Dynamic Earth & Global Change
implications of living on planet Earth

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Class Meetings
OLRI-187
MWF 10:50 - 11:50 am

Laboratory Meetings
OLRI-187
T: 8:00-11:10 am -OR-
T: 1:20-4:30 pm

GEOL/ENVI-160-02
http://moodle.macalester.edu

Why Study The Earth?
With the rise of the world population, it is becoming increasingly important to understand the consequences of human endeavor on planet Earth. The surface environment is changing at an unprecedented rate. Dams have changed the distribution of water and sediment; soils are degrading or being lost; problems of groundwater depletion and contamination are being compounded by drought; deserts are expanding; sea level is rising; and our mineral resources are in increasingly limited supply. The last year has witnessed several natural events that resulted in significant human suffering (e.g., devastating floods in East Africa and India; volcanic eruptions in Guatemala; earthquakes in Papua New Guinea and Indonesia; hurricanes in Puerto Rico and Bahamas). How do we make sense of these changes? To what degree should we try to geoengineer our way out of these problems?

Essential Questions

• How do we read the clues to Earth's origin and evolution?
• How has Earth shaped the origin and evolution of life?
• How has life shaped the evolution of the Earth?
• What are the implications of living on a dynamic planet?
• What is the proper relationship of humans with planet Earth?
Course Description

The Dynamic Earth and Global Change course provides a framework for understanding recent human-induced global change on an evolving planet. We will examine the origins of mountains, the eruption of volcanoes, and the drifting of continents in the context of the unifying theory of plate tectonics. We will also learn about surface processes, including landscape evolution, river systems, groundwater, desert environments, and coastal processes, all of which have profound effects on the human condition.

Broadly, the goals of the course are three-fold: (1) introduce the materials and natural processes that govern the evolution of the Earth, (2) examine global changes in the context of natural process, and (3) help students develop a lifelong interest in the Earth. The course begins with an overview of the origin of the solar system and other planets. Next, students learn about Earth materials, and how to interpret the significance of important minerals and rocks. Building on an understanding of planetary materials, we examine the composition, structure, the evolution of the Earth’s interior, and the plate tectonic model. The last segment of the course focuses on surface processes, including the hydrologic cycle, the formation of soils, the water cycle, stream processes, shorelines, deserts, and glacial environments. The observational and interpretative skills developed in the course will provide a basis for understanding the natural evolution of the Earth and the effects of human activities on its surface environment.

We will accomplish the course goals using a variety of approaches, including: lecture, readings, laboratory activities, group projects, field trips, exams, and projects. In particular, the course will emphasize active and problem-based learning in which students work in groups to solve problems. This approach requires that students are fully engaged and active participants in their learning. Regular attendance in the classroom, laboratory, and field is essential for successful team performance. The course will also emphasize developing a number of skills, including: critical thinking, scientific thinking, problem posing, data interpretation, map reading, 3D visualization, oral presentation, and writing. A field trip will introduce students to important geological concepts and the geology of Minnesota. Students will be assessed on both individual and team performance.

Course Objectives

Upon completing this course, you will have a new appreciation and understanding of the world that we live on. There are a number of essential concepts around which this course is developed, including: deep time, plate tectonics, earth systems, and earth materials as clues to earth history. These powerful concepts offer new perspectives that only geology
<table>
<thead>
<tr>
<th>Course Learning Goals</th>
<th>Macalester Student Learning Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will be able identify and interpret the significance of common minerals and rocks, and apply these to understanding the history and evolution of the Earth</td>
<td>Demonstrate Intellectual Breadth and Depth</td>
</tr>
<tr>
<td>Students will be familiar with the composition and structure of the Earth, and the methods we use to study the Earth’s interior</td>
<td></td>
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<tr>
<td>Students will be able to interpret surface landforms and features in terms of the important processes that modify the Earth's surface (e.g., rivers, glaciers, oceans)</td>
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<tr>
<td>Students will know the internal and external energy sources of the Earth, and will understand how these interact and drive Earth systems and global change</td>
<td></td>
</tr>
<tr>
<td>Students will understand the many forms of equilibrium and its central role in driving global change and Earth evolution</td>
<td>Demonstrate Intellectual Breadth and Depth</td>
</tr>
<tr>
<td>Students will understand the basis of plate tectonic theory, and be able to apply this theory to understanding present-day phenomena and the evolution of the Earth</td>
<td></td>
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<tr>
<td>Students will be able to use the concepts of relative and absolute time, the significance of ‘deep time’, and the cumulative effects of incremental change in interpreting the Earth</td>
<td></td>
</tr>
<tr>
<td>Students will be able to apply the methods, processes, and principles of Earth science to understanding natural phenomena</td>
<td>Think Critically and Analyze Effectively</td>
</tr>
<tr>
<td>Students will think more critically about the Earth and environment</td>
<td></td>
</tr>
<tr>
<td>Students will be able to describe the characteristics that distinguish the scientific method from other methods of acquiring knowledge about the world</td>
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</tbody>
</table>
What You Can Expect From Your Instructor

- provide learning opportunities that will help you meet course objectives
- provide constructive feedback on your performance
- be open to constructive feedback on the course and instruction
- be open-minded in responding to your ideas
- allow you to wrestle with ideas in order to develop your own understanding
- bring teaching experience and a passion for the Earth into the classroom

The Dynamic Earth and Global Change course also offers insights into two concepts that have broad and enduring value. Everything that we know, and that we think we understand, about the earth depends on evidence. What does this evidence look like? Is all evidence of equal nature and strength? How do we extricate evidence from something as complex as the natural world? In this course, we will also learn quite a bit about the concept of equilibrium. Ultimately, most physical, chemical, and natural process on Earth are driven by this fundamental concept. As such, we will continually relate our understanding and questions back to the concept of equilibrium in an effort to fully comprehend its many forms and implications. The concept of equilibrium is also of special interest to us because it is such an important concept in so many other fields.

Other, more specific course learning outcomes are described in the table below. These not only provide a basis for the evaluation of student learning in the course, but are also designed to support the Macalester College Student Learning Goals.

Teaching Philosophy

My goal is that students will leave my courses more intentional and self-directing about their learning. The AAC&U (2002) Greater Expectations: A New Vision for Learning as a Nation Goes to College report reminds us that in an increasingly complex and interconnected world, students need to be intentional learners who are purposeful and self-directing, empowered through intellectual and practical skills, informed by knowledge and ways of knowing, and responsible for personal actions and civic values. As self-directing learners, students need to develop skills and habits for diagnosing their learning needs, formulating learning goals, identifying resources for learning, selecting and implementing learning strategies, and evaluating learning outcomes (Savin-Baden and Major in Foundations of Problem-Based Learning, 2004).

The past few decades have seen a large body of research that informs our understanding of learning, intellectual development, cognitive theory, and the physiology of the brain. In particular, several books have had a profound influence on my teaching and course design. D. Fink’s book on Significant Learning emphasizes the importance of the educating the “whole student.” Whereas I previously regarded my role as primarily a teacher of science, I now have a much more wholistic view of my role as an educator and this has resulted in careful consideration of what I teach and how it contributes to the development of students. How People Learn: Brain, Mind, Experience and School (Bransford et al., 2000) details the importance of building on prior knowledge, active learning, metacognition, transfer, and learning
How To Take This Course

There are many ways to learn something new. Imagine learning about the ocean using one of the three approaches (wading, snorkeling, or diving) described at right. Learning about the Earth in this course is no different. Of course, the depth to which you are prepared to go likely depends on your reasons for taking this course, other obligations, and other goals in your life. The choice is yours to make. I am here to support you.

Wading

“Waders” are willing to get their feet wet, but prefer to spend most of their time learning from other sources, including books, videos, and the testimonies of others; their knowledge and understanding comes largely from outside experts. This approach to learning is perfectly satisfactory, and can result in a good course grade. However, the danger of this approach is that it can easily lead to a collection of seemingly unconnected and irrelevant facts and concepts. This is surface learning, and the content learned by this approach will likely do little to change your perspective on the world.

Snorkeling

“Snorkelers” prefer experiential learning and are willing to explore new environments, but their observations are “remote” and constrained by their surface perspective; their knowledge and understanding is supplemented by first-hand observations and experiences. This approach will likely result in richer understanding because it combines “book-learning” with first-hand observation and experience. Importantly, this approach usually signals an important shift in the interest and engagement of the learner. However, the constraints of the “surface” approach to learning may limit the impact of the new understanding to the learner.

Scuba Diving

“Divers” also prefer to learn by doing, but they are willing to develop specialized skills that enable them to go deeper and make more direct observations; as a result, divers have a richer base of observations and experiences upon which to draw. This approach is more reflective, emphasizing careful observation, deep questioning, and critical reflection, and favors deeper learning. Learners who adopt this approach challenge their assumptions, seek alternatives, and identify areas for improvement. Learning is more significant, and ways of thinking and understanding often transform the learner.

Course Format

This is your course. Each of you communities. I address these in my courses with a combination of knowledge surveys, problem-based learning, reflective journaling, and collaborative work. I use knowledge surveys to guide student learning and as formative assessment tools. Daily reading reflections provide students an opportunity to self-assess their learning and help me to evaluate their understanding.

The focus of my courses is on mastery. As such, there are many opportunities for revision. Grading in the course is criterion-based, rather than norm-based, to minimize competition among students while they work on collaborative activities. Regular journal activities throughout the semester provide students opportunities to reflect on their learning, how it is working, and how it might be improved. Many of these activities are accomplished using Moodle, a learning management system that not only serves as a dynamic syllabus and schedule throughout the course, but also helps guide student learning and build community.

In general, whenever possible we will try to learn by “doing” rather than by more traditional lecture. Therefore, it is essential that students come to class prepared to learn and “do”. Many of our activities will benefit from collaborative work, and you will be encouraged to work closely with others throughout the semester.

We Don’t Learn From Experience; We Learn From Reflecting on Experience.

John Dewey (1933)

Modified from T. Hangen
brings different experiences, interests, and expertise to the course. My role is to help make the course a meaningful learning experience for each of you. To help us get started, I have outlined some learning goals and ideas for activities, but we can modify these as we go along. As outlined, the content and skill objectives of the course will be accomplished using a variety of formats, including: lecture, readings, laboratory projects, group activities, field trips, exams, and a final project. Recent research on learning indicates that lectures, although widely used in higher education, do not always result in deep learning. Therefore, we will also use several other modes (e.g., problem-based, activities, and writing) of learning. In particular, we will spend considerable time working together collaboratively. A team-based approach to problem solving is not only more effective; it is also more similar to the way that modern scientists actually work.

Approaches to Learning
There is a generous amount of work in this course, but research has shown that the best way to learn is “by doing,” and doing takes time. However, you will remember and understand better what you learn as a result of it. As with the learning in the other disciplines, you will need to learn some terminology and “facts.” Keep in mind though, that the importance of these lies in their value for understanding more complex concepts and theories, and for thinking critically about them. The many activities of this course are designed to encourage this kind deep, high-level understanding, so please allow me to help you make this happen. Below are some of the important course elements.

Knowledge Surveys
To help you learn I have prepared a knowledge survey for this course. This survey consists of 10-15 items from each chapter in the textbook. Other survey items address the projects and skills in the course. Each survey item identifies an important learning objective and describes a desired cognitive processes (Bloom level) needed for mastery. You will complete the knowledge surveys several times throughout the course (beginning, before each exam, and end of course). I will not grade your knowledge survey responses, but I will provide you with information for understanding your learning in the course. You should also review the knowledge survey before reading (to help you identify the learning goals), and after reading (to see if you have met those goals). Similarly, the knowledge survey serves as a study guide before exams. Several questions on each of the exams will come directly from the knowledge survey.

Course Activities & Projects
The activities that we do both during and outside class meetings will help you develop a deeper understanding of important concepts through application to real-world. As a group we will explore two different projects (Trouble in Paradise, and Pine County) that provide opportunities to apply course content to solving real-world problems. The projects are carefully designed to help you meet the content and skill goals for learning in the course. If you work together and ask questions of each other and the instructor, there is no reason for you to not master the important concepts. In other words, these activities provide an opportunity to develop the knowledge and practice the skills you will need for the exams and final project. Throughout the semester, we will also be engage in several problem-solving activities. These multi-week projects give us a chance to apply the concepts learned in the course, to use modern instrumentation, and to become familiar with research and science methods themselves. The final project provides an opportunity to apply all of the knowledge and skills that you
To succeed in this course:

- Check the Moodle page frequently
- Meet assignment deadlines and requirements
- Communicate with me and the learning assistant
- Take responsibility for your learning
- Discover the joy of learning about the Earth

**EduCation is what survives when what has been learned has been forgotten.**

B.F. Skinner

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Paleozoic Sediments of Dunvegan Head, Scotland (Geikie, 1893)

Develop toward understanding a real-world problem. Frequent journal reflections provide opportunities to reflect on your learning, learning goals, strategies for learning, and ways to improve.

**Group Work**

There are numerous group activities in this course, varying in extent from a single day to several weeks. Teamwork requires that all team members be present during class, laboratory activities, field trips, and other out-of-class meetings. The problem-based learning approach also requires that all participants are well-prepared and equal contributors to the learning process. Assessment of your learning in this course is based both on individual (75%) and team (25%) performance. Be an effective collaborator!

**Reading**

Your first encounter with course material should be in the reading. I will make minimal use of lecture in this course to address material that is not well explained in the text, when concepts are particularly complex, or when students indicate the need for additional explanation. If you have questions after reading and reflecting on the text, it is very important that you make any questions that you might have known to your classmates or me. Because we will spend much of our time in the classroom working on projects, presenting, and discussing, it is essential that you do the reading assignments each day before you come to class. If you do not, you will not be prepared to help your team or participate in classroom activities. To help you stay on task with the readings, I will frequently post a reading reflection that covers the reading assignment for that day. The questions will be posted to the course page on Moodle. You answer the questions and submit them electronically using Moodle. Late submissions (after the class meeting) will not receive full credit. You can miss up to two reading reflections without penalty. Your reflection will not be graded, but you will receive credit for each submission that demonstrates significant reflection on the assigned reading.

**Exams**

There will be three exams in the course, and each will cover approximately one-third of the course material. There will not be a comprehensive final exam. The format of the exams will vary, but each will consist of a variety of questions, including terms, diagrams, short answer, and essay.

**Lab Quiz**

There will be one lab quiz on mineral and rock identification. The
quiz is not about memorizing minerals and rocks; you will have access to classification keys during the quiz. The objective of the quiz is to demonstrate your facility for working with the tools and concepts used to classify and interpret minerals and rocks.

**Participation**

As noted above, participation is key to the success of problem-based learning. The success of your team, and your learning in this course depends on each of its members. When each project is submitted, you will assess your own contribution to the project, as well as the contributions of your team members. I will also keep notes of your participation in class (e.g., using clicker responses), out-of-class (reflections, surveys), in lab, field trips, and group activities. The assessment of your participation in the course (10%) will come both from the instructor and from your peers.

**Student Response Systems**

Student Response Systems (SRS’s), or clickers, may be used from time to time in class to promote deeper learning. Clickers are provided by the instructor and will be picked up at the front of the classroom at the beginning of class meetings. Students will receive 85% of the points for participating in clicker questions, and they will receive the full 100% for correct answers.

**Field Trip**

A field trip in the Twin Cities region will introduce students to geologic features in the field and to the geology of the region. This trip will explore the geology of Pine County and will lay the foundation of the Final Project.

Attendance on the field trip is very important.

**Evaluation of Learning**

Your learning in the course will be assessed using a variety of different formative and summative activities and performance tasks, including activities, journals, projects, and exams.

**Grading** in this course is criterion-based. That is, assigned grades reflect student levels of mastery of knowledge, understanding, and skills. Grading rubrics that clearly identify the content and skill dimensions, and the desired levels of mastery, will be used for the major projects and activities, and these will be available to students beforehand. With this method, it is entirely possible for everyone in the class to earn a letter grade of “A.”

All assignments are **due on the assigned date**. Laboratory activities are due at the beginning of the lab meeting the following week. I reserve the right to deduct ten percent of the point value for each unexcused day that an assignment is late.

**Incompletes** are typically granted only under unusual circumstances. If you experience extraordinary circumstances during the semester, please consult with the instructor before semester end.

**Course Etiquette**

It is vital that everyone in the course respect the time, space, values, and ideas of each member of the learning community. Come to class and group meetings **on time; remain in the room for the duration of the meeting; and be prepared, engaged, and respectful.** This also includes silencing/storing cell phones and other electronic devices in the classroom, and refraining from distracting activities during class (e.g.,

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**Letter Grades**

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<thead>
<tr>
<th>Pts</th>
<th>0</th>
<th>60</th>
<th>63</th>
<th>67</th>
<th>70</th>
<th>73</th>
<th>77</th>
<th>80</th>
<th>83</th>
<th>87</th>
<th>91</th>
<th>94</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NC</td>
<td>D-</td>
<td>D</td>
<td>D+</td>
<td>C-</td>
<td>C</td>
<td>C+</td>
<td>B-</td>
<td>B</td>
<td>B+</td>
<td>A-</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

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**Evaluation of Learning**

Final course grades will be assigned on the following percentage basis:

- Lab Activities: 25
- Reading Reflections: 10
- Participation: 10
- Projects: 25
- Lab Quiz: 5
- Mid-Term Exams: 25

**TOTAL: 100%**

**What Letter Grades Mean**

- **A** = outstanding achievement
- **B** = achievement that is above required, but not yet outstanding
- **C** = course requirements met in every respect
- **D** = worthy of credit, but not yet meeting course requirements
- **NC** = level of achievement not yet worthy of credit
When communicating with me, I prefer face-to-face conversation, especially when important decisions or complicated topics need to be discussed. My online Google calendar is typically up-to-date, so you can check it to find out if I am likely to be available for a meeting. Always feel free to stop by my office – the door is always open (and the chocolate jar is usually full!). All of us are busy, and face-to-face conversation may not always be possible, so please feel free to contact me by phone or email. Last-minute e-mails, texts, and chat messages are not generally acceptable forms of communication when dialogue is appropriate and needed (e.g., late-night requests to re-schedule taking an exam).

You may use a laptop to take notes during class. Indeed, there will be many times when your laptops will be useful while working on projects. However, in-class laptops also present temptations that many students find irresistible. Recent research demonstrates that the use of laptops in class reduces learning up to 20 percent, even for those near an open laptop in the classroom. Please respect others in the class by not offering this distraction. You should not use a laptop during class in any way that will distract you, your classmates, or me from reaching our learning goals.

### Writing
- outline - use a structure when you write
- first be creative, then be critical – write to develop and clarify your thinking
- strive for clarity – use first definitions, use fewer and shorter words
- start with a strong thesis or argument
- present evidence in support of your thesis
- discuss the strength of the evidence, and supporting arguments
- conclude with a concise summary of the question, findings, and implications
- revise – elaborate, cut, and re-organize; find an editor
- check spelling and grammar

### Making Notes
- focus on “making” rather than “taking” notes (re-write them afterward in your own words)
- make notes from readings before class (identify questions)
- notes from lecture should reflect new insights gained from combined reading and lecture
- rewrite notes after class to identify new insights and remaining questions
- summarize (paraphrased notes, make outlines, flowcharts, or diagrams)
- concept maps are a graphical way of illustrating the relationships between important ideas

### Exam Preparation
- begin preparing for exams early
- review knowledge survey (it identifies learning objectives for the course)
- compare knowledge survey with reading, lecture, and course notes (whenever all of these activities have addressed a concept or skill, it probably is very central to the course)
- review key terms, formulas, and concepts
- check for understanding (internal consistency, connections and implications)
- formulate questions that you think might be asked (answer them; ask them of others)
- sleep well (research shows that the brain “solidifies” neural pathways during sleep)

### Critical Thinking

**Elements of Thought**
- **PURPOSE** - all reasoning has a purpose
- **QUESTION** - all reasoning is an attempt to figure something out
- **ASSUMPTIONS** - all reasoning is based on assumptions
- **POINT OF VIEW** - all reasoning is done from some point of view
- **EVIDENCE** - all reasoning is based on data, information, and evidence
- **CONCEPTS** - all reasoning is expressed through, and shaped by, concepts
- **INTERPRETATIONS** - all reason contains inferences or interpretations
- **IMPLICATIONS** - all reasoning has implications and consequences

**Universal Standards of Thinking**
- **CLARITY** – could it be elaborated further?
- **ACCURACY** – can we be sure it is true?
- **PRECISION** – is there sufficient detail?
- **RELEVANCE** – is it related to the issue?
- **DEPTH** – does it address the complexities of the question?
- **BREADTH** – does it consider other views or interpretations of the question?
- **LOGIC** – does it make sense?
- **FAIRNESS** – is it without distortion of information or perspective?

Modified from the Critical Thinking Foundation

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Modified from the Critical Thinking Foundation
Academic Integrity
The focus of this course is on helping you to learn how to think and learn. I cannot help you learn if the work you submit is not your own. Furthermore, presenting the work of others without proper attribution is a very serious offense. Macalester “students are expected to maintain the highest standards of honesty in their college work. Forgery, cheating and plagiarism are serious offenses and students found guilty of any form of academic dishonesty are subject to disciplinary action” (consult the Academic Integrity at Macalester College website for policies .../academicprograms/integrity.html).

Strategies for Learning
As a student in a course, you are at the center of the learning process. My role is to design opportunities that promote learning, and to provide guidance when necessary. Ultimately, it is your responsibility to set learning goals, plan your work, implement strategies for learning, and assess your progress toward your goals for learning. The reflective journal assignments in this course provide you opportunities to be more intentional in your thinking about the learning process. Some tips for reading, writing, critical thinking, note-taking, and exam preparation can be found in the panels in this syllabus.

Resources and Support
I am committed to providing assistance to help you be successful in this course. If you encounter challenges in the course, whether they are content or skill related, or logistical in nature, I strongly encourage you to meet with me to discuss how to improve your learning. I maintain a detailed calendar (see my Google Calendar) and welcome unscheduled visits whenever I am not in a class or a meeting. In particular, I encourage you to communicate with me if you anticipate any challenges in this course.

Accommodations for Learning
I am committed to ensuring access to course content for students. Reasonable accommodations are available for students with documented disabilities. Contact the Office of Student Affairs, 651-696-6220 to schedule an appointment and discuss your individual circumstances. It is important to meet early in the semester; this will ensure that your accommodations can be implemented early on. The Assistant Dean of Students, Robin Hart Ruthenbeck, coordinates services for first, second and third year students, as well as seniors new to accommodations. The Associate Dean of Students, Lisa Landreman, coordinates services for seniors.

Support from the MAX Center
The Macalester Academic Excellence (MAX) Center (x6121; Kagin Commons) is here to help you do your best at Macalester in meeting your own goals and highest standards. Through academic enrichment and support services, ranging from workshops to individual assistance, the MAX Center can help you excel in your academics. Professional counselors and peer tutors in writing, mathematics, science, and study skills provide personal assistance in:
- Writing for any college course,
- Content areas such as calculus, organic chemistry, or cell biology
- Sharpening study and time management skills

General hours are 9:00 A.M. – 4:30 P.M., M-F and 7 P.M. – 10 P.M., S-Th. Peer tutors are usually available in all areas during the evening. The MAX Center also provides testing accommodations. Students must verify the need for accommodations through the Dean of Students Office.
## Course Schedule

A detailed schedule of the course will be maintained on the Moodle course page. Below is a general outline of the topics and activities in the course.

<table>
<thead>
<tr>
<th>Week</th>
<th>Start Date</th>
<th>Topics</th>
<th>Lab Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 Sep</td>
<td>Introduction to course and the dynamic Earth</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9 Sep</td>
<td>Nature of science, plate tectonics, Solar System</td>
<td>Field Trip to St. Anthony Falls</td>
</tr>
<tr>
<td>3</td>
<td>16 Sep</td>
<td>Solar system and Earth materials</td>
<td>Lab I: Dynamic Earth</td>
</tr>
<tr>
<td>4</td>
<td>23 Sep</td>
<td>Igneous rocks, processes, and environments</td>
<td>Lab II: Minerals</td>
</tr>
<tr>
<td>5</td>
<td>30 Sep</td>
<td>Sedimentary rocks, processes, and environments</td>
<td>Lab III: Igneous Rocks</td>
</tr>
<tr>
<td>6</td>
<td>7 Oct</td>
<td>Metamorphic rocks and processes; deformation</td>
<td>Lab IV: Sed &amp; Metamorphic Rx</td>
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<tr>
<td></td>
<td></td>
<td><strong>Mid-Term Exam I (near here)</strong></td>
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<td></td>
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<td><strong>Pine Co Trip (13 Oct)</strong></td>
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<tr>
<td>7</td>
<td>14 Oct</td>
<td>Geologic Time</td>
<td>Lab V: Topographic Maps</td>
</tr>
<tr>
<td>8</td>
<td>21 Oct</td>
<td>Plate Tectonics</td>
<td>Break: Tues is Thurs</td>
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<td><strong>Mid-Semester Break</strong></td>
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<tr>
<td>9</td>
<td>28 Oct</td>
<td>Seafloor and continental margins</td>
<td>Lab VI: Quiz; Folds and Faults</td>
</tr>
<tr>
<td>10</td>
<td>4 Nov</td>
<td>Mountains and Earth’s interior</td>
<td>Lab VII: Geologic Map</td>
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<tr>
<td>11</td>
<td>11 Nov</td>
<td>Weather, deserts, and climate</td>
<td>Lab VIII: Pine County Project</td>
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<tr>
<td></td>
<td></td>
<td><strong>Mid-Term Exam II (near here)</strong></td>
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<tr>
<td>12</td>
<td>18 Nov</td>
<td>Shorelines and glaciers</td>
<td>Lab IX: Pine County Project</td>
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<tr>
<td>13</td>
<td>25 Nov</td>
<td>Weathering and streams</td>
<td>Lab X: Hydro</td>
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<td><strong>Thanksgiving Break</strong></td>
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<td>14</td>
<td>2 Dec</td>
<td>Groundwater and resources</td>
<td>Lab XI: Pine County Project</td>
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<td><strong>Pine Co. Presentations (07 Dec)</strong></td>
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<td>15</td>
<td>9 Dec</td>
<td>Resources</td>
<td>No Lab</td>
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<td><strong>Mid-term Exam III (11 Dec)</strong></td>
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