Title *Science in the Atomic Age*
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This course is NOT for high school credit

This middle-school course is designed to give students a broad introduction to the sciences. It begins with a short chapter on the scientific method and the role of experiments in science. In that chapter, students learn how to document the experiments they will do throughout the rest of the course.

Once that introductory material is covered, students learn the story of how scientists developed the current model of the atom, which is the quantum-mechanical model. They learn about the major experiments that led to the model as well as the scientists who did the experiments and the assumptions that were made along the way. Emphasis is given to the fact that often, the assumptions defied common sense but were nevertheless confirmed by experiments.

After students learn the quantum mechanical model, they are introduced to The Periodic Table of the Elements and are taught how to interpret it in order to learn many of the details regarding each element. This leads to a discussion of how atoms form specific ions, which culminates in students learning how to determine the chemical formulas of ionic compounds.

Students then learn about covalent compounds, how they are different from ionic compounds, and how to distinguish between the two. They then learn about Gilbert Lewis's cubical model of the atom, which is completely incorrect but led to the development of Lewis structures, which are a powerful tool used in modern chemistry. Students learn how to come up with Lewis structures for simple covalent compounds, and then they learn to interpret more complex Lewis structures. Once they understand how to interpret Lewis structures, students learn about how scientists discovered the macronutrients and micronutrients used by organisms, which leads to a discussion about the discovery of DNA's role in life.

The means by which scientists figured out the major organelles in eukaryotic cells are then covered, which leads to a discussion of cells and cell theory. The differences between plant and animals cells are discussed, as are the differences between eukaryotic and prokaryotic cells. Prokaryotic cells are then used to introduce the concept of mutualism, which leads to a discussion about the human microbiome. Students also learn about prokaryotic organisms like nitrogen-fixing bacteria that are absolutely essential for all living things. Plants are then covered, because they are crucial to a later discussion on biological communities.

With a good knowledge of cells, students are able to learn about how cells form tissues, how tissues form organs, and how organs form organ systems. All of this is done in the context of the human body so that the student is familiar with all of the systems of the human body, except the reproductive system.

Students then learn about how organisms group together to form populations, how scientists measure populations, and the factors that can lead to extinction. The ways in which populations relate to one another in a biological community are discussed, with emphasis on the balance that is found throughout creation. After that, students learn about how communities interact with their physical environment to form ecosystems, and how people have affected ecosystems in both positive and negative ways. During this process, students learn about the different means by which we produce energy, including nuclear power. The benefits and drawbacks of nuclear power and other energy-production processes are discussed.

The course ends with a discussion of how ecosystems interact to form biomes and how biomes form the biosphere (planet earth). The design seen in creation is stressed throughout the course, but it becomes especially important when the biosphere is discussed. To emphasize the point, a human-made biosphere (called “Biosphere 2”) is compared to the earth. It is clear that the earth is a product of significantly superior design.

There are a total of 58 experiments in the course, representing roughly 45 hours of laboratory work.