

Seventh Grade Level Science Syllabus

Grace Academy, New Haven, CT

Tutors: Jill and Ben Zwickl. Most lectures will be taught by Jill, though we are both involved in designing the lessons. jill.zwickl@gmail.com (203) 499-9314.
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Course Description

Students will appreciate the beauty of God's creation, the adventure of scientific discovery, and the invention of technology. The course will emphasize learning key ideas in biology, chemistry, physics, and engineering. Critical thinking and scientific problem solving will reinforce students' concurrent study of logic while historical background material will put science in the broader context of world history. Hands-on demonstrations, experiments, and possible field trips will be part of the course.

The course will be divided into five units: an introduction, followed by the four main branches of science: physics, chemistry, biology, and earth science. The introductory unit will give a quick overview of the scope of science, and its basic methods. These methods will be emphasized throughout the course. The latter four units will focus on a particular idea in each field. These ideas are important not only for their value in understanding science, but also for their relevance to society. We want students to appreciate science for its intrinsic value as knowledge of God's creation, and also for its value as a tool for critical thinking, problem solving, and helping others.

Introduction to Science and its Methods What is science? Why do it? Who does it? Summary of the different scientific disciplines. Science, technology, and engineering. Terminology, observation, and record keeping. Math as a language for science. Units and Measurement. Statistics. Designing Experiments.

Energy (Physics) From ancient astronomy to the scientific revolution. Newton's laws. Force and work. Simple machines. Potential and kinetic energy. Conservation of energy. Sun as energy source for life. Sun as energy source for weather. Heat and engines. Energy from fossil fuels. Energy in the human body. Transformations of energy.

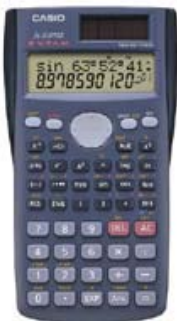
Atoms (Chemistry) Simple properties of materials. Atoms as building blocks. Density. Metals and non-metals. Molecules and their physical and chemical properties. Phase changes. Elements, compounds, and mixtures. Periodic Table and its history. Visualizing molecular structure.

Cells and Skeletons (Biology) Scale of living things. Single and multi celled organisms. Cell structure and function. Cells, tissues, organs, and systems. Skeletal system. Joints muscles and simple machines. Respiratory and circulatory system. Human digestive system. Chemical and physical breakdown of food. Nutrition and food science.

Water (Earth Science) Its essential for life. Physical and chemical properties. Fresh and salt water. Surface and ground water. Water cycle and weather. Water and geology. Water and civilization. Drinking water and sewage. Water as an energy source. Water as a natural resource.

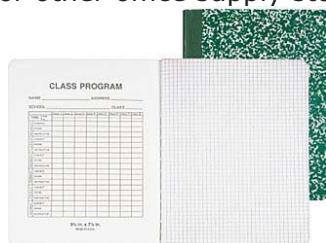
Required Materials

- Binder
- Colored pencils
- Calculator - This calculator from Casio is great if you're interested in purchasing one. I've used this model since college, and am still using it years later in grad school (I must admit that I purchased a second one after melting the buttons of the first together in chemistry lab!). It is a basic scientific calculator that is permitted on the PSAT and SAT exams. *Casio FX-300MSPlus*, \$10.99 list price.



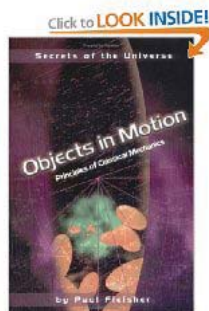
[Casio FX-300MSPlus](#)

- Composition book, quadrille ruled (to be used as a lab notebook) – available at *Staples*, \$2.79, or other office supply stores



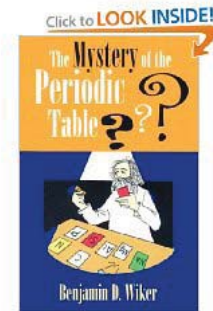
[Available at Staples](#)

- *Objects in Motion: Principles of Classical Mechanical (Secrets of the Universe)*, Paul Fleisher (\$25.26 at Amazon.com)



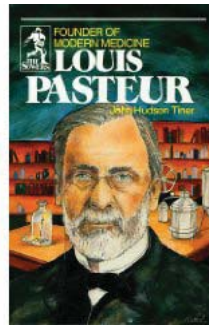
[Available at Amazon.com](#)

- *The Mystery of the Periodic Table (Living History Library)*, Benjamin Wiker (\$10.17 at Amazon.com)



[Available at Amazon.com](#)

- *Louis Pasteur: Founder of Modern Medicine*, John Hudson Tiner (\$7.99 at Amazon.com)



[Available at Amazon.com](#)

- We have not yet selected a book for the final unit of the course on water.