



UNIVERSITY OF CALGARY

DEPARTMENT OF GEOSCIENCE COURSE OUTLINE

1. **Course:** GOPH 517, Time Series Analysis and 1D Data Processing

Lecture Sections:

L01: MoWeFr, 09:00-09:50, PF 118

Dr. G. Margrave, Office: ES 218A, Ph. 403-220-4606, margrave@ucalgary.ca. Office Hours: MWF 1-2pm

Lab/Time/Day/Loc: B01 08:00 - 10:50 T ES 924

B02 11:00 - 13:50 T ES 924

Lab Instructor: Tianci Cui, Office: ES640, Email: cuit@ucalgary.ca

Lab instructor: Michelle Montano, Office: ES244, Email: mmontano@ucalgary.ca

The course website can be found on Desire 2 Learn (D2L)

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

2. **Prerequisites:** Geophysics 355 and Applied Mathematics 415. 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:

Grading Schedule	Percent
Lab Papers (2)	10%
Quizzes & LS Exams (best 8)	40%
Mid Term – October 26 2014	20%
Final exam – To be scheduled by the Registrar's office	30%
Total	100%

The beginning of each lab will be either a Quiz or a Lab Skills Exam. The quizzes will last 30 minutes while the Lab skills exams will last 1 hour and each counts as two quizzes. The focus of each quiz will be anything covered in lecture since the previous quiz, but may include material from earlier lectures. Quizzes will begin promptly at the official lab start time and will continue for a precise time. Don't be late! Missed quizzes or Lab Skills Exams will count as a score of zero, there will be no opportunity for make-up. There are 8 possible quizzes plus each Lab Skills exam counts as two quizzes, for a total of 12 effective quizzes. Your eight (8) best quiz scores will be counted towards your course grade. You may consult your "course notes" or any of your previous quizzes during quizzes but you may not consult copies of quizzes from previous years. You will need a calculator and it is an advantage to learn to use MATLAB for this. The two lab skills exams are intended to motivate learning and assess your lab skills. Since the labs are mostly about using MATLAB for data analysis and processing, the Lab skills exams will require you to make calculations and plots similar to those already done in lab but without consultation with your friends.

A student's 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+	96-100	C+	60-64.9
A	90-95.9	C	50-59.9
A-	85-89.9	C-	45-49.9
B+	80-84.9	D+	44-44.9
B	70-79.9	D	40-44
B-	65-69.9	F	0-40

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:** The course D2L site contains all of the handouts for labs, as well as other resource material that you might find useful. You are also required to obtain the two texts (available in the University Bookstore):
Methods of Seismic Data Processing, by Gary F. Margrave
Getting Started with MATLAB, by Rudra Pratap

Reading the course D2L page is not a substitute for attendance at lectures. The lectures provide an interactive environment that embellishes on, and provides a context for, the material in the textbook, whereas D2L is a live site that allows for tailoring and updating of the course material during the term. Failure to attend the lectures will put you at a serious disadvantage.

6. **Examination Policy:** All exams and quizzes are "open book". During an exam or quiz, you may consult any course materials including notes and previous exams or quizzes *which you have made yourself*. You may not consult exams or quizzes from previous years. You may not access the internet or use email during an examination. The use of calculators or computers for computation is encouraged. Students should also read the Calendar, [Section G](#), on Examinations.

7. **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: suypaca@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.

COURSE CONTENT, OBJECTIVES AND ORGANIZATION:

This course surveys the subject of times series analysis specifically as applied to seismic traces. It is the first of a two part series in seismic data processing, the second part being Goph 557. The laboratory component of the course is essential to the subject and emphasizes the use of MATLAB to analyze and manipulate time series. MATLAB will be available at no charge on the computers in ES924 where the lab will be held. You may also purchase the student edition of MATLAB from the University MicroStore at a very reasonable cost; however, this is not required. The course begins with the construction of synthetic seismograms from well logs and proceeds through signal theory, Q attenuation, filtering, and deconvolution.

The topics covered in the course are given in the table below. This is intended as a general guideline and the schedule of topics may change slightly as the course transpires.

Week of	Lecture Topic (PF 118)	Labs (ES 0924)	Events
September 8	Introduction to Matlab and signals	Labs begin	
September 15	Synthetic seismograms	Quiz 1	
September 22	Convolution	Quiz 2	
September 20	Fourier transforms	Lab skills exam	← a double quiz
October 6	Correlations, Hilbert attributes	Quiz 3	
October 13	Noise and filtering	Quiz 4	Lab paper 1
October 20	Attenuation, minimum phase	Quiz 5	Midterm (Oct. 26)
October 27	No lectures (SEG)		
November 3	Attenuation, minimum phase	Quiz 6	
November 10	Deconvolution	Holiday	
November 17	Deconvolution (frequency domain)	Lab skills exam	□ a double quiz
November 24	Deconvolution (time domain)	Quiz 7	
December 1	Deconvolution	Quiz 8	Lab paper 2, no lecture Fri 12-5
Final exam as scheduled by Registrar			