

Physical Science: Earth

2022-2023

This is a generic course syllabus for general information on the class. Please see your instructor's syllabus for expectations, requirements, formats, and/or procedures that may be unique to your instructor and specific course section.

Last Edited: July 2022

I. Rationale:

Building off of previous exposure to concepts of physical science and Earth systems, students will be taking their first steps into applying scientific thinking and scientific practices to their study of the physical aspects of the created world. Students will study a number of topics in Earth science in detail and will learn essential research skills.

II. Course Aims and Outcomes:

A. This course aims to:

- Be informative and engaging to students at a middle school level
- Lay a solid foundation of topics introduced to leave them prepared for highschool courses
- Equip all students with a deep and meaningful understanding of earth as creation, exploring connections between our faith and scientific study and how we apply those to our life.
- Support and encourage the development of a sense of wonder, curiosity, and awe about the created universe.

B. Specific Learning Outcomes.

The following outcomes are an incomplete draft. They are offered here for general reference, as an overview of the intended outcomes, yet not a final list of course goals.

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

- Scientific Inquiry: Explain what science is and what science is not.
 - Describe the scientific method and apply it to various earth science topics.
 - Outline a few major historical developments in physical earth science.
 - Apply critical thinking skills to draw conclusions from scientific evidence
 - Select and evaluate collected information / data
 - Use scientific reasoning to outline a simple argument, supporting a claim with evidence.
- Science and Technology:
 - Briefly describe the relationship between science and engineering.

- Understand the physical laws underlying simple machines and apply this understanding to creating and using simple machines.
- Forces in Nature (Introduction to physics)
 - Describe Newton's Laws of motion
 - Explain the relationship between physical forces, energy, and motion.
 - Define velocity and acceleration.
 - Intro to pressure, gravity, circular motion, electromagnetism, nuclear energy, waves, sound, light
- Astrophysics
 - Describe the basic physical characteristics of our solar system's planets.
 - Apply an introductory understanding of physics principles to astronomical phenomena such as planetary orbits.
- Earth Systems
 - Describe the various layers of planet Earth and its atmosphere
 - Read and draw maps showing the major tectonic plates and their direction of movement.
- Oceanography
 - Physical
 - Chemical
 - Geological
- Meteorology
 - Connection between major physical forces and experienced weather results
 - The ocean as a major driver of weather on Earth
 - Data collection and interpretation
 - Weather patterns
- Landforms and Natural Disasters
 - Connection between major physical forces and visible landform results
 - Connection between physics of geology and weather events

III. Format and Procedures:

Students are expected to:

- A. **Science notebook:** This is where you will keep a record of everything you do to support and demonstrate your learning. I encourage you to make this notebook as thorough, complete, neat, and organized as possible. You may print or type it. A physical notebook is best! Science journals tend to get a little bit messy, so I encourage you to divide it into sections, one for each lesson, and keep everything from each lesson together in one section. Use it to record:
 - a. facts and interesting things that you find in reading and presentations
 - b. observations from experiments
 - c. vocabulary words

- d. test and quiz scores along with a little note about what the test/quiz tells you about how you're doing (for example, you could celebrate a perfect score, or write down answers you got wrong and correct them)
- e. summaries of class discussions
- f. questions to ask at the next class meeting,
- g. anything else that you think is important!

Every time that you do something for this class, you should write what you did in your notebook. Every week, I will ask that you submit anything you've added to your notebook. Submissions can be pictures, scans, file uploads – anything that shows evidence that you've added new items from the week.

B. Class Discussions:

Expectations to be discussed

C. Presentations:

Expectations to be discussed

D. Experiments:

Expectations to be discussed

E. Quizzes and Tests:

Expectations to be discussed

IV. My Assumptions

I assume that you want to learn about physical and earth science, that you are at least a little curious about the world around you, that you wish to satisfy your curiosity, and that you will therefore complete your assignments without too much difficulty. I acknowledge that you may be bored with some portions of this course, as everyone has their own particular likes and dislikes, and I ask that you think of any boredom you encounter as an opportunity to learn how to get through something that's difficult.

Science is best learned in a hands-on method, and we will do as many projects as possible! The bulk of work in the study of science lies in recording information and observations over a period of time. I want you to experience what it's like to keep a record of your observations, and to that extent, you will be keeping a science notebook to record much of the content of this course. Science advances when scientists share their observations and information with each other, and therefore you will also be expected to participate in discussions with your classmates.

V. Course Requirements:

A. Prerequisites:

- a. Science: Students are expected to have had experience with exploring creation through science in elementary school. No other middle school level science courses, nor specific elementary level topics are required prerequisites.
 - b. Mathematics: A minimum 5th grade level of experience with and understanding of taking measurements, using a clock and calendar, and graphing data are needed. Students without this will likely need additional direction/assistance from their parent when making weather observations.
 - c. Reading: Sections of text will be assigned reading for homework outside of class. We aim to have all texts at a grade level suitable for most middle school students to comfortably read independently. Parents will need to determine if it is best for their student to do this reading independently or if it is best they are read out loud to.
 - d. History: A minimum 5th grade level of experience with and understanding of a timeline and the major periods of world history is expected. Students without this will likely need additional explanation/guidance from their parent during the history of science section.
- B. Class attendance and participation policy:
- a. Regular attendance of live classes is expected as an integral part of being successful in reaching the course goals. If you are ever unable to attend, please:
 - i. Inform your instructor promptly.
 - ii. Ask about any reading or activity that would help keep you current on the course activities.
 - iii. Listen to and actively follow along with the class recording if possible.
 - b. Full participation in live classes
 - i. Have your camera on during all discussions and
 - ii. Mute your microphone when not in use.
 - iii. Be an active, respectful participant in academic conversation.
- C. Course readings:
- a. Required text: For this course we will be making use of **Apologia's Exploring Creation with Physical Science** textbook. We will be using the **1st or 2nd edition**, NOT the most recent 3rd Edition (which has significant changes in content topics and layout). You only need to purchase the textbook (links below) the tests and solutions manual or other supplementary items are not needed.
 - i. ABE Books link [1st Edition](#)
 - ii. ABE Books link: [2nd Edition](#)
 - b. Background readings: Texts from a variety of sources will be regularly shared through Edmodo. Parents should assist students as needed with printing these texts or providing a suitable device with which to read them.
- D. Additional Materials:

- a. Lab materials will need to be put together ahead of each lab that your student is performing. A list of necessary supplies will be shared ahead of time.
- b. We aim to have most lab materials be commonly available household materials, but some will likely need to be purchased. Please review the list of lab materials ahead of time and acquire all needed supplies.

VI. Expectations for Parents

- Set aside a calm, quiet, distraction-free space for your child(ren) to work every day.
- Ensure virtual learning equipment is available and charged.
- Establish routines and expectations and a basic schedule for completing classwork.
- Help students ‘own’ their learning.
- Check Edmodo for communications from teachers and help students print off resources that are provided.
- Stay abreast of teacher feedback in the form of grades or other messages.
- Proctor tests, quizzes, or other assessments as scheduled by the teacher. Parents ensure academic integrity because they are on the “live” side of the screen.
- Communicate with teachers regularly via email or Edmodo regarding any questions or issues that arise.
- If your child is having trouble completing work, email teachers to schedule a time for an online meeting.
- Science is a hands-on activity and students learn best when they do or see something that demonstrates what they are learning. To enhance their learning, we will regularly do lab work related to each topic. In order to best facilitate labs, we ask that you do the following:
 - Provide necessary materials
 - Provide a dedicated space and time
 - Supervise labs as needed

VII. Grading Procedures

- A. Grades will be weighted on the following scale:
 - a. (40%) Participation: Classwork and Discussions
 - b. (40%) Notebook: Lab Reports, Homework Assignments
 - c. (20%) Assessments: Tests, Quizzes, Projects, and Presentations
- B. In-Class assignments - such as discussions and presentations - require students to be prepared on-time for the scheduled class time.

- C. At-Home assignments - such as lab reports and notebook entries - are expected to be submitted no later than two weeks after the listed deadline. Past two weeks the class will have moved on to a new topic.
- D. Exceptions will be made at instructor's discretion, such as in case of emergencies.
- E. **For students seeking high school credit:**
Students should complete all labs individually
Quizzes, tests, and projects will be graded to a more exacting standard and may have additional requirements.

VIII. Academic Integrity

Each student in this course is expected to abide by the Cornell University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student's own work. Explicitly collaborative assignments will be the sole work of the assigned collaborative group, with meaningful contribution made by each team member.

You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. One great way to assess what you know is to teach the idea to a peer! You may also work together on problem sets and give "consulting" help to or receive "consulting" help from your peers. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in any form (e.g. email, Word doc, Box file, Google sheet, or a hard copy). Assignments that have been previously submitted in another course may not be submitted for this course.

Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Code can also be extended to include failure of the course.

During examinations, you must do your own work. Talking or discussion about the examinations are not permitted, nor is sharing test information nor comparing answers or content. Any collaborative behavior on an examination will result in failure of the exam and may lead to failure of the course. Accessing or using non-approved materials, such as unpermitted use of the internet or textbook, during an examination will result in failure of the exam and may lead to failure of the course.

IX. Tentative Course Schedule

Each of the following units will cover approximately 4 weeks of instruction, covering about one topic per week. This is an approximation and the instructor will adjust the schedule as seen fit to

accommodate the individual topics, unique set of students, and student needs. Please see the Edmodo calendar for an updated schedule of topics, assignments, and due dates.

| Unit | Topics | Readings to be discussed | Lab Activity or Presentation |
|--------------------|------------------------|---------------------------------|---------------------------------------|
| | Introduction Week | Syllabus | Notebook Set-up |
| Scientific Inquiry | Brief History | Uploaded File | Weather Station Set-up |
| | Scientific Method | Uploaded File | Experiment 2.3 |
| | Analyzing Experiments | Uploaded File | Experiments 2.1 & 2.2 - uploaded file |
| | Science and Tech | Uploaded File | Simple Machine |
| Physics | Motion | Module 9 | Lab 9.1, pp. 209-10 |
| | Newton's Laws | Module 10 | Newton Car |
| | Intro to forces / Atom | Module 13 pt. 1 | Report on an element |
| | Light | Module 15 pt. 1 | Lab 15.2, pp. 374-5 |
| Astronomy | Sun and energy | Module 16 pt. 1 | Track sunspots |
| | Stars and galaxies | Module 16 pt. 2 | Parallax activity |
| | Gravity and orbits | Module 11 | |
| | Planets | Research | Present on a planet |
| Earth Systems | Earth & Lithosphere | Modules 6 & 7 | |
| | Air | Module 2 part 1 | |
| | Atmosphere, flight | Module 3 | |
| | Energy and life | Uploaded File | |
| Oceanography | Water | Module 4 | |
| | Hydrosphere | Module 5 | |
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| Meteorology | Factors & Measuring | Module 7 | |
| | Weather & Prediction | Module 8 | |
| | Electrical charge | Module 12 part 1 | |
| | Weather maps, Climate | | |
| Topography | Plate tectonics | Module 6 | |
| | Earthquakes & Sound | Module 14 | |
| | Water & Topography | Uploaded Article | |
| | Major Landforms | Uploaded Article | |
| Local Applications | Local topography | Research & Write | |
| | Local water & Atm. | Research & Write | |
| | Local climate | Research & Write | |
| | Presentation | | |