



# UNIVERSITY OF CALGARY

## DEPARTMENT OF GEOSCIENCE COURSE OUTLINE

1. **Course:** Geophysics 351 (GOPH 351), Introduction to Geophysics, Fall 2014.

Lecture Sections:

L01: MoWeFr, 16:00-16:50, KNB 132.

Lab Sections:

B01: Thurs, 8:00-10:50, ES 115. B02: Thurs, 11:00-13:50, ES 115. B03: Thurs, 14:00-16:50, ES 115.  
B04: Thurs, 17:00-19:50, ES 115. B05: Thurs, 8:00-10:50, ES 213. B06: Thurs, 11:00-13:50, ES 213.  
B07: Thurs, 14:00-16:50, ES 213. B08: Thurs, 17:00-19:50, ES 213. B09: Tues, 14:00-16:50, ES 115.  
B10: Tues, 17:00-19:50, ES 115.

Dr. E.S. Krebes, Office: ES 230, Ph. 403-220-5028, [krebes@ucalgary.ca](mailto:krebes@ucalgary.ca).

Office Hours: anytime I'm in the office and the door is open.

Desire 2 Learn (D2L) course name: F2014GOPH351L01

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

2. **Prerequisites:** Geology 201, and 202 or 203; Mathematics 253 or 267 or 277 or 283 or Applied Mathematics 219; Physics 211 or 221, and 223. See also Geology [Course Descriptions](#) of the University Calendar.
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 (9)	30%
Midterm exam	20% (Friday, Oct. 24, in class)
Final Examination	50% (To be scheduled by the Registrar)

Each piece of work, e.g., assignment or exam(s), submitted by the student will be assigned a percentage score. The score for the exam(s) and the average score for the assignments will be combined with the weights indicated above 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. The lower number P in the A to D+ percent ranges below can be determined from the formula  $P = 10 * GPV + 43$ , where GPV is the grade point value of the letter grade.

Letter Grade	GPV	Percent	Letter Grade	GPV	Percent
A+	4.0	90-100	C+	2.3	66-70
A	4.0	83-90	C	2.0	63-66
A-	3.7	80-83	C-	1.7	60-63
B+	3.3	76-80	D+	1.3	56-60
B	3.0	73-76	D	1.0	50-56
B-	2.7	70-73	F	0.0	0-50

Scores within 0.5% of the upper boundary of a Percent range (e.g., 79.5%) may or may not be rounded up at the discretion of the instructor (a decision will be made based on the student's performance in the course). For percent grades on a boundary, the higher grade will be chosen (e.g., 73% is a B, not a B-).

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:** Fowler, C.M.R. (2005). *The Solid Earth: An Introduction to Global Geophysics*, 2<sup>nd</sup> edition. Mussett, A.E., Khan, M.A. (2000). *Looking into the Earth: An introduction to geological geophysics*. Both available at the bookstore. Other materials: documents posted on D2L.

6. **Examination Policy:** Closed-book. No calculators or any other electronic devices. Formulas will be provided. 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 and exams 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) **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](mailto:suvpaca@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) 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.

## TENTATIVE LECTURE SCHEDULE

Week of:	Topics
Sept. 8	Basic math. Computation of errors. Great circle distances. Seismic wave basics.
Sept. 15	Earthquakes: magnitudes, energy, traveltimes, location, intensity scales, etc.
Sept. 22	Earthquakes: source mechanisms, radiation patterns, fault plane solutions & applications.
Sept. 29	Snell's law. Wiechert-Herglotz inversion. Moment tensor. Tsunamis. Body waves.
Oct. 6	Pressure, gravity, density in Earth's interior. Rays. Fermat's and Huygens' Principles.
Oct. 13	Absorption, dispersion. Diffraction. Seismic phases in the Earth. Free oscillations.
Oct. 20	Basics of the seismic reflection and refraction methods.
Oct. 27	Geochronology: Rb-Sr, K-Ar, Pb-U age-dating methods. Heat flow. Heat conduction.
Nov. 3	Temperature in Earth's interior. Cooling/heating of lithosphere. Convection.
Nov. 10	Gravity: Laplace's equation, rotation and figure of the Earth, variation with latitude.
Nov. 17	Gravity surveying and modelling. Inertial forces, isostasy, tidal forces, Roche limit.
Nov. 24	Earth's magnetic field, polar wandering, magnetic surveying and modelling.
Dec. 1	Other topics: e.g., basics of electrical and EM methods, Earth-moon system.

## TENTATIVE LAB SCHEDULE

Week of:	Topics
Sept. 8	<b>No lab.</b>
Sept. 15	Basic math exercises. Errors. Great circle distances. Least-squares method.
Sept. 22	Earthquake magnitude, location, traveltimes.
Sept. 29	Earthquake focal mechanisms and fault plane solutions.
Oct. 6	Wiechert-Herglotz seismic velocity inversion method.
Oct. 13	Calculating density, gravity and pressure profiles inside the Earth.
Oct. 20	<b>No lab (mid-term exam week).</b>
Oct. 27	Seismic absorption. Seismic reflection and refraction. Other facets of the seismic method.
Nov. 3	Geochronology problems (computing ages of rock samples).
Nov. 10	<b>No lab (Reading Days, Remembrance Day week).</b>
Nov. 17	Computing heat flux and temperature profiles in the Earth.
Nov. 24	Gravity problems. Gravity modelling.
Dec. 1	<b>No lab (last week of lectures).</b>