

## Welcome to EOSC 118 Earth's Treasures: Gold and Gems!

Welcome to EOSC118 - Earth's Treasures: Gold and Gems! We are pleased to have you all here for this very new course and hope you are as enthused as we are!

This course will introduce you to the scientific world of gemstones and precious metals. We'll touch on where gems and precious metals crop up in our everyday life, learn background geoscience concepts to put course content in context, and dive into the exciting realm of precious gemstones and metals.

In this Distance Education section, you will be learning independently; you will progress at your own pace, and study and learn in your own time and chosen place. You decide when and where you want to actively be in class, how to study, and when to write the Quizzes within the 48-hour window they are available.

What will it take to successfully complete this course? You will need to **A)** read and understand the course materials, including the online course notes (Learning Modules) and assigned textbook readings; **B)** ask (a lot of) questions on the Discussion Board; **C)** write all 3+1 Quizzes (plus the practice quiz); and **D)** write and pass the Final Exam.

As your Course Instructors, we (David Turner and Jan Cempirek) will guide you through the Course Material. We are a resource for more and detailed information on the concepts and issues we will be discussing in class and will be actively in class much of the time. We'll also have a fantastic set of Teaching Assistants for the course, and further assistance is available 24/7 on our Discussion Board (DB) and by email.

Again, **Welcome to class!** We look forward to this entire term with you!

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## COURSE OVERVIEW

### Course Overview

EOSC118 is divided into three exciting Modules centered on the title of the course: The Earth's Treasures.

#### **The first Module, "Rocks, Minerals and Gems", covers:**

1. Aspects of the jewellery industry and current events
2. Science introduction to help understand precious gems and metals

#### **The second Module, "Precious Gemstones", covers:**

1. The world of diamonds!
2. The nature of colour and light, and exploring tools of the trade
3. Coloured gems: emeralds, rubies, sapphires, and more!

## **The third Module, "Mining and Major Metals", covers:**

1. Gold!
  2. Platinum and its precious relatives
  3. Silver, copper and precious metal alloys
  4. Mining of gems and precious metals and its implications
  5. Production aspects of the jewellery industry
  6. Ancient numismatics
  7. Self guided field trip
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## **COURSE GOALS**

### **Module A. Diamonds and Due Diligence**

#### **Lesson 1 - Introduction to EOSC118**

### **Course Goals**

**These are the overarching course goals for EOSC 118 - Earth's Treasures: Gold and Gems.**

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

1. Recognize valuable gems and metals and identify factors that contribute to their value.
2. Sharpen your observations of nature and make connections between science and everyday life.
3. Think like an Earth Scientist:
  - If you see one of the rocks, minerals, metals, or gemstones that we cover in this course, you should know: i) what it is made of, ii) how it may have formed, iii) what it might be used for.
  - If you see a rock, mineral, metal or gemstone that we DID NOT cover in this course, you should know what steps to take to identify it and discern its importance.
4. Identify the steps needed to go from discovery of a gem or metal deposit to bringing the end product to the consumer.
5. Be aware of the broader social, economic and environmental implications of mining practices in different parts of the world, and how these practices effect the market value of gems and/or metals.
6. Identify and describe current and historical gem and metal localities in Canada and around the world and appreciate how they impacted settlement, infrastructure, and the local economy.
7. Use knowledge you gained from this course for your personal gem and metal investments.

We also hope that you'll develop your reading skills related to validating and understanding information you come across. In particular, by the end of the course you should be able to:

1. Read [Gems & Gemology articles](#)
2. Read [Elements Magazine articles](#)
3. Read [Pala International newsletters](#)
4. Critically read news releases from mining companies
5. Critically assess general "news" articles
6. Critically discuss exploitation of gem and precious metal mines around the world

Also, each lesson or set of lessons (e.g., Diamonds are covered in Lessons 8 through 11) have their own learning objectives. Be sure to review these prior to reading the material and also afterwards to assess your learning.

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## COURSE MATERIALS

### Module A. Diamonds and Due Diligence

#### Lesson 1 - Introduction to EOSC118

### Course Materials

This online course is delivered almost entirely through Connect. All the information for this course will be provided in the Online Course Notes, assigned textbook readings, videos, and movies. There are a few external websites we also refer you to. The online course notes are Lesson-based (there are 36, including this Intro Lesson), which are clustered into three Modules (A, B and C).


The **required textbook** for this course is:

**Rock and Gem: The Definitive Guide to Rocks, Minerals, Gems, and Fossils** Ronald L. Bonowitz, Margaret Carruthers, and Richard Eftim 2008, DK Publishing, Inc., 360pp. ISBN-13: 9780756633424

The **Course Textbook** may be purchased at:

- "Pacific Museum of the Earth" Gift Shop in the EOS department building. The hours of the gift shop are posted [here](#). While you are there check out the cases of mineral and gem specimens - this makes a good introductory 'field trip' to EOSC118!
- Discount Textbooks in the UBC Village may also have some copies:  
<http://www.discounttextbooks.ca/>
- Order online at major book resellers, such as ABE Books or Amazon

The course also makes use of some **required readings outside the textbook**, normally with associated **guides**. You will be prompted to read these required articles within the lesson in which they are applicable. **Required Material is examinable** - note that if the associated reading guide states that only a subset of the information is to be read, it is only the outlined information that is examinable (note! some articles are VERY long, but we only ask you to read a small portion, as outlined in accompanying guides... so don't skip the guides!). Here is an example of how an article and reading guide for EOSC118 is presented in the course (you don't need to read it now...):



#### Required Readings Outside the Textbook

- Mauthner, M. and Francis, C. (2006). "[Gold Crystal Localities of British Columbia, Canada](#)", *Rocks & Minerals*, Vol. 81, No. 1, pp 14-22.  
Use this [BC Gold Crystal Localities Guide](#) to help you with the article.

The course makes use of some **required streaming videos**, with associated **reading guides**. You will be prompted to watch the videos within the lesson in which they are applicable. Here is an example of how a video and reading guide for EOSC118 is presented in the course (you don't need to watch it now...):



### Required Video

View the video entitled [Queens of Diamonds](#) which follows the dramatic adventures of two women and their high-stakes quest to develop Canada's next diamond mine in Nunavut. This video showcases a good cross-section of the diamond exploration industry in Canada from the boardroom to the field, from the science lab to investor shows. Don't forget to use the [Queens of Diamonds Guide](#) to help you with the video.

We refer you to **required outside websites** a few times, however, they are clearly stated within the lessons.

Because this course is meant for a general audience we have also tried to supply some extra information here and there throughout the lessons. In these cases, this **optional material** and web resources will be listed separately but in a space where it matches that particular theme. For example, optional readings about pearls will be given in the Lesson that contains information about pearls, and in some cases might even have a reading guide. "Optional Readings" are not explicitly examinable, however, some of the content within these optional readings will inevitably be found within some of the course content or required readings. Again, **Optional Material is not examinable, Required Material is examinable**. Here is an example of how an optional reading for EOSC118 is presented in the course:



### Optional Readings Outside the Textbook

- Shor, R. (2007). "[From Single Source to Global Free Market: The Transformation of the Cultured Pearl Industry](#)". *Gems & Gemology*, Vol 43, No. 3, p200-226.  
This [Shor-2007 Reading Guide](#) can help you with the article.

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## QUIZZES, FINAL EXAM, AND COURSE GRADE

### Module A. Diamonds and Due Diligence

#### Lesson 1 - Introduction to EOSC118

### Quizzes, Final Exam, and Course Grade

Your **Course Grade** will be based on your three (3) best **Quizzes** (40% total) and a comprehensive **Final Examination** (60%). Here is how your Course Grade will be calculated:

$$\text{Course Grade} = 40\% \text{ of Quizzes} + 60\% \text{ of Final Exam} + \text{Bonuses}$$

The Quizzes will be delivered online and will include questions covering the online Course Notes, the assigned readings, and the required videos and movies. Each Quiz will be 30-minutes long and will include up to 20 multiple-choice questions. There are 4 quizzes but only your top three results will be used to calculate the portion for your final mark.

The Final Examination will be a paper-based exam to be written in-person at the UBC-Vancouver Campus or at other Exam Centres outside of UBC. Like the Quizzes, the Final Exam will also cover the online Course Notes, and the required readings, videos and movies.

The Final Exam will be 2.5 hours long and is comprehensive of all of the material.

*Schedule Of Assessments (Quizzes And Final Exam)*

Evaluation (Course Notes, Videos, Movies)	Coverage	% of Course Grade
3 of 4 Quizzes (online, 20 Qs each)	Q1: Intro material (L1 - L7) Q2: Diamonds, Beryl, Corundum (L8 to 15) Q3: Pegmatites, other gems (L16 to 23) Q4: Metals and mining (L24 to 33)	40 % (13.33+13.33+13.33)
Final Examination (paper-based, invigilated)	<b>Approximate</b> weighting on the exam is balanced across the lessons.	60 %
	<b>TOTAL:</b>	<b>100%</b>
Extra Credit: Provide collaborative content for peers and participate in student surveys.		up to 3%

Please read the Course Schedule, Quiz FAQs and Final Exam FAQs for more detailed information.

Furthermore, in order to earn a passing Course Grade, students **must** earn a mark of at least 50% in the Final Exam.

The relationship between Course Grade and letter grade is defined by **UBC Grading Practices**.

We do **not** give extra make-up work, so please maintain strong study activities during the term to help maximize the grade you earn. Keep up with the readings from the Online Course Notes. Form study groups with fellow students.

**HOW TO PROCEED WITH EOSC 118 GOLD AND GEMS**

**Module A. Diamonds and Due Diligence**

Lesson 1 - Introduction to EOSC118

**How To Proceed With EOSC118 Gold and Gems**

Be active in class often and regularly. Check out the Course Schedule posted in the following page and on the Home Page, and record the relevant dates (such as quiz windows) in your calendar. When you login to our EOSC118 website you are actively in class regardless of whether you are at UBC or anywhere in the world. We provide a recommended schedule to follow, however, since the course is in a distance format it is up to you to decide how you want to schedule your readings/learning.

*Ways to succeed in EOSC118:*

1. **Read/study online course notes** that have been organized into 3 Learning Modules (A, B and C), each with its own collection of across 36 Lessons (L1 to L36) and Pages. Each "Lesson" is

approximately the same amount of content as you would receive from a single face-to-face lecture plus readings, so you should aim to complete ~3 Lessons per week. Click on 'Learning Modules' on the Home Page to access the Course Notes.

2. **Read/Study the assigned textbook readings**, including figures, tables and captions. These are listed at the start of each Lesson.
3. **View/Study the required outside readings, videos and movies**. These are accessible from within the Lessons and are normally accompanied by **reading guides**. Observe the difference between *Required* and *Optional* resources.
4. **Post questions and respond to questions on the Discussion Boards**. Access the Discussion Boards from the 'Course Tools' menu on the left - this is a great place to actively engage your instructors, TAs and fellow students.
5. Write the **Practice Quiz**. This test is **not** graded and is intended to help you get a sense of the types of questions to expect in the Graded Quizzes, as well as the format of the online quizzes. Click on 'Assessments and Quizzes' on the left hand navigation screen.
6. **Write Graded Quizzes**. There will be four (4) 30-minute Quizzes covering all the modules. These are scheduled about every few weeks and are available for 48 hours. More information on the Quizzes can be found in the Quiz FAQs under 'Help' on the Course Content Page.

### *Notes and Guidelines:*

1. Spend at least 10 hours/week in class. Class hours include the activities listed above and studying your own course notes. In most Distance Education courses, the most successful students were those who were in class often and regularly. We're all aware how our brains can easily be saturated! To avoid brain-fatigue, spread out the minimum 10 hours/week over 2-3 days. Students who study only a day or a few hours prior to a Quiz usually do not retain much information and do quite poorly.
2. While all the lessons are roughly the same length, some are a bit longer and some are a bit shorter. If you find yourself 'zipping through' a lesson, capitalize on the situation and move onto the next one instead of leaving it for later. For example, Lessons 2 through 4 are a bit on the shorter side, while 5 and 6 are a bit on the longer side.
3. If you study/learn better with a highlighter and by writing your own notes, then you could print or download the Course Notes.
4. Communicate with other members of the class often and regularly. This includes the Course Instructor, the Teaching Assistants, your classmates, and the OLT Help Desk. Use the Discussion Board, internal email, external email, and in-person consultation. More information on how to get help can be found in the Course FAQs under 'Help' on the Home Page.
5. Form study groups for Quizzes and the Final Exam. A 'Study Groups' Discussion topic has been setup for this.
6. If you miss a Quiz or the Final Exam, you get a **zero**. So, know and follow the Quiz and Final Exam schedule!
7. If you have to miss a Graded Quiz:
  - Inform the Course Instructor(s) **well in advance**, ideally within the first week of class.
  - Only those absences for short-term illness, emotional difficulties, family emergencies, or specially approved UBC activities will be tolerated (as defined by UBC policy).
  - Travel or work schedules are not accepted as valid excuses for missing a Quiz because Connect is accessible from anywhere in the world with access to the Internet. Remember that you are expected to have reliable access to the internet as a requirement for this course. Quiz dates are published at the beginning of the term and you are expected to integrate your class schedule with any trips (personal or business) or work schedules.
  - Computer problems, Internet access issues, lost passwords, etc. are not acceptable as valid excuses for missing a Quiz. You are expected to resolve these issues within the period that

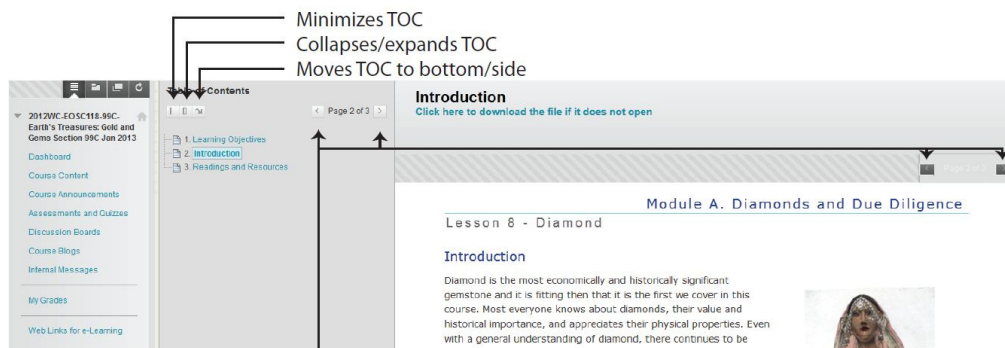
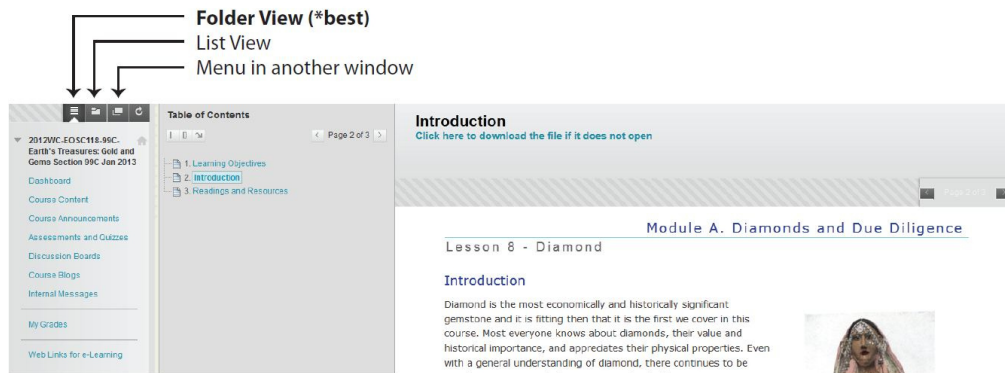
Quizzes are available. This does not apply, however, if Internet access issues are related to a UBC-wide outage. Note that even if you are using UBC WiFi, it cuts out more often than you might expect. Wired connections are recommended for quizzes.

- Medical and emotional reasons for missing a Quiz will require a note from your doctor, counsellor, or other health practitioner.
  - A make-up Quiz will **only** be considered upon submission of appropriate and verifiable documentation explaining your absence.
  - Absolutely **no** make-up Quizzes will be administered to students who fail to contact and make arrangements within **one week** after the regularly scheduled Quiz. Extenuating circumstances that prevent students from contacting the Instructor must be documented.
7. There is **no extra make-up work**, so please maintain strong study activities during the term to help maximize the grade you earn. Keep up with the readings of the Online Course Notes, textbook, articles, and videos.

### Connect Navigation Tips

The figure below details some helpful buttons within the Connect environment. It might be useful to right-click on the image and "open the image in a new tab" or "view image" for full resolution.

Example Navigation Panes in Connect (from Lesson 8.2)



### How to View your Completed Quiz

1. Go To My Grades
2. Click on score for quiz to view attempt
3. Click on score in attempt to view submission

**My Grades**

Item Name	Alignments	Due Date	Last Student Activity	Factor	Grade
Weighted Total					-
Total					10.75/20
Practice Quiz	<a href="#">Alignments</a>				-5
Quiz 1	<a href="#">Alignments</a>	Jan 26, 2013	Jan 25, 2013 9:57 PM	Jan 25, 2013 9:57 PM	10.75/20
Quiz 2	<a href="#">Alignments</a>	Feb 16, 2013			-20
Quiz 3	<a href="#">Alignments</a>	Mar 2, 2013			-20
Quiz 4	<a href="#">Alignments</a>	Mar 23, 2013			-20

**View Attempts**

**Column Details**

Item Name	Quiz 1
Aggregation	First attempt
Due Date	1/26/13
Points Possible	20

**Attempts**

Date Created	Date Last Submitted or Edited	Calculated Grade
Jan 25, 2013 9:57 PM	Jan 25, 2013 9:57 PM	10.75

[Icon Legend](#)

**Review Test Submission: Quiz 1**

User	Demo User
Course	2012WC-EOSC118-99D-Earths Treasures: Gold and Gems Section 990 Jan 2013
Test	Quiz 1
Started	1/25/13 9:54 PM
Submitted	1/25/13 9:57 PM
Status	Completed
Score	10.75 out of 20 points
Time Elapsed	3 minutes out of 30 minutes.

**Instructions** **Quizzes are Open Books and Open Notes**  
 While writing self-imagined Quizzes, students are reminded to strongly uphold the pr  
 Academic misconduct that is subject to disciplinary measures includes, but is not lim  
 cheating, impersonating a registered student at a Quiz, submitting false records or inf  
 distributing quiz questions and answers is strictly prohibited and to the detriment of a  
 Disciplinary measures are outlined in the section on Student Conduct and Discipline  
 CAUGHT WITH PREVIOUS QUIZZES WILL RESULT IN A SCORE OF ZERO  
**BE SURE TO SAVE YOUR ANSWERS AS YOU GO ALONG IN THE QUIZ AND TO**

**Question 1**

The acronym IGI stands for \_\_\_\_\_

Selected Answer:  a. International Gemological Institute

Correct Answer:  a. International Gemological Institute

**Question 2**

Sedimentary rocks are derived \_\_\_\_\_

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## Lesson 1 - Introduction to EOSC118

### About The Instructors

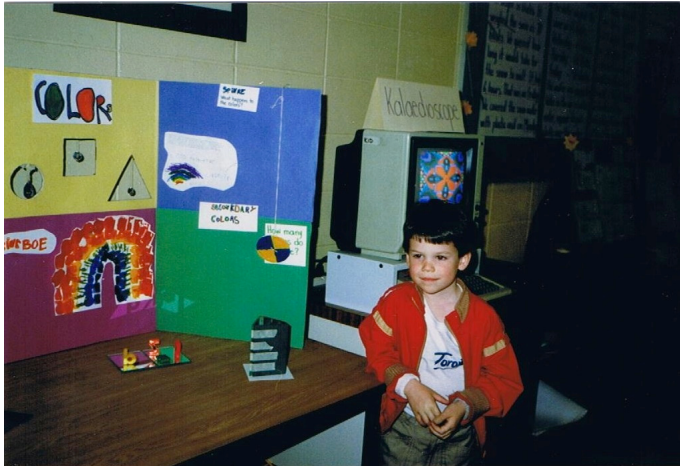
Hello, our names are David Turner and Jan Cempirek and we will be your instructors for EOSC 118, Earth's Treasures: Gold and Gems. Please call us Dave and Jan.

#### David Turner



Hello students of EOSC118! I have been teaching online since 2009 as well as instructing in classroom and laboratory environments at UBC and UVic since 2002. In reality though, I started my teaching life at Silver Star Ski Resort as a children's ski instructor where the thrill of learning took place 'on the slopes' with sliding boards. Now I am fortunate enough to be able to continue that thrill of learning 'on line' with another one of my passions: The Geology and Mineralogy of Gems and Precious Metals!

My geoscience career has followed an exciting and winding path. I have a combined B.Sc. in Earth and Ocean Science and Geography from the University of Victoria and earned my M.Sc. at the University of British Columbia. My research at UBC has been focused on the *very specific* geological settings of gemstone deposits and over the past ~10 years I have also been working with the mineral exploration industry on a number of exciting projects. Tools we use in the field and in the lab vary considerably, and it is always fascinating how tiny observations made under a microscope can lead to big implications on the scale of mountain ranges or initiate million-dollar mineral exploration programs. In recent years I have also been working on the application of hyperspectral reflectance spectroscopy to rare earth element ore deposits and minerals... but not long ago my mother dug up this Grade 1 science fair photo from an old album - it turns out that that I've been studying colour in natural materials for a while!



Professionally, however, I have worked from the deserts of Mexico all the way up to the rolling scrubland of Yukon Territory and across to the glaciated arctic shorelines of Greenland and Nunavut. My passion for gemstones, pegmatites, and rare metals (like tungsten, samarium and tantalum) has kept me pretty busy and I've been privileged enough to have been involved in some unique gemstone discoveries in the northern hemisphere. I hope to share some of my enthusiasm for gems and precious metals with you and plant a seed of knowledge in you that grows into your own enthusiasm for the subject!

## Jan Cempirek



Hello, my name is Jan Cempirek and I am your instructor for EOSC 118, Earth's Treasures: Gold and Gems. I am a Sessional Lecturer and Post-Doctoral Fellow in the Department of Earth, Ocean, and

Atmospheric Sciences at UBC.

I completed my MSc. and Ph.D. in Geological Sciences at the Masaryk University, Brno, Czech Republic, which is traditionally specialized on pegmatite and rare-elements deposits. For more than 10 years I also worked as a curator-researcher of a mineral, meteorite and gemstone collections of the second biggest museum in the country. My main interests are pegmatite deposits, gemstones, deposits of rare elements (e.g. lithium, beryllium, tantalum, and cesium), and boron minerals (tourmaline, dumortierite, grandidierite, etc.).

During my studies and career, I visited pegmatite, gemstone and metal deposits in many European countries (Norway, Sweden, Finland, Italy, Portugal, Spain, Germany, Austria, Slovakia, Poland, Hungary, etc.), in USA (several pegmatite fields in Maine and southern California), Canada (eastern Ontario, Manitoba, Yukon, British Columbia) and Brazil (Minas Gerais area & Paraiba gem tourmaline mines).

One of the fascinating things about geology is the diversity of minerals; the same mineral can form in different environments by different processes which define its properties. For example, carbon will crystallize as diamond if subjected to high pressure of Earth's deep interior; the same carbon will form graphite in conditions closer to the Earth's surface. In this case, the pressure determines whether the mineral is useful in a diamond ring, or in a pencil.

I am very excited to share my knowledge about gemstones and precious metals with you, and I hope you enjoy learning about them in this this course.

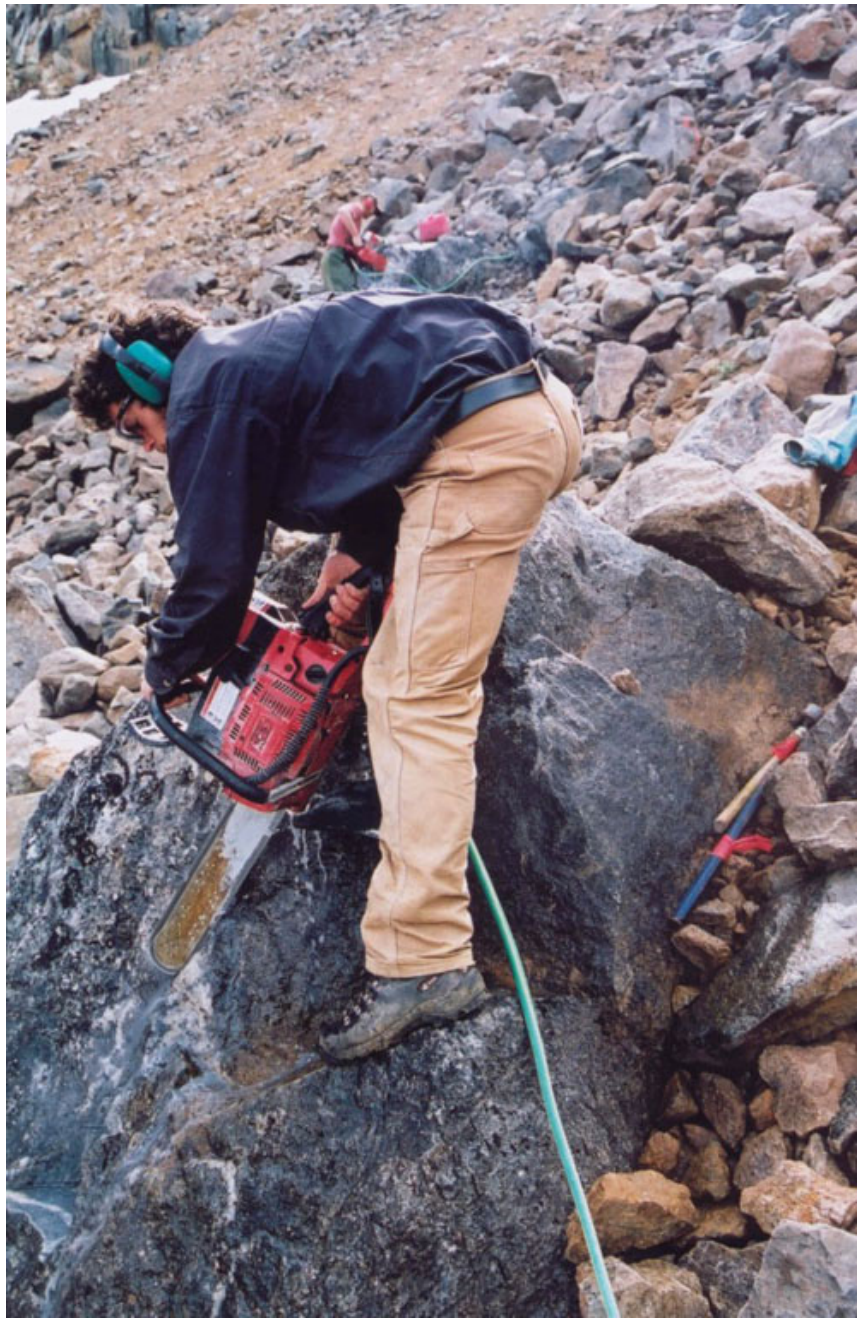
**We welcome you to class and look forward to a very productive semester!**

Cheers,

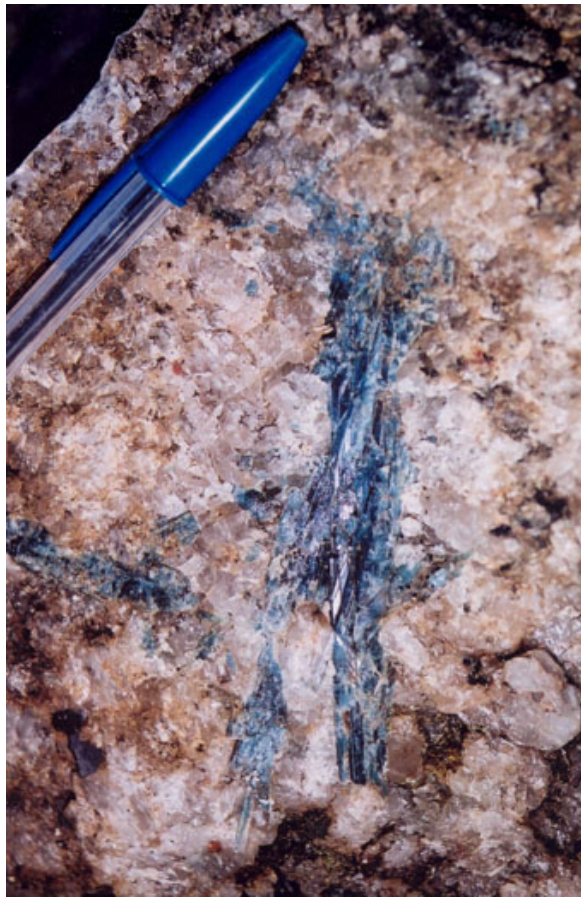
Dave & Jan

dturner@eos.ubc.ca & jcempirek@eos.ubc.ca

Here are a few pictures of field work from Yukon Territory, British Columbia and Greenland. Enjoy!



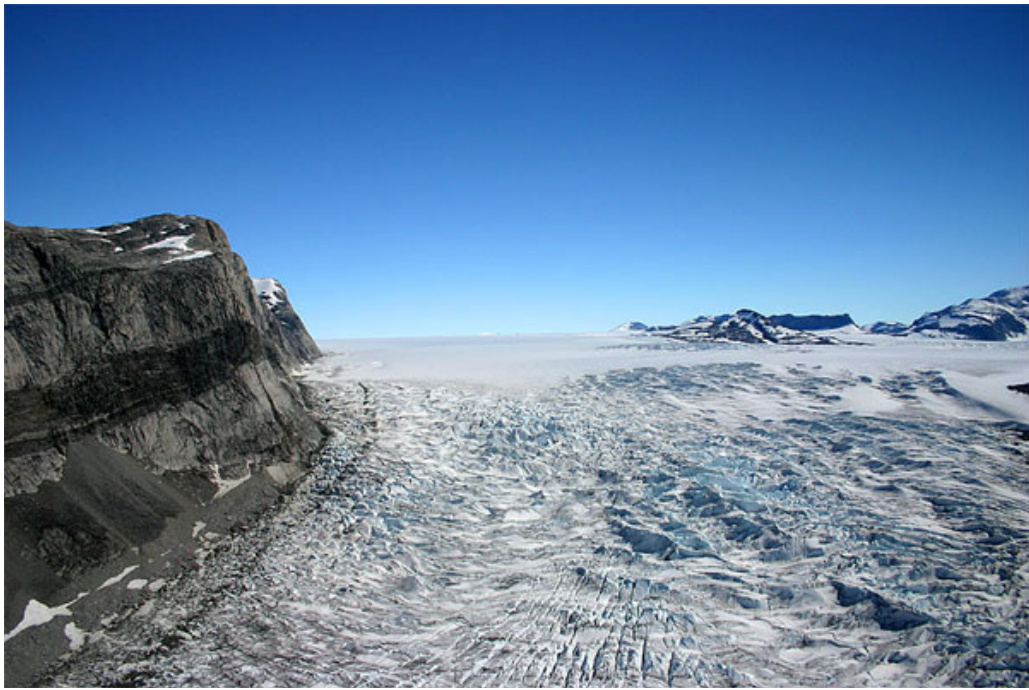
Extracting aquamarine from syenite host rock using chain saws studded with micro diamonds(!). True Blue Occurrence, Yukon Territory.



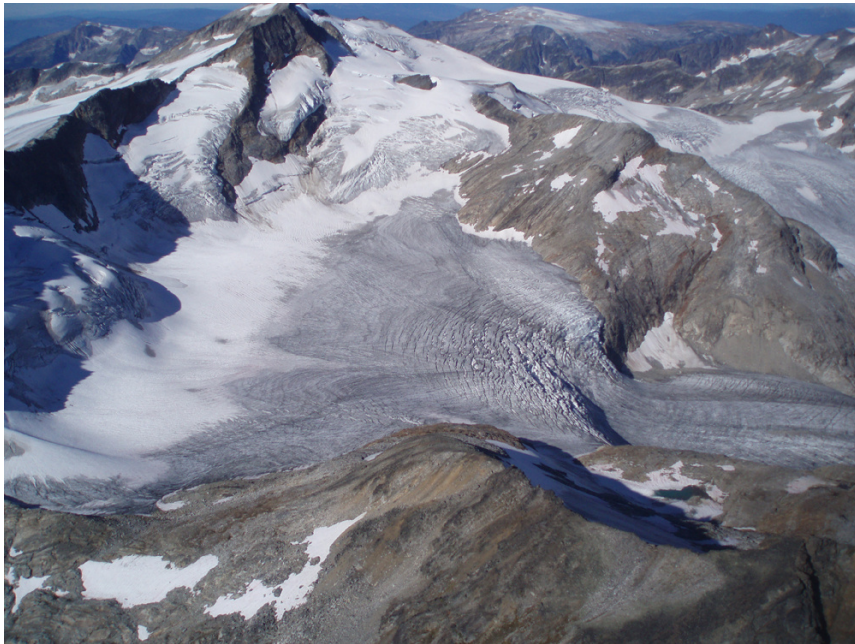
Dark blue aquamarine crystals from the True Blue Occurrence, Yukon Territory.



Faceted (cut) dark blue aquamarine gem from the True Blue Occurrence, Yukon Territory.



Greenland ice sheet and ruby-bearing rocks!



Flowing Glacier as seen from a helicopter near Revelstoke, BC.



Jan's favorite breathless-geologist-next-to-big-spodumene-crystal photo!



Ruby bearing marble lens near Revelstoke, BC.

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## CHECK YOUR UNDERSTANDING

### Module A. Rocks, Minerals and Gems

#### Lesson 1 - Introduction to EOSC118

#### Learning Objectives

- None

## Check Your Understanding

### Lesson 1 Check Your Understanding (CYU) Form

This is an example of a Check Your Understanding (CYU) question set that you'll see throughout the course. Some will simply be questions or statements while others, like this one, will be "Forms" where students can have immediate passive feedback. They are not mandatory to fill out but they do give us a sense of how material was understood, however, please remember that the way to get active feedback is through the Discussion Boards. As a test, please let us know if you are clear about the course objectives, the course syllabus and how the online quizzes will be delivered.

**Do you understand the Course Objectives?**

- Yes
- No

**Do you understand the Course Syllabus**

- Yes
- No

**Do you understand that quizzes will be (1) delivered online, (2) on specific dates, (3) in a restricted time period and (4) have a time limit once started?**

- Yes
- No

**If you selected "NO" for any of the above, could you please expand on what needs to be clarified?**

Submit

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