



## **Earth Materials – GEOL 2105 & 3105**

**Spring Semester 2022**

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**Lecture:** T and R 1:15-2:30PM; note, we will occasionally use a flipped format with online content.

**Lab meeting time:** either T or R 2:50-5:40 in room 218

**Credits:** 4

**Pre/co-requisites:** Prerequisite: GEOL1400 or GEOL1600 or GEOL 1025.

**Catamount Core:** N2, SU.

**Book:** Earth Materials: Introduction to Mineralogy and Petrology, Cornelius Klein and Anthony Philpotts, Cambridge University Press

### **Welcome to Earth Materials!**

Human history is closely coupled to Earth materials. For example early cultural evolution is classified based on Earth Materials (Stone Age, Bronze Age, Iron Age) and we would not have buildings, toothpaste or I-phones without minerals and assemblages of minerals (rocks). The exploration and use of Earth Materials, especially since the industrial revolution, confronts us with important issues of social, environmental and economic justice and sustainability that we need to investigate. But Earth materials go much further back in time than the ~ 2 million years of human history: they can tell us about Earth processes over the last billion years and provide us with a window into the fascination history of our universe.

Whether we want to explore the Earth's history of sea-level change, rise and fall of mountain ranges, or the occurrence of gold, we need to be able to identify minerals and rocks and place them into the local and regional context. In this course we will therefore introduce basic concepts of mineralogy (chemistry, structure and properties of minerals) and petrology (composition, structure, origin and distribution of rocks) in lab and lecture.

### **Course Goals:**

**This course is a key course for all Geology and Environmental Geology trajectories. The associated course goals are:**

- identify samples of the common rock-forming minerals in hand samples and thin sections of common rocks.
- synthesize mineralogical data (visual inspection, petrographic microscopy) to make inferences on the setting producing selected rocks.

**This course is also a Sustainability course (SU). The associated course goals are:**

- able to have an informed conversation about the multiple dimensions of sustainability.
- able to evaluate sustainability related to Earth Materials to integrate economic, ecological, and social aspects.
- able to think critically about sustainability across a values and scales from local to global.
- able to think critically about how you impact (and are impacted by) the sustainable use of Earth Materials.

**This course also includes writing for various audiences. The associated course goal is:**

- Combine writing and visualizations to communicate findings to science and non-science audiences.

### **How a typical week will look like:**

**Lectures:** We will use lecture class meeting times to explore the necessary background across time and spatial scales ranging from molecular scale structures to plate tectonic settings and the history of our solar system to challenges of the Anthropocene. Using group work, discussions and paper presentation, everybody will be engaged during class meeting times.

In some weeks we will use a flipped classroom approach where you will complete pre-meeting reading/videos that will be posted on BlackBoard. You will also submit pre-meeting quizzes that will be due before the class meeting time. This means that on some Tuesdays we will not have in person lecture but we will have open work time and office hours. We will communicate the schedule well in advance.

Most Thursdays will be reserved for working in groups, discussions, or presentations.

After each module (~5 times in the semester), we also will have short in-class quizzes that you will take at the beginning of class meeting time. We will give you a heads up on these quizzes ahead of time and provide a study guide (RoCKS Doc).

**Labs:** You will spend most of the lab meeting times in the petrology lab working with rocks and minerals but one lab meeting time will be dedicated to using Crystal Maker and excel, this lab will be remote.

You will receive training in the skill of identifying minerals and rocks in hand specimen and thin sections. Like any skill, this needs practice and you will have ample time for it. Most students do best when they come back to practice more outside of the lab meeting times. All relevant specimen will be available in room 218 throughout the week. Make it to the labs, it will be hard to make up for missed sessions and more than 2 missed labs result in the failure of the course!

**Transferable Skills:** During this course you will learn the following skills that are helpful outside the scope of this course:

You will train your 3-D visualization

You will learn how to synthesize observations and data into a process interpretation

You will practice comprehensive, concise writing

**Learning assessment:** we will assess your learning in the following principle ways:

- **Pre-meeting quizzes for lecture and lab preparation 10%:** Keeping up with the assigned readings and actively reading and reflecting on the material is important. Come prepared to by having read the assigned material and having completed short pre-meeting quizzes. We will send out reminders ahead of time. Assignments are posted on BlackBoard (bb.uvm.edu) under "Course Materials" and the respective week. Pre-meeting quizzes are due on BlackBoard by 1:00PM each Tuesday. Your first pre-meeting assignment will be a practice run (not graded) and will be due Tuesday 01/18 at 1:00PM.
- **In-class quizzes in Lab and Lecture = 30%:** Quizzes on lecture content will take place several times during the semester. We will announce the timing of the quiz ahead of time and communicate which lecture guide questions in the RoCKS Doc are relevant (appendix C). Note that we will exclude the lowest grade (i.e. you have one free pass) including missed quizzes. You will take quizzes on lab content in the actual lab space in room 218 several times during the semester as well.
- **Writing assignments = 20%:** You will complete two writing assignments for which you will synthesize you knowledge (lecture) and skills (labs) to provide a fact sheet a "mystery mineral" (assignment 1) and a rock (assignment 2). Detailed instructions for the writing assignments will be given well in advance of the deadlines that typically are in week 5 and 10.

- Lab reflections = 10%: The lab meeting times are designed to allow self-directed learning and practice. To keep track of your progress we will ask you to hand in lab reflections that are due before the labs of the following week (i.e. T or R 2:30PM). These will be graded using 3 main categories. Category 1 (100%): you submitted a reflecting responding to each prompt succinctly and thoughtfully. Category 2 (75%): you submitted a reflection but did not respond to most of the prompts (this happens mostly when folks forget the reflection and submit a one-sentence answer for good measure). Category 3 (50%): you do not submit a reflection for this week.
- Sustainability presentation = 10%: In small groups (2-4 people) you will give a 20 minute oral presentation of a topic of your choice on sustainability and justice aspects of Earth Materials. Please see detailed instructions in appendix A.
- Sustainability reflection = 10%: You will compile a reflection on sustainability and /or justice in relation to Earth Materials. You can submit this early (e.g. after we completed the sustainability buffet activity), but most wait until the end of the semester (appendix B).
- Final Group poster = 10%: We will have a mini conference at the end of the semester and you will, in groups of 3-4, present a final poster on selected aspects of Earth materials, justice and sustainability.

| Type of assessment                        | Frequency          | Available  | Due  | Format                                      | Folder                           | Contribution to grade |
|---|--------------------|--|--|---|----------------------------------|-----------------------|
| Pre-meeting quiz and lab preparation quiz | Weekly to biweekly | Thursday of previous week  | Tuesdays 1:00PM                            | Blackboard (BB) quiz                        | Course Materials of current week | 10%                   |
| Lab reflection                            | Weekly             | Same week as lab   | before next lab Tuesday or Thursday 2:30PM | BB quiz, open answer to questions           | Course Materials of current week | 10%                   |
| In-class quiz                             | After each module  | Made available during the first 20 minutes of our class meeting time.            |  | We will hand out quizzes in person in class |                                  | 30%                   |
| Writing assignment                        | Twice              | Typically made available in week 3 and 8   | Typically due in week 5 and 10             | Assignment in BB                            | "Assignments" folder             | 20%                   |
| Sustainability reflection                 | Once               | Available after week 3-4   | By end of semester                         | Assignment in BB                            | "Assignments" folder             | 10%                   |
| Sustainability presentation               | Once               | PPT presentation by student groups during class meeting times (to be scheduled). |  |   |                                  | 10%                   |
| Poster                                    | Once               | Group poster presentation during a mini conference in last week of classes       |  |   |                                  | 10%                   |

### Rules:

- Make it to class: you can miss class twice, more missed classes will impact you grade. If you miss classes more than 6 times you may fail the class.
- If you miss more than 2 labs you will fail the course.
- Please turn in your assignments in time; I will decrease your grade by 10% per late day.
- Please complete your reading, we will have graded quizzes in lab and lecture.
- Please mute cell phones during class and don't text.
- Adhere to the **Code of Academic Integrity** (no plagiarism, fabrication, collusion, and cheating). Deliberate offense against the code will be forwarded to the Center for Student Ethics and

Standards (see <http://www.uvm.edu/~uvmppg/ppg/student/acadintegrity.pdf> for more information).

**Teaching and Learning Style:**

It's always helpful to know about your own learning style and know what you can do to support your own learning. Please take the "Index of Learning Styles Questionnaire" following this link:

<http://www.engr.ncsu.edu/learningstyles/ilsweb.html>

The results are for yourself only, but this very simple test will help you to better understand your learning (and probably my teaching).

**Student learning accommodations:**

Students who wish to be considered for a reasonable accommodation for a disability must contact the SAS office at 802-656-7753 or email [access@uvm.edu](mailto:access@uvm.edu) to set an appointment.

**Preliminary schedule (subject to changes, for deliverables and quizzes please always check the updated schedule on BB):**

**Week 1:**

Introduction to Earth Materials (reading Chapter 1)  
(No lab)

**Week 2:**

Introduction to Earth Materials (reading Chapter 2)  
Lab: Mineral identification (reading Chapter 4)

**Week 3:**

Crystal chemistry (reading Chapter 4)  
Lab: Minerals in rocks

**Week 4:**

Crystal structures (reading Chapter 4)  
Lab: Mineral ID quiz (note, check schedule updates on BB)

**Week 5:**

Igneous rocks (Chapter 8)  
Lab: Crystal maker – ONLINE lab  
*Writing assignment 1 due (check schedule updates on BB).*

**Week 6:**

Igneous rocks (Chapter 8)  
Lab: optics, igneous rocks and minerals under the microscope (Chapter 6)

**Week 7+8:**

Occurrence, classification and setting for igneous rocks (Chapter 9)  
Lab: optics, igneous rocks and minerals under the microscope (Chapter 6)

**Week 9:**

Formation of Sedimentary rocks (Chapter 11)  
Lab: thin section quiz (note, check schedule updates on BB)

**Week 10:**

Formation of Sedimentary rocks (Chapter 11, 12)  
Lab: sedimentary rocks  
*Writing assignment 2 due (check schedule updates on BB).*

**Week 11:**

Metamorphic rocks (Chapter 14)

Lab: metamorphic rocks under the microscope

**Week 12:**

Metamorphic rocks (Chapter 14)

Lab: metamorphic rocks under the microscope

**Week 13:**

Metamorphic rocks and minerals (Chapter 14)

Lab: quiz metamorphic rocks and thin sections (check BB schedule for updates)

**Week 14:**

Finishing up

No lab.

*Sustainability reflection due*

## DELIVERY

- 1) **BlackBoard:** The class website is housed on Blackboard, the University's online course utility. You can log into Blackboard at: <http://bb.uvm.edu>. Use your UVM NetID and password to log in; if you have registered for the course you should see this class as one of your options. Click on the course name to enter. The instructors and teaching assistants will use Blackboard to organize everything related to class, including updates to the course schedule, course announcements, reading assignments, and homework assignments. **Blackboard will be updated frequently;** you should plan to log in at least once for every day we have class.

## WHAT'S OK AND WHAT'S NOT OK

**ACADEMIC HONESTY AND PLAGIARISM** – Academic honesty is expected of all students. The University of Vermont has a very strict policy concerning academic honesty and plagiarism. Please see the statement on academic honesty <http://www.uvm.edu/~uvmppg/ppg/student/acadintegrity.pdf>. Plagiarism constitutes a violation of Academic Honesty and warrants failure on an assignment and/or failure in the course. The consequences of plagiarism or cheating range from a score of zero on the assignment or exam, to failing the class with an XF and filing a complaint with the University's Coordinator for Academic Honesty which can result in expulsion from UVM.

**What's OK:** its ok and even expected that you work together and help each other with work in lecture and labs. For individual assignments it is OK to ask a friend, tutor or group member to help you, however, you have to compile your own work based on this understanding.

**What's not OK:** Delivering any work without having understood the work brings you into a potential danger zone: it is not ok to simply copy an answer for reflections, writing assignments or quizzes. Plagiarism includes copying part or all of a fellow student's report, copying from original references, texts, or websites etc. You are not allowed to use another person's knowledge during in-class quizzes (lab and lecture).

**RESPECT** – It is of utmost importance to maintain a respectful environment in class and this includes online environments. We expect this from all of you as you should expect this from us. You are here to learn and we are here to help you learn with mutual respect.

**What's OK:** its OK to arrive late if you have any unforeseeable events. Its OK to miss class for any reason that is out of your control (e.g. sickness) BUT we expect you to make up for it. This means complete all assigned reading, watching and contact your group for additional materials, spend some time with this BEFORE you contact us with questions.

Its OK to disagree with each other and ask for clarification. Its OK to feel frustrated when things don't go well.

**What's not OK:** It is not OK to disrupt class. It is not OK to expect a private tutoring session from us if you missed class for any reason. Before you contact us or come to office hours you should complete all assigned reading, watching, check in with your group as appropriate and spend some time thinking about

the materials. We will be happy to address any remaining issues. It is not OK to blame, shame or insult anybody e.g. when you disagree. It is not OK to work out your frustration on others.

**COPYRIGHT ON TEACHING AND CURRICULA MATERIALS** – It is the University's policy that teaching and curricular materials (including but not limited to classroom lectures, class notes, exams, handouts, and presentations) are the property of the instructor.

**What's OK:** you can and will use all class materials for your own learning.

**What's not OK:** electronic recording and/or transmission of classes or class notes is prohibited without the express written permission of the instructor. Such permission is to be considered unique to the needs of an individual student (e.g. ADA compliance), and not a license for permanent retention or electronic dissemination to others. For more information, please see the UVM policy on Intellectual Property, sections 2.1.3 and 2.4.1. In short, do not share any class materials.

**EMAIL** – email is an important way of communicating, at the same time it is not uncommon for faculty members to receive more than a 100 emails per day and emails can get lost. Because of this, your primary point of contact will be the TA, they will check in with me regularly and forward emails as necessary. Please always add GEOL110 into the subject line when you contact your TA.

**What's OK:** please contact your TA with any questions on the lecture or lab part that you cannot solve by yourself. The TA and I will check in on these requests and one of us will answer you within a few business days. If you want an appropriate answer to your particular question it is important to be precise in your wording. Also, please note that we will not be able to answer emails during afterhours or weekends.

**What's not OK:** please do not contact us with questions you could have googled or ask content questions before you completed the assigned reading/watching. Please don't count on last minute help during afterhours when an assignment is due, you might not get an answer in time. Please use a respectful tone when writing us. For us it is OK to be addressed by our first name but note that this varies by instructor and you should ask if you are unsure. It is not uncommon that TAs and faculty are addressed with "Yo", "Dude" etc, which is not acceptable.

**RELIGIOUS HOLIDAYS** – We endorse observation of religious holidays!

**What's OK:** by the end of the second full week of classes submit in writing your documented religious holiday schedule for the semester to us. Plan ahead and make you're your group knows if you will miss group work. Students who miss work for the purpose of religious observance will be allowed to make up this work. Please avoid informing us post-hoc (after the fact).

#### **OTHER INFORMATION and POLICIES:**

In keeping with University policy, any student with a documented disability interested in utilizing ADA accommodations should contact Student Accessibility Services (SAS), the office of Disability Services on campus for students. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly recommended to discuss with their faculty the accommodations they plan to use in each course. Faculty who receive Letters of Accommodation with Disability Related Flexible accommodations will need to fill out the Disability Related Flexibility Agreement. Any questions from faculty or students on the agreement should be directed to the SAS specialist who is indicated on the letter.

#### **Contact SAS:**

A170 Living/Learning Center;  
802-656-7753  
access@uvm.edu  
[www.uvm.edu/access](http://www.uvm.edu/access)

**A credit hour is now formally defined**, for Title IV aid purposes, as an amount of work that reasonably approximates not less than: (a) one hour of classroom or direct faculty instruction and a minimum of two hours of out of class student work each week for approximately fifteen weeks for a semester or (b) at least an equivalent amount of work as required in (a) for other academic activities such as laboratory work, internships, practica, studio work, or other academic work leading to the award of credit hours. This means for the GEOL110 lecture part (worth 3 credits) you should expect to **work up to 9 hours** each week (this includes the synchronous meeting times).

### **COVID 19 Policy section**

#### **General statement regarding potential changes during the semester:**

<http://catalogue.uvm.edu/>

The University of Vermont reserves the right to make changes in the course offerings, mode of delivery, degree requirements, charges, regulations, and procedures contained herein as educational, financial, and health, safety, and welfare considerations require, or as necessary to be compliant with governmental, accreditation, or public health directives.

**The Green and Gold Promise** clearly articulates the expectations that UVM has for students, faculty, and staff to remain compliant with all COVID-19 recommendations from the federal CDC, the State of Vermont, and the City of Burlington. We ask that you follow UVM's guidelines. The Code of Student Conduct outlines policies related to violations of the Green and Gold Promise. Sanctions for violations include fines, educational sanctions, parent notification, probation, and suspension.

**Attendance and illness/isolation/quarantine:** Some of you may need to isolate or quarantine this semester, in this case Student Health Services will inform the Dean's office and we will confirm with them. Please contact us to discuss how to make up for missed work. Especially if you are asymptomatic you should plan on continuing academic work.

#### **Code of Student Conduct:**

<http://www.uvm.edu/policies/student/studentcode.pdf>

#### **FERPA Rights Disclosure:**

The purpose of this policy is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.

<http://catalogue.uvm.edu/undergraduate/academicinfo/ferparightsdisclosure/>

#### **Promoting Health & Safety:**

The University of Vermont's number one priority is to support a healthy and safe community:

Center for Health and Wellbeing:

<https://www.uvm.edu/health>

Counseling & Psychiatry Services (CAPS)

Phone: (802) 656-3340

C.A.R.E. If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380). If you would like to remain anonymous, you can report your concerns online by visiting the Dean of Students website at <https://www.uvm.edu/studentaffairs>

#### **Alcohol and Cannabis Statement:**

The Division of Student Affairs has offered the following statement on alcohol and cannabis use that faculty may choose to include, or modify for inclusion, in their syllabus or Blackboard site:

Statement on Alcohol and Cannabis in the Academic Environment

As a faculty member, I want you to get the most you can out of this course. You play a crucial role in your education and in your readiness to learn and fully engage with the course material. It is important to note that alcohol and cannabis have no place in an academic environment. They can seriously impair your ability to learn and retain information not only in the moment you may be using, but up to 48 hours or more afterwards. In addition, alcohol and cannabis can:

- Cause issues with attention, memory and concentration
- Negatively impact the quality of how information is processed and ultimately stored
- Affect sleep patterns, which interferes with long-term memory formation

It is my expectation that you will do everything you can to optimize your learning and to fully participate in this course.

### **APPENDIX A Paper presentations nuts and bolts:**

#### **Presenters:**

- The presenters (group of 2 students) upload a research paper or other materials relevant for the course at least 3 days in advance using the “paper upload” in Blackboard.
- Put some thought into the topic selection:
  - Consider the theme: what is interesting to you that also **links Earth materials to human live and sustainability**.
  - Consider the type of paper: primary research articles are sometimes very specialized, review articles can be very dense and content rich. News articles might need some additional science content.

#### Presentation tips:

- The presentation should be about 15 minutes long
- Use power point
- Sign in a few minutes early to practice sharing screen
- Rule of thumb: you'll need ~1 minute/per slide, don't exceed 15 slides
- Give enough background so that class can follow
- Don't overcrowd the slides, especially avoid too much text
- Use plenty of visualizations and avoid data tables (or highlight aspects of a data table)

#### Sustainability:

Make specific reference to sustainability either throughout the presentation or at the end by adding a slide. Include the following in the context of your presentation:

- the multiple dimensions of sustainability and justice including economic, ecological, and social aspects.
- the relation to cultural values and/ or relevance from local to global scales.
- your thoughts on how we impact or are impacted by the sustainable use of Earth materials.

#### Public speaking:

- **If you struggle with anxiety around public speaking please contact me as soon as possible, we can find ways to work with this.**



| Presentation rubric             | Full score   |
|---------------------------------|--|
| <b>Presenter(s)</b>             | <ul style="list-style-type: none"> <li>Connects with the audience throughout the presentation</li> <li>Eloquent, does not read verbatim from slides</li> </ul>   |
| <b>Content</b>                  | <ul style="list-style-type: none"> <li>The introduction prepares the class for the paper content.</li> <li>Content is accurate, information is presented in a logical order</li> <li>Information amount and level of detail is adapted to the course and the allotted time (no nitty gritty)</li> </ul>                              |
| <b>Sustainability</b>           | <ul style="list-style-type: none"> <li>Sustainability aspects are thoughtfully covered</li> <li>→ multiple dimensions, relation to cultural values and/or relevance from local to global scales.</li> <li>Reflection on how we are impacted by (and impact) sustainable/unsustainable use of Earth materials is included.</li> </ul> |
| <b>Flow</b>                     | <ul style="list-style-type: none"> <li>Presentation flows well and logically</li> <li>Transitions are smooth (talk was practiced)</li> <li>Presenter keeps allotted time</li> </ul>  |
| <b>Use of pictures and text</b> | <ul style="list-style-type: none"> <li>Slides are not overcrowded</li> <li>Effective visualizations are used AND explained</li> <li>Amount of text is limited and font is large enough</li> <li>Slides have a pleasing appearance</li> </ul>   |
| <b>Discussion</b>               | <ul style="list-style-type: none"> <li>Presenter(s) invites questions and displays subject knowledge</li> <li>Answers are thoughtful and concise (no rambling on)</li> </ul>   |

- You also should anticipate general questions from the audience and prepare for them. We will not expect you to know everything, but you should be able to define abbreviations, explain main underlying principles and have answers to questions like: why does this matter? Are these concepts important for other areas/systems/countries? Where is the study situated? If it is an older paper, check what the current state of knowledge is.

**If you are not presenting:**

- read at least the abstract of the paper before class
- During the presentation make notes for questions to ask later. The trick for having a good question is to think about it during the presentation, not only at the end.
- Ask a question! Especially if you're nervous about public speaking, make yourself ask one question per month, its good practice!

**APPENDIX B**

**Sustainability reflection**

Halfway through the semester (i.e. spring break) you will hand in your reflection on sustainability on if and how your views on sustainability have changed as a result of taking this course for each of the sustainability learning outcomes (SLOs). We provide some questions for each SLO to consider and integrate in your answers.

**1) Sustainability learning outcome (SLO) 1:** ability to have an informed conversation about the multiple dimensions of sustainability.

- What did you think sustainability was before taking a SU course?
- What sustainability definition from the “sustainability buffet exercise” stuck out to you and why?
- What do you think are the biggest misunderstandings when talking about sustainability?

**2) Sustainability learning outcome (SLO) 2:** ability to evaluate sustainability related to Earth Materials to integrate economic, ecological, and social aspects.

- What are the most important sustainability aspects specifically with respect to Earth Materials?
- What is an example that exemplifies how economic, ecological and social aspect of sustainability might be easy to integrate? What is an example where this integration is difficult?

**3) Sustainability learning outcome (SLO) 3:** ability to think critically about sustainability across cultural values and scales from local to global.

- Concerning Earth Materials, what are examples where sustainability considerations may depend on cultural values?
- In which way are scales (local to regional to global) significant in this context?

**4) Sustainability learning outcome (SLO) 4:** ability to think critically about how you impact (and are impacted by) the sustainable use of Earth Materials.

- What items do you use in everyday life that are not derived from Earth Materials?
- How empowered do you feel to make changes in your personal life to make the use of Earth Materials more sustainable?
- What is the one unsustainable practice you wish people would stop?

| <b>Rubric for sustainability reflection</b> | <b>Excellent (full points)</b>  |
|---|---|
| <b>Depth of Reflection</b>                  | Response demonstrates an in-depth reflection on, and personalization of, concepts of sustainability in general and related to Earth Materials specifically. Viewpoints and interpretations are insightful and well supported. Clear, detailed examples are provided, as applicable. |
| <b>Required Components</b>                  | Response includes thoughtful reflection on all prompts. Each question or part of the assignment is addressed thoroughly.  |
| <b>Structure and writing</b>                | Writing is clear, concise, and well organized with excellent sentence/paragraph construction. Thoughts are expressed in a coherent and logical manner.  |
| <b>Evidence and Practice</b>                | Response shows strong evidence of synthesis of ideas presented and discussed during the course. The implications of these insights for the respondent's thinking about sustainability are thoroughly detailed, as applicable.   |

**APPENDIX C:****Using the “Record of Core Knowledge and Skills (RoCKS) Document” in Geology:**

In Geology we will be expecting you to recall information and skills from any geology course you've already taken and apply it to subsequent courses. To help you we use a knowledge base that will increase with each course: we call it Record of Core Knowledge and Skills Document (or RoCKS Doc).

RoCKS-Doc is a document for each class filled with key knowledge (factual) and skill contents of each of your geology courses. GEOL 110 puts emphasis on synthesizing and applying information rather than compiling it, therefore your RoCKS-Doc will already have content (compiled by students from previous years). Make it your own by amending the content.

**Quiz study guide:** Each section contains a **self-check** that you could/should use as study guide for our lecture quizzes. For example, one of the self-check questions in the RoCKS Doc is “how does the structural formula of silicates reflect their structure (e.g. the silicate class)?”. You will need to combine reading in your book, your class notes and your experience from exercises in class to accurately and comprehensively answer this question. If the materials in the current RoCKS Doc are not sufficient for you, consider amending your RoCKS Doc and share with us at the end of the year. We will include your additions for the RoCKS Doc for next year.