fluid and electricity
Lec. 28	W 25 Mar	
Lec. 29	F 27 Mar	Percolation theory, forest fires, size and distribution of earthquakes
Lec. 30	M 30 Mar	Magnetic, diamagnetism, para., fero., mag surveys, reversals
Lec. 31	W 1 Apr	Sea floor shredding, bathymetry, Eltanin profiles, deep sea drilling
	F 3 Apr	<b>Good Friday</b>
Lec. 32	M 6 Apr	Thermal properties, convection, conduction,
Lec. 33	W 8 Apr	role of porosity fluids fractures, conductivity and anisotropy?
Lec. 34	F 10 Apr	Well logging
Lec. 35	M 13 Apr	Review <b>Take-home test</b>
Lec. 36	W 15 Apr	<b>Final test</b>