



SUBJECT	EESC 390 AND GEOG 416 FIELD TRIP FEE PROPOSAL
MEETING DATE	APRIL 13, 2017

Forwarded to the Board of Governors on the Recommendation of the President

APPROVED FOR SUBMISSION

Santa J. Ono, President and Vice-Chancellor

DECISION REQUESTED	<p>IT IS HEREBY REQUESTED that <i>the UBC Board of Governors approve the following field trip fees for the 2017-2018 academic year:</i></p> <ul style="list-style-type: none"> • EESC 390 Geological Field Mapping: \$850 <i>(Department of Earth & Environmental Sciences)</i> • GEOG 416 Applied Management of Mountain Hazards: \$750 <i>(Department of Geography)</i>
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Report Date	March 9, 2017
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Presented By Deborah Buszard, Deputy Vice-Chancellor and Principal
Cynthia Mathieson, Provost and Vice-President Academic
Louise Cowin, Vice-President Students

EXECUTIVE SUMMARY

The Departments of Earth and Environmental Sciences and Geography in the Irving K. Barber School of Arts and Sciences propose the following field trip fees, for the 2017-18 academic year:

- EESC 390 Geological Field Mapping: \$850
- GEOG 416 Applied Management of Mountain Hazards: \$750

INSTITUTIONAL STRATEGIC PRIORITIES SUPPORTED

Learning
 Research
 Innovation
 Engagement (Internal / External)
 International

or Operational

DESCRIPTION & RATIONALE	<p>The Departments of Earth and Environmental Sciences and Geography in the Irving K. Barber School of Arts and Sciences propose the following field trip fees, for the 2017-2018 academic year:</p> <ul style="list-style-type: none"> • EESC 390 Geological Field Mapping: \$850 • GEOG 416 Applied Management of Mountain Hazards: \$750
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EESC 390 Geological Field Mapping

The proposed field trip fee of \$850 will cover campsite fees for 13 days, provision of cooking fuel, and vehicle rental, insurance and fuel costs for ~2,000 km of return travel to Crowsnest Pass, AB via Cranbrook, BC. Campsites are used for accommodation during the field course to minimize the cost to students. An additional vehicle is required to transport equipment and to ensure students' safety and comfort.

GEOG 416 Applied Management of Mountain Hazards

The proposed field trip fee of \$750 is for an eight-day field school in Canmore, AB. The field school venue is in one of the most iconic and heavily visited mountain landscapes in Canada, if not the world, and presents a range of serious mountain hazard problems for study (such as the debris-flood hazard facing the town of Canmore).

For safety and logistical reasons, students are not allowed to drive their own vehicles, and hence the field trip fee covers the rental of seven-passenger vans. Accommodation is in townhouse units sleeping five students each, the least expensive form of accommodation available in Canmore. These units are roomy enough for project work and team meetings in the evenings.

BENEFITS Learning, Research, Financial, Sustainability & Reputational	The field courses are meant to enhance the tangible, hands-on, experiential learning that students gain during their undergraduate studies.
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CONSULTATION Relevant Units, Internal & External Constituencies	Feedback was requested from the Earth and Environmental Sciences Course Union and the Executive Committee of the Students' Union of UBC Okanagan. The letters of support are attached in the Appendix.
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APPENDIX 1



Student's Union of the University of British Columbia Okanagan

3272 University Way, UNC 133
Kelowna, British Columbia
V1V 1V7
T: 250-807-8842
F: 250-807-8079
www.ubcsuo.ca

Dear Ian Cull,

Thank you for giving students the opportunity to provide feedback for the proposed EESC 390 and GEOG 416 fee revisions.

After careful consideration by the Executive Committee of the Students' Union of UBC Okanagan, it is our recommendation that no further student consultation for the fee adjustments.

Our initial concern was whether this additional charge would become a financial barrier to students. After comparing the course offerings with similar courses and the importance of field work, we believe that the additional fee is reasonable. The University should, however, strive to make sure that students from all financial backgrounds can afford these additional academic costs. As these courses offer a lot to the academic experience for students, the University should consider case-by-case accommodations to allow all students the ability to participate.

Sincerely,



Blake Edwards



BLAKE EDWARDS, BA / ubcsuo.ca
PRESIDENT
Students' Union of UBC Okanagan
3272 University Way, UNC133
Kelowna, BC V1V 1V7
w: 250-807-9194 c: 250-863-1243
e: president@ubcsuo.ca f: 250-491-1083

APPENDIX 2

March 1st, 2017

Dear Associate Vice-President Students Office,

The proceeding comments regarding associated fees for the proposed EESC 390 and GEOG 416 courses offered by the Department of Earth, Environmental and Geographic Sciences in the Irving K. Barber School of Arts and Sciences are on behalf of the Earth and Environmental Sciences Course Union. Comments reflect the majority of thoughts from students within the course union.

Overall feedback for EESC 390 is positive. When considering the proposed fees, they are competitive with similar courses offered throughout western Canadian universities. Students are in support of camping accommodations as opposed to motel rentals as there is a significant difference in price. We believe it is important to keep costs to a minimum in order to include students from a variety of financial backgrounds.

Similarly, feedback for GEOG 416 is positive. In the past, this course has been considered a highlight of the undergraduate program and students are eager for its return. Proposed fees are reasonable considering accommodations. Some students have brought up the option of making their own accommodations with family in the area. Perhaps this could be considered on a case-by-case basis, as it would significantly reduce costs for those people.

Sincerely,

Cole Evans
President, Earth and Environmental Sciences Course Union

EESC 390 Geological Field Mapping Fees Consultation

The Department of Earth, Environmental and Geographic Sciences in the Irving K. Barber School of Arts and Sciences will offer a new elective field course in Geological Field Mapping (EESC 390) during the summer of 2018. A consultation with various stakeholders on our campus is being conducted regarding a student fee that will be charged in addition to tuition to cover the cost of transportation, accommodation and meals. After consultation with the UBCSUO it will be determined if a broader consultation is required.

The additional fee specifically covers the cost for accommodation, travel and incidental expenses paid by the Department on behalf of students (e.g., entrance fees, insurance, minor equipment and supplies, etc.) The fee does **not** include a charge for Teaching Assistant (TA) salaries or travel and subsistence costs for the course instructor or TA(s). The Department pays the latter costs as part of general operating expenses for course delivery.

Please note that the scope of this consultation process is limited to the fee proposal. The attached document outlines the consultation process, including:

- instructions to provide feedback
- course syllabus for EESC 390
- the proposed fees and rationale for the fees
- similar field course fee at other universities

Students and student organizations can submit comments via e-mail or during a face-to-face meeting to be held on campus on a date to be determined in consultation with the UBCSUO. The consultation process will end 1 March 2017.

Please do not hesitate to contact us if you have any questions. Thank you.

Ian Cull
Associate Vice President Students

Bernard Momer
Associate Dean, Teaching Learning and Curriculum
Irving K Barber School of Arts and Sciences

Edward Hornibrook
Head, Earth, Environmental and Geographic Sciences (Unit 7)
Irving K Barber School of Arts and Sciences

Section 1.0 – Feedback Instructions

The Office of the Associate Vice-President (Students), and only analysts within that office, will know the identity of individual students submitting comments. At no time will anyone outside the Office of the Associate Vice-President (Students) know the identity of individual students who submit comments to this consultation. Your comments will only be used for the purposes of the fee consultation. Comments from individual students will be stripped of any identifying information to ensure confidentiality, but otherwise will be provided verbatim to the Irving K. Barber School of Arts and Sciences, the Department of Earth, Environmental and Geographic Sciences, and the UBC Board of Governors.

Comments received from student organizations will be reported as coming from those organizations, and provided as received to the Irving K. Barber School of Arts and Sciences, the Department of Earth, Environmental and Geographic Sciences, and the UBC Board of Governors.

A summary report of the consultation process and outcomes will be prepared for the Irving K. Barber School of Arts and Sciences, and the Board of Governors.

Section 2.0 – EESC 390 Course Syllabus

EESC 390 (3) Geological Field Mapping

Instructor:

Name: Kyle Larson
Office: FIP353
✉ kyle.larson@ubc.ca
☎ 250.807.8564
🕒 Office Hours: open door or by appointment

Trip Coordinator:

Name: Stuart MacKinnon
Office: SCI 208
✉ stuart.mackinnon@ubc.ca
☎ 250.807.8405

Teaching Assistants:

Name: TBA
Office:
✉

Name: TBA
Office:
✉

Academic Calendar Entry

EESC 390 (3) Geological Field Mapping

Collection, interpretation, and presentation of geological data in the field. Typically held in the two weeks preceding the start of Winter Term 1. A special fee must be paid in advance.

Prerequisites: EESC 200, EESC 325 and EESC 356

Course Format

This is a field-based course conducted in the mountains of Western Canada. It involves a substantial component of geologic fieldwork and field observation toward the construction of a geologic map, vertical geologic section, and a conceptual model of the evolution of the region under study. The course is self-contained, conducted onsite over approximately two weeks.

Course Overview, Content, and Objectives

This course will explore the detailed bedrock geology of a portion of the Canadian Cordillera. Students will undertake a series of mapping projects and assignments of various lengths that will involve substantial amount of field observations and data collection. The course is conducted as an on-site field trip with field work and data collection carried out during the day and data analysis, map generation, assignment preparation and report writing taking place in the evenings. Students will be (re)introduced to geological mapping methods, field note taking, and geologic observational tools. They will be trained in various observational techniques and asked to use what they have learned to generate a reasoned geologic map and history for the region being investigated. Students will work together in small groups, though it is expected that each student will be proficient at all necessary tasks.

The objectives of this course include:

- Preparing students to undertake field geology projects
- Introducing students to the complications and realities of trying to conduct field research
- Providing a hands-on, tangible learning environment where students can apply knowledge gained from other courses
- Creating competent, careful, well-reasoned field geologists

- Introducing the geology of the Western Canadian Cordillera

Learning Outcomes

By the end of this course, students should be able to:

- Carryout a geologic mapping program in the field
- Make accurate geologic measurements and take complete/concise geologic notes
- Form a mapping strategy build to both complete a successful traverse in a timely manner and answer a geologic question
- Locate themselves in the field using a topographic map, air photo, GPS, compass and/or pacing
- Be able to describe and identify different rock types based on their observable/measurable characteristics
- Work in a group environment toward achieving a common goal
- Construct a geologic map and vertical geologic section based on surficial data
- Produce a geologic history of an area based on the constructed map and observations.

Additional Course Requirements

This course is conducted on-site in the field. Student attendance for the entire duration of the ~ two-week course is mandatory. Geologic mapping and exercises are conducted during the day with data synthesis, discussion, interpretation, traverse planning and report writing carried out at night. Students will need to bring appropriate clothing and personal supplies (see required materials section below) and a means to write a final report on-site (laptop/tablet computer).

Evaluation Criteria and Grading

Rock Identification Test (Oral)	10%
<i>-description of rock textures and characteristics from hand specimen</i>	
Field Skills	15%
<i>- measurement and note-taking, rock identification, structure identification, geologic mapping</i>	
Assignments	10%
<i>-based on geologic section logging and outcrop sketching</i>	
Maps, Vertical Sections, and Final Report	65%
<i>-final geologic maps of the study areas, vertical geologic sections across the study areas, final report about the geologic characteristics and evolution of the region</i>	
Total	100%

The final report is to be between 10 and 25 pages long, double-spaced, 10-12 pt. font, and 1–inch borders on letter-size paper. See course handout for further description of the expected content.

Final grades will be based on the evaluations listed above and the final grade will be assigned according to the standardized grading system outlined in the UBC Okanagan Calendar. The Barber School reserves the right to scale grades in order to maintain equity among sections and conformity to University, faculty, department, or the school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department, or school (<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,41,90,1014>).

Required Materials/Equipment

- Geology Related
 - Geologic hammer, hand lens, field notebook, pencils, pens, pencil crayons, erasers.

- Personal Equipment – *This field course is conducted in mountainous terrain with weather conditions that can change suddenly and drastically. Students must be prepared. Please contact the instructor with any questions prior to departing on the field trip.*
 - Students must bring clothing and personal equipment for all types of weather/outdoor conditions.
 - Sturdy hiking boots and raingear as much of the terrain that will be covered is steep and exposed.
 - Hats and water bottle as daytime temperatures can be quite hot at the end of August, especially on exposed ridges.
 - A backpack.

Recommended Readings

- Introduction to Field Geology by Mary Lou Bevier (McGraw-Hill – out of print?) ISBN: 0-07-093109-7
- Basic Geological Mapping by Richard J. Lisle, Peter Brabham, and John W. Barnes (Wiley) ISBN: 978-0470686348
- Geological Field Techniques* ed. by A.L. Coe (Wiley) ISBN: 978-1-4443-3062-5
**Detailed and in-depth, but expensive.*

Course Schedule

The following table provides a tentative schedule for the class and may be adjusted dependent on the class needs.

	Topics
Day 1	Travel from Kelowna to Cranbrook
Day 2	Geology around Bear Lake
Day 3	Travel to Crowsnest Pass + Introduction to the Regional Stratigraphy
Day 4	Group mapping I - south of Turtle Mountain
Day 5	Group mapping I - south of Turtle Mountain
Day 6	Group mapping I - south of Turtle Mountain
Day 7	Crowsnest Lake roadcut geology
Day 8	Frank Slide, Bellevue Mine, Leitch Collieries tour
Day 9	Group mapping II
Day 10	Group mapping II
Day 11	Group mapping II
Day 12	Report Writing
Day 13	Travel from Crowsnest Pass to Kelowna

Missed Graded Work:

Because this course is field-based, attendance is mandatory. Students who, because of unforeseen events, are unable to complete graded work, should normally discuss with the instructor(s) as to how they can make up for missed work. Instructors are not required to make allowance for any incomplete work that is not satisfactorily accounted for. If ill health is an issue, students are encouraged to seek attention from a health professional. Students who feel that requests for consideration have not been dealt with fairly by their instructors may take their concerns first to the Head of IKBSAS Unit 7, and if not resolved, to the Office of the Dean. Further information can be found at:

<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,48,0,0>.

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar at

<http://okanagan.students.ubc.ca/calendar/index.cfm?tree=3,54,111,0>.

UBC Okanagan Disability Resource Centre

The Disability Resource Centre ensures educational equity for students with disabilities and chronic medical conditions. If you are disabled, have an injury or illness and require academic accommodations to meet the course objectives, please contact Earllene Roberts, the Diversity Advisor for the Disability Resource Centre located in the University Centre building (UNC 214).

UNC 214 250.807.9263

email earllene.roberts@ubc.ca

Web: www.students.ok.ubc.ca/drc

Ombuds Office

The Ombuds Office offers independent, impartial, and confidential support to students in navigating UBC policies, processes, and resources, as well as guidance in resolving concerns related to fairness.

UBC Vancouver Ombuds Office:

email: ombuds.office@ubc.ca

Web: www.ombudsoffice.ubc.ca

UBC Okanagan Equity and Inclusion Office

UBC Okanagan is a place where every student, staff and faculty member should be able to study and work in an environment that is free from discrimination and harassment. UBC prohibits discrimination and harassment on the basis of the following grounds: age, ancestry, colour, family status, marital status, physical or mental disability, place of origin, political belief, race, religion, sex, sexual orientation or unrelated criminal conviction. If you require assistance related to an issue of equity, discrimination or harassment, or to get involved in human rights work on campus, please contact the Equity and Inclusion Office.

UNC 216 250.807.9291

email: equity.ubco@ubc.ca

Web: www.equity.ok.ubc.ca

Health & Wellness

At UBC Okanagan health services to students are provided by Health and Wellness. Nurses, physicians and counsellors provide health care and counselling related to physical health, emotional/mental health and sexual/reproductive health concerns. As well, health promotion, education and research activities are provided to the campus community. If you require assistance with your health, please contact Health and Wellness for more information or to book an appointment.

UNC 337

Web: www.students.ok.ubc.ca/health-wellness

Section 2.1 – EESC 390 Fee Details and Rationale

Course Overview

EESC 390 is a field course that explores the detailed bedrock geology of a portion of the Canadian Cordillera. Students undertake a series of mapping projects and assignments involving substantial field observations and data collection. The course is conducted as an on-site field trip with fieldwork and data collection carried out during the day and data analysis, map generation, assignment preparation and report writing taking place in the evenings. Students are (re)introduced to geological mapping methods, field note taking, and geologic observational tools. They are trained in a variety of observational techniques and asked to use what they have learned to generate a well-reasoned geologic map and history for the region being investigated. Students work together in small groups, but each student is expected to become proficient at all necessary skills.

This course is meant to enhance the tangible, hands-on, experiential learning that students gain during their undergraduate studies. The course is focused specifically on training students in geologic field techniques that are standard in both academia and industry. The course prepares students for work where skills such as field observation, data assimilation, hypothesis driven directed study, and interpretation are widely applicable. The course provides an opportunity for students to utilize skills acquired in other courses (e.g. EESC 200, 325, 356) to elucidate real-world geological problems. Students are trained in the rationale behind field research, how to parse data and observations that are commonly contradictory, and how to distil that information into a unified, internally consistent geologic model. It is anticipated that this elective course will become an eligible option towards requirements for registration with the Association of Professional Geoscientists and Engineers of British Columbia (APEGBC).

Proposed Fee

In addition to tuition, the proposed fee for this course is \$850.00 CAD. The fee per student is based upon the following costs:

Accommodation	\$ 325
Vehicle rental and insurance	\$ 365
Fuel and/or mileage charges for vehicles	\$ 150
Camping fuel (propane)	\$ 10
TOTAL:	\$ 850

Rationale for Fee

The field course fee covers campsite fees for 13 days, provision of cooking fuel, and vehicle rental, insurance and fuel costs for ~2,000 km of return travel to Crowsnest Pass AB via Cranbrook BC. Campsites are used for accommodation during the field course to minimize the cost to students. The estimated fee per student would be ~\$1,300 if motel (double occupancy rooms) accommodation was used instead. An additional vehicle is required to transport equipment and to avoid conditions in vehicles carrying students from becoming uncomfortable and potentially unsafe.

Additional Costs to Students

Students are responsible for purchasing and preparing meals during the field course. The department provides cooking stoves, pots and pans, table sets (plates, cups, cutlery), and coolers. The estimated cost of meals per day based upon purchase of groceries is \$20/day or ~\$260 for the

duration of the course. The cost clearly will vary depending upon students food preferences and whether some meals are purchased at restaurants.

Fees for comparable field courses at other Canadian universities

UBC (Vancouver campus)

EOSC 328 Field Geology (based in Oliver BC at the UBC field station) [Additional fee: \$1,641]

Simon Frasier University

EASC 308 Field Geology III [Additional fee: \$900]

University of Calgary

Geology 337 Introduction to Geologic Field Methods [Additional fee: \$1,035]

Department Investment in Course Start-Up

The Department of Earth, Environmental and Geographic Sciences is making an initial investment of ~\$5,000 for equipment to enable the course to be campsite based. Students will be provided with sleeping tents, cooking equipment and communal work and dining area shelters. Over a 5-year time span is expected that the department will spend ~\$1,000 per year to maintain and replace equipment for the course.

Equipment Start-up and Replacement Costs

<i>Item</i>	<i>Description</i>	<i>Cost</i>	<i>Number</i>
Tent	3-person tents - 1 per 2 people	\$ 150.00	12
Shelters	Serve as communal work areas	\$ 350.00	3
Propane Stoves	1 stove per 4 people	\$ 125.00	6
Cook sets	Pots and pans for cooking 1 per 4 people	\$ 65.00	6
Table Sets	Plates/cutlery/cups per person	\$ 20.00	24
Large Coolers	1 per 4 people	\$ 100.00	6
TOTAL (excl. taxes)		\$ 5,070.00	

GEOG 416 Applied Management of Mountain Hazards Fees Consultation

The Department of Earth, Environmental and Geographic Sciences in the Irving K. Barber School of Arts and Sciences offers an elective field course in GEOG 416 Applied Management of Mountain Hazards. A consultation with various stakeholders on our campus is being conducted regarding a student fee that will be charged in addition to tuition to cover the cost of transportation, accommodation and meals. After consultation with the UBCSUO it will be determined if a broader consultation is required.

The additional fee specifically covers the cost for accommodation, travel and incidental expenses paid by the Department on behalf of students (e.g., entrance fees, insurance, minor equipment and supplies, etc.) The fee does **not** include a charge for Teaching Assistant (TA) salaries or travel and subsistence costs for the course instructor or TA(s). The Department pays the latter costs as part of general operating expenses for course delivery.

Please note that the scope of this consultation process is limited to the fee proposal. The attached document outlines the consultation process, including:

- instructions to provide feedback
- course syllabus for GEOG 416
- the proposed fees and rationale for the fees
- similar field course fee at other universities

Students and student organizations can submit comments via e-mail or during a face-to-face meeting to be held on campus on a date to be determined in consultation with the UBCSUO. The consultation process will end 1 March 2017.

Please do not hesitate to contact us if you have any questions. Thank you.

Ian Cull
Associate Vice President Students

Bernard Momer
Associate Dean, Teaching Learning and Curriculum
Irving K Barber School of Arts and Sciences

Edward Hornibrook
Head, Earth, Environmental and Geographic Sciences (Unit 7)
Irving K Barber School of Arts and Sciences

Section 1.0 – Feedback Instructions

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Comments received from student organizations will be reported as coming from those organizations, and provided as received to the Irving K. Barber School of Arts and Sciences, the Department of Earth, Environmental and Geographic Sciences, and the UBC Board of Governors.

A summary report of the consultation process and outcomes will be prepared for the Irving K Barber School of Arts and Sciences, and the Board of Governors.

Section 2.0 – GEOG 416 Course Syllabus

GEOG 416: Applied Management of Mountain Hazards Winter Session 2017 (Term 1)

Instructor:	Dr. Fes de Scally
Office:	ART 250 (office hours to be posted)
Telephone:	250-807-9361
Email:	fes.descally@ubc.ca
Prerequisite:	GEOG 108, GEOG 109, GEOG 316, and third-year standing.

CALENDAR DESCRIPTION

The course aims are to develop an understanding of mountain hazards and approaches to their management, and foster a critical understanding of the contributions made to the field by other earth sciences. Hazards covered include snow avalanches, debris flows, floods, rock avalanches, and hazards of tectonically active mountains. The normal format of this course is as a field course at a facility in the Canadian Cordillera. The alternative format is as a regular semester course.

PREAMBLE

The 930,000 km² land surface of British Columbia is composed primarily of mountains and dissected plateaux. Although the majority of British Columbia's population is concentrated in the lowlands surrounding the Strait of Georgia in the southwestern corner of the province, many small- and medium-sized communities with economic bases in forestry, mining, agriculture, tourism, or transportation are situated in steep-sided valleys and fjords in the mountainous areas. Important links such as highways and roads, railways, pipelines and electricity transmission lines also crisscross the mountains. Furthermore, increasing numbers of recreationists—from urban centres in BC, other parts of Canada, and overseas—venture into British Columbia's mountains for enjoyment. The province's heli-skiing industry and ski resorts are world renowned, attracting visitors who often have no knowledge of mountain environments and associated hazards such as avalanches. Even the large urban centres of southwestern BC are not immune from the problems associated with living on steep slopes, as illustrated by several damaging landslides that have occurred in the District of North Vancouver over the years. As a result of all these factors, there is significant scope and potential in BC for disaster resulting from hazards associated with high-mountain environments.

The objectives of this course are as follows:

- 1) To create an understanding of the character and relative importance of mountain hazards facing human activities and communities in the Canadian Cordillera (encompassing British Columbia, Alberta, and the Yukon).
- 2) To compare the types and degrees of mountain hazard in the Canadian Cordillera with that in other mountain regions of the world such as the Pakistan Himalaya, Southern Alps (New Zealand) and Swiss Alps.

- 3) To critically appraise ways by which the geosciences can make applied contributions to the understanding and management of mountain hazards.
- 4) To test the thesis that successful management of mountain hazards is not possible without understanding the role of human agency, and that insights into hazard management must rely on social sciences and an understanding of how public policy is formulated. In other words, the contributions of the geosciences to mountain hazards management are only a first step.
- 5) To learn some specific skills related to the identification and assessment of common mountain hazards in B.C.

COURSE LEARNING PHILOSOPHY

Learning in this course is underpinned by the educational philosophies of ‘experiential learning’ and the ‘Socratic method’ (have a look in Wikipedia if you don’t know what these terms mean). Put another way, you will be learning by doing and discussing, not by passively absorbing material within a traditional lecture format. This ‘doing and discussing’ will occur during the field school and in the classroom sessions following the field school. The field school will focus on the collection of measurements and observations to be used for your group research projects, as well as the discussion of hazards and their management at various field sites. The classroom sessions will involve seminar-type discussions about your research projects (including oral presentations on your part) and other topics listed below. You are expected to play an active part in these discussions rather than sitting by as a passive observer.

It is important for you to realise that this course involves more participation in the learning process on your part than you may experience in most of your other courses. I view it as a partnership between students and teacher whereby the contribution from both parties leads to increased knowledge and understanding for all of us. Put another way, the more motivated and willing you are to engage in the course objectives and material, the more you will get out of this course.

For details about elements of the course for which you will receive a mark, see the section on ‘Course Organisation’.

READINGS

There is no course text. The readings for this course will be provided to you in the form of pdf’s. Please bring a USB drive with you to Canmore to copy these pdf’s. You will also need a means of reading these pdf’s in Canmore, such as a laptop or tablet. The pre-field school readings (see below) will be provided to you via a Dropbox link.

You will be provided with three types of readings:

1) Readings which must be read before the field school:

- Smith, D., 2013. “Reducing the impacts of disaster” (Ch. 5). In: Environmental Hazards: Assessing Risk and Reducing Disaster (6th edition). Routledge, New York, pp. 96-136.
*This is an important chapter if you have not completed the GEOG 316 pre-requisite. Even if you have taken GEOG 316, I strongly suggest you review this chapter. It nicely summarises all of the ways by which we can manage natural hazards, and therefore forms an important wider context for our mostly geosciences-type work in GEOG 416. Note how all measures to reduce natural hazard risk can basically be grouped into three categories: Protection (hazard resistance), Mitigation (disaster aid; insurance), and Adaptation (preparedness; predictions, forecasts and warnings; land use planning). You should think about the

appropriateness of each of these categories as we discuss strategies for reducing mountain hazard risk throughout the course.

- Hewitt, K., 2004. Geomorphic hazards in mountain environments. In: Mountain Geomorphology (eds. P.N. Owens and O. Slaymaker). Edward Arnold, London, pp. 187-218.
- Gardner, J.S., 1993. Mountain hazards. In: Canada's Cold Environments (eds. H.M. French and O. Slaymaker). McGill-Queens University Press, Montreal & Kingston, pp. 247-267.
- Slaymaker, O., 1999. Natural hazards in British Columbia: an interdisciplinary and inter-institutional challenge. International Journal of Earth Sciences 88: 317-324.
- Cave, P.W., 1992. Hazard acceptability thresholds for development approvals by local government. In: Proceedings of the Geological Hazards '91 Workshop, 20-21 February 1991, University of Victoria. Open File Report 1992-15, BC Geological Survey Branch, Victoria, pp. 15-25.

2) Readings and other information pertaining to your research projects. It is assumed that you will be reading some of this material during the field school so you have a handle on the field observations and measurements that need to be collected for your project. You won't have the opportunity to go back to measure things if you've neglected to do it during the field school! For your project's final research report due near the end of the term (see below), your group will need to employ a significant list of references pertaining to your project topic. Some of these will be available from me as pdf's, but your group is also expected to find additional references.

3) Readings which will form the basis for classroom discussions following the field school. You will be notified of which readings to do before each of our meetings.

COURSE ORGANISATION

Timetable:	Term 1 meetings:	Tuesday, Thursday 12:30-14:00	ART 106 ¹
	Pre-field school orientation:	Friday, 4 Sep 10:00- ~16:00	SCI 374
	Field school (Canmore AB):	Sunday, 6 Sep to Sunday, 13 Sep inclusive	

Grading:	Final research report ² :	60 %
	Oral research presentation ³ :	15%
	Field effort and participation ⁴ :	15%
	Class participation ⁵ :	<u>10%</u>
		100%

¹We will be meeting occasionally during the Thursday time slot in order to avoid a conflict with GEOG 272 labs. The exact schedule of Thursday meetings will be determined during the field school, and attendance at these is mandatory (see "Grading").

(Please note that you will have ample opportunity during the scheduled class times for GEOG 416 to meet with your group members over project work. In this course you cannot use the excuse that you couldn't find a common time/day to meet.)

² The final report is based on a research project and forms the major component of your grade. It will be due near the end of the term—exact date to be announced. These projects must be completed in groups. Two types of group project work are possible:

i) A project for which the whole class will help the group collect detailed field observations and data in the Banff–Canmore area. There are three field project topics:

- Evaluation of debris flow potential, volume and frequency on small depositional fans, Hwy. 1A between Canmore and Exshaw.
- Mapping and modelling of snow avalanche runout distance and frequency on an avalanche path, Minnewanka Lake Road or Fortess Mountain Road.
- Flood hazard evaluation and peak flow calculation on Exshaw or Jura Creek, Exshaw/Hwy. 1A.

ii) A project on some other aspect of mountain hazard management in the Canadian Cordillera. There are a maximum of two possible project topics:

- Evaluation of the flood hazard protective measures installed at Cougar Creek, Canmore following the destructive 2013 debris flood.
- Some aspect of hazards in tectonically active mountains, for example landslide hazard in the Mount Meager Volcanic Complex north of Pemberton BC or current volcanic hazard elsewhere.

If any group is interested in working on one of these two topics, the specific topic must be approved by me before you begin work. Also, if you decide to work on one of the topics under (ii), be aware that given the time limitations in Canmore, the only projects for which we can collect field data are the three projects listed in (i) above. Therefore, for the two projects in (ii) your group project will have to rely on existing literature and non–field sources of information.

All research projects must be tied to the literature on that topic by way of a literature review of appropriate length within your final report. Also, your final report must include a section detailing hazard mitigation options which are appropriate to the land use at the site.

Be aware that all group members are expected to contribute equally to a project. Slackers will not be tolerated because this kind of behavior impacts negatively on other members of the group.

Grading of the final research report, worth 60% of your course grade, will be broken down as follows:

- 30% for individual effort, based on your personal contribution to the group effort and the quality of your contributed material. This evaluation of individual effort will be carried out by your group members (15%) and by me (15%).
- 30% for the group effort, based on the quality (content and presentation) of the final written report. This evaluation will be carried out by me.

The structure, length, format and so on of the final research reports will be discussed as we proceed through the course.

³The oral research presentations will take place about $\frac{2}{3}$ to $\frac{3}{4}$ of the way through the term—exact dates to be announced. The purpose of these presentations is for your group to provide the rest of the class with a formal summary of your written research report. For this reason I strongly recommend that you have your project’s analysis completed and the write–up of the final report well underway by the date of the oral presentations. All members of a group will receive the same mark for the presentation, but I reserve the right to deduct marks from those individuals who are not present for other groups’ presentations. No write–up is required for the oral presentation but you may wish to create a summary handout for your classmates.

⁴My evaluation of your individual field effort and participation will be based on your critical thinking skills, questioning, ability to carry out field measurements and observations, knowledge of mountain hazards as it develops over the course of the field school, and your ability to work as a responsible member of a field party. This evaluation will be carried out during the course of fieldwork: It is not a written test but rather observation of your performance by me.

⁵Attendance at all class meetings following the field school is mandatory, and this participation forms 10% of your course grade. If you have other courses that conflict with the Thu 12:30–14:00 meeting time, you are responsible for getting excused from these courses on the dates that we meet for GEOG 416.

COURSE TOPICS (SUBJECT TO CHANGE)

Note: As discussed under ‘Course Learning Philosophy’, most of the topics below will be explored by way of fieldwork and field observations, informal discussions in a field setting, case studies using slide shows and videos, readings, and classroom discussion. The traditional lecture format will not be employed in this course. Discussion and debate is therefore encouraged and necessary—be prepared to be more than just a passive observer.

1) Attributes of mountain environments giving rise to hazards.

2) Types of mountain hazards:

- Snow avalanches
- Debris flows and mudflows
- Regional and flash floods
- Rockfalls and rock avalanches
- Glacial hazards including ice avalanches, jökulhlaups (glacial outburst floods), moraine dam failures, moraine wall collapses.
- Volcanic and earthquake hazards in tectonically active mountains.
- Wildland–urban interface (WUI) fire hazards.

Note: The combination of hazards present in any specific mountain region depends on the region’s elevation, relief, ruggedness, climate, degree of glacierisation, vegetation, geology and tectonic activity, and type and intensity of human activity. Since volcanic and earthquake hazards are not present in the Rocky Mountains where the field school takes place, these will be discussed using my own experiences from other mountain regions.

3) Magnitude–frequency relationships of mountain hazards, and their importance for hazard management; methodologies for evaluating event magnitude and frequency.

4) Historical and modern land uses in the Canadian Cordillera which are vulnerable to natural disasters; hazards and disasters in the Canadian Cordillera contrasted with other high–mountain regions (e.g. Swiss Alps, Southern Alps of New Zealand, Himalaya/Karakoram of northern Pakistan, Snowy Mountains of Australia).

5) Distinctions between mountain hazards which result in individual accidents (snow avalanches, lightning, glacier travel, objective hazards in mountaineering etc.) and hazards which result in larger scale disasters (snow avalanches, earthquakes, landslides, floods etc.).

6) The role of Geography, Physical Geography, other Earth Sciences (Geology, Geophysics, Volcanology, Seismology), Civil Engineering, and the social sciences in mountain hazards management; the need for an interdisciplinary approach in hazard management.

7) Approaches to the management of mountain hazards:

- **Passive measures:** hazard identification, evaluation and mapping; land use planning and zoning; risk assessment procedures; route selection; public education.
- **Active measures:** real-time warnings of rising hazard based on monitoring and short-term forecasting; area closure and evacuation; artificial triggering as a means of reducing the hazard.
- **Structural measures:** engineered structures for modifying the hazard process and/or protecting lives and property; reforestation to increase slope stability.
- **Emergency measures:** rescue, recovery, and rebuilding strategies.

Note: Emphasis will be placed on approaches in which Geography and the Earth Sciences play a central role, i.e. Passive and Active measures.

8) Relationships between hazards and the sustainability of human activities and communities in mountain environments; the role of adverse environmental impacts of human activity in exacerbating mountain hazards.

9) Alluvial fans in mountains as case studies of the “resource-hazard paradigm”.

10) Conduct of field operations in mountain environments: planning, logistics and safety.

TENTATIVE FIELD SITES TO BE VISITED

- Alluvial fans with associated flash flood and debris flow hazards along the Bow Valley corridor between Banff and Exshaw.
- Snow avalanche and debris flow sites along the Minnewanka Lake Road.
- Snow avalanche paths at Rogers Pass, Hwy. 1 and the Fortress Mountain Road, Kananaskis Country.
- Snow avalanche paths on the Sunshine Road, Banff National Park.
- Five Mile Creek debris flow fan, Hwy. 1 west of Banff.
- West Wilson Creek snow avalanche and debris flow channel, Hwy. 93N (Icefields Parkway).
- Athabasca Glacier at the Columbia Icefields, Hwy. 93N (Icefields Parkway).
- Mount Kitchener rock avalanche, Hwy. 93N (Icefields Parkway).
- Hillsdale earth slide, Bow Valley.

ACADEMIC INTEGRITY

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President’s Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

A more detailed description of academic integrity, including the University’s policies and procedures, may be found in the Academic Calendar at:

<http://okanagan.students.ubc.ca/calendar/index.cfm?tree=3,54,111,0>.

If you have any questions about how academic integrity relates to this course, please ask me. Material from GEOG 416 research reports submitted in previous years may not be used in your research projects.

UBCO DISABILITY RESOURCE CENTRE

The Disability Resource Centre ensures educational equity for students with disabilities, injuries or illness. If you are disabled, have an injury or illness and require academic accommodations to meet the course objectives, please contact Earllene Roberts, the Diversity Advisor for the Disability Resource Centre located in Commons Corner in the University Centre building (UNC 227).

UNC 227A 250.807.9263

Email: earllene.roberts@ubc.ca

Web: www.ubc.ca/okanagan/students/drc

Please note that a moderate level of fitness and an ability to work in rough mountain terrain without endangering the safety of yourself or others is a requirement on this course, given the nature of work we will engage in during the field school.

UBCO OMBUDS OFFICE

The Ombuds Office offers independent, impartial, and confidential support to students in navigating UBC policies, processes, and resources, as well as guidance in resolving concerns related to fairness.

UNC 227B 250.807.9818

Email: ombuds.office.ok@ubc.ca

Web: <http://ombudsoffice.ubc.ca/ubc-okanagan-2/>

UBCO EQUITY AND INCLUSION OFFICE

UBC Okanagan is a place where every student, staff and faculty member should be able to study and work in an environment that is free from discrimination and harassment. UBC prohibits discrimination and harassment on the basis of the following grounds: age, ancestry, colour, family status, marital status, physical or mental disability, place of origin, political belief, race, religion, sex, sexual orientation or unrelated criminal conviction. If you require assistance related to an issue of equity, discrimination or harassment, please contact the Equity and Inclusion Office.

UNC 227C 250.807.9291

Email: equity.ubco@ubc.ca

Web: www.ubc.ca/okanagan/equity

Section 2.1 – GEOG 416 Fee Details and Rationale

Course Overview

GEOG 416 is a field course emphasizing practical, field-based experiential education in mountain hazards management. It is highly relevant in a province such as British Columbia with its extensive mountain terrain and associated hazards. The course is intended to teach senior undergraduate students about the principles and processes of mountain hazards assessment and management in western Canada and other mountain regions where the instructor has experience (Pakistan Himalaya, Southern Alps of New Zealand, Swiss Alps, Snowy Mountains of Australia). Learning occurs primarily through group-based research projects involving analysis of field data collected during an eight-day field school in Canmore, Alberta in the Rocky Mountains. Following the field school, the project work continues on campus over the duration of Term 1.

GEOG 416 is always in very heavy demand as an elective for students completing majors in Geography (GEOG) or Earth and Environmental Sciences (EESC) and wishing to gain some field experience prior to their graduation. The course also provides a useful field course elective for students in the Freshwater Science (FWSC) program who wish to acquire some experience in water-related hazards such as flooding.

GEOG 416 is an accredited field course elective for EESC students wishing to acquire professional registration as a Geoscientist with the Association of Professional Engineers and Geoscientists of British Columbia.

Proposed Fee

In addition to tuition, the proposed fee for this course is \$750.00 CAD. The fee per student is based upon the following costs:

Accommodation	\$ 425
Vehicle rental and insurance	\$ 245
Fuel for vehicles	\$ 80
TOTAL:	\$ 750

Rationale for Fee

The proposed field fee of \$750 is for an eight-day field school in Canmore AB. This is a very reasonable amount given that the field school venue is in one of the most iconic and heavily visited mountain landscapes in Canada if not the world, and presents a range of serious mountain hazard problems for study (such as the debris-flood hazard facing the town of Canmore).

The proposed field fee does not include any instructor or TA expenses, and it does not include TA salary.

For safety and logistical reasons, students are not allowed to drive their own vehicles on the field school, and hence seven-passenger vans are rented from Budget. Accommodation is in townhouse units sleeping five students each, the cheapest form of accommodation available in Canmore. These units are roomy enough for project work and team meetings in the evenings.

Additional Costs to Students

Food/meal costs are not included in the proposed field fee. Students are responsible for their own food/meal costs. Because the townhouse units come with fully equipped kitchens, students will

save money by buying groceries and cooking their own meals. An estimate of \$20/day for a total cost of \$160 seems a reasonable per-student cost for groceries in Canmore.

Students sign a pre-trip information sheet acknowledging this cost in addition to the course fee and tuition.

Fees for comparable field courses at other Canadian universities

The examples below are for field schools of similar duration in British Columbia's natural environments.

UBC (Vancouver campus):

GEOB 309 (Geographical Sciences Field Course): based in Whistler BC, \$750 field fee.

University of Victoria:

GEOG 438 (Aquaculture in BC): based in Bella Bella BC, \$800 field fee.