Correlation of AeroScholars

Fundamentals of Aviation Science

to National Science Teachers Association's
Standards: Grades 9-12

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Introduction

This report correlates the AeroScholars *Fundamentals of Aviation Science* course to the National Science Teachers Association's Standards for Grades 9-12. Among the points to consider while reviewing this information:

- **Course Content** – *Fundamentals of Aviation Science*, being detailed in nature, contains specific science content that is not found in the broad NSTA standards. Please keep this in mind as you compare the course to your state or local science standards. Also, the course contains more than just science content. It is also strong in mathematics and technology. Currently, the course is correlated to only the NSTA standards but could easily be correlated to state-level math and technology education standards.
- **Major and Minor Numbers** – The numbering system utilized in this report is designed to show a parent-child relationship. For example, NSTA Standard A is Science as Inquiry. The first statement has a major of 1 and a minor of 1.00. This first statement is the parent for the next five statements [1.01 through 1.05]. At least one child must be correlated for the parent to be shown as correlated as well. When moving from Standard A to Standard B, the major number switches from 1 to 2.
- **Lesson, Chapter, Page Number** – Each lesson number listed in the correlations is referencing the lesson associated with the online course. The chapter number is referencing the corresponding book chapter, and the page numbers are the corresponding pages in the book that address the NSTA standard. A few of the correlations include references to lessons only. In these instances, the online lesson addresses the NSTA standard, but the chapter in the book does not.
- **N/A** – A standard is not addressed by any part of the online course if N/A is listed in the column on the right.

In summary, *Fundamentals of Aviation Science* contains a vast amount of content. Students who successfully complete the online course will have experienced a wealth of information related to science, mathematics, and technology education.

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
Standard A: Science as Inquiry			
1	1.00	Students develop the abilities necessary to do scientific inquiry.	N/A
1	1.01	Students identify questions and concepts that guide scientific investigations.	N/A
1	1.01	Students design and conduct scientific investigations.	N/A
1	1.02	Students use technology and mathematics to improve investigations and communications.	N/A
1	1.03	Students formulate and revise scientific explanations and models using logic and evidence.	N/A
1	1.04	Students recognize and analyze alternative explanations and models.	N/A
1	1.05	Students communicate and defend a scientific argument.	N/A
1	2.00	Students develop understandings about scientific inquiry.	Lesson 2, Chapter 1 (2-21); Lesson 11, Chapters 12 & 13 (284-312)
1	2.01	Students understand scientists usually inquire about how physical, living, or designed systems function; understand conceptual principles and knowledge guide scientific inquiries; and understand historical and current scientific knowledge influence the design and interpretation of investigations and the evaluation of proposed explanations made by other scientists.	Lesson 2, Chapter 1 (2-21)
1	2.02	Students understand scientists conduct investigations for a wide variety of reasons (for example, they may wish to discover new aspects of the natural world, explain recently observed phenomena, or test the conclusions of prior investigations or the predictions of current theories).	Lesson 2, Chapter 1 (2-21); Lesson 11, Chapters 12 & 13 (284-312)
1	2.03	Students understand scientists rely on technology to enhance the gathering and manipulation of data; understand new techniques and tools provide new evidence to guide inquiry and new methods to gather data, thereby contributing to the advance of science; and understand the accuracy and precision of the data, and therefore the quality of the exploration, depends on the technology used.	Lesson 2, Chapter 1 (2-21); Lesson 11, Chapters 12 & 13 (284-312)
1	2.04	Students understand mathematics is essential in scientific inquiry and understand mathematical tools and models guide and improve the posing of questions, gathering data, constructing explanations, and communicating results.	Lesson 2, Chapter 1 (2-21)
1	2.05	Students understand scientific explanations must adhere to criteria such as: a proposed explanation must be logically consistent; it must abide by the rules of evidence; it must be open to questions and possible modification; and it must be based on historical and current scientific knowledge.	Lesson 2, Chapter 1 (2-21)
1	2.06	Students understand the results of scientific inquiry – new knowledge and methods – emerge from different types of investigations and public communication among scientists; understand that in communicating and defending the results of scientific inquiry, arguments must be logical and demonstrate connections between natural phenomena, investigations, and the historical body of scientific knowledge; and understand that in addition, the methods and procedures that scientists used to obtain evidence must be clearly reported to enhance opportunities for further investigations.	Lesson 2, Chapter 1 (2-21)

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
Standard B: Physical Science			
2	1.00	Students understand the structure of an atom.	N/A
2	1.01	Students understand matter is made of minute particles called atoms, and atoms are composed of even smaller components; understand these components have measurable properties, such as mass and electrical charge; understand each atom has a positively charged nucleus surround by negatively charged electrons; and understand the electric force between the nucleus and electrons holds the atom together.	N/A
2	1.02	Students understand the atom's nucleus is composed of protons and neutrons, which are much more massive than electrons; and understand that when an element has atoms that differ in the number of neutrons, these atoms are called different isotopes of the element.	N/A
2	1.03	Students understand the nuclear forces that hold the nucleus of an atom together, at nuclear distances, are usually stronger than the electric forces that would make it fly apart; understand that nuclear reactions convert a fraction of the mass of interacting particles into energy, and they can release much greater amounts of energy than atomic interactions; understand that fission is the splitting of a larger nucleus into smaller pieces; and understand fusion is the joining of two nuclei at extremely high temperature and pressure, and is the process responsible for the energy of the Sun and other stars.	N/A
2	1.04	Students understand radioactive isotopes are unstable and undergo spontaneous nuclear reactions, emitting particles and/or wavelike radiation; understand the decay of any one nucleus cannot be predicted, but a large group of identical nuclei decay at a predictable rate; and understand that this predictability can be used to estimate the age of materials that contain radioactive isotopes.	N/A
2	2.00	Students understand the structure and properties of matter.	Lesson 2, Chapter 7 (173-176); Lesson 10, Chapter 6 (159-171)
2	2.01	Students understand atoms interact with one another by transferring or sharing electrons that are furthest from the nucleus and understand that these outer electrons govern the chemical properties of the element.	N/A
2	2.02	Students understand an element is composed of a single type of atom; understand that when elements are listed in order according to the number of protons (called the atomic number), repeating patterns of physical and chemical properties identify families of elements with similar properties; and understand that this "Periodic Table" is a consequence of the repeating pattern of outermost electrons and their permitted energies.	N/A
2	2.03	Students understand bonds between atoms are created when electrons are paired up by being transferred or shared, understand a substance composed of a single kind of atom is called an element, understand the atoms may be bonded together into molecules or crystalline solids, and understand a compound is formed when two or more kinds of atoms bind together chemically.	N/A

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard B: Physical Science (cont.)	
2	2.04	Students understand the physical properties of compounds reflect the nature of the interactions among its molecules; and understand that these interactions are determined by the structure of the molecule, including the constituent atoms and the distances and angles between them.	Lesson 10, Chapter 6 (159-171)
2	2.05	Students understand solids, liquids, and gases differ in the distances and angles between molecules or atoms and therefore the energy that binds them together – in solids the structure is nearly rigid; in liquids molecules or atoms move around each other but do not move apart; and in gases molecules or atoms move almost independently of each other and are mostly far apart.	Lesson 2, Chapter 7 (173-176); Lesson 10
2	2.06	Students understand carbon atoms can bond to one another in chains, rings, and branching networks to form a variety of structures, including synthetic polymers, oils, and the large molecules essential to life.	N/A
2	3.00	Students understand chemical reactions.	Lesson 4, Chapter 8 (194-201)
2	3.01	Students understand chemical reactions occur all around us (for example in health care, cooking cosmetics, and automobiles) and understand complex chemical reactions involving carbon-based molecules take place constantly in every cell in our bodies.	Lesson 4, Chapter 8 (194-201)
2	3.02	Students understand chemical reactions may release or consume energy, understand some reactions such as the burning of fossil fuels release large amounts of energy by losing heat and by emitting light, and understand light can initiate many chemical reactions such as photosynthesis and the evolution of urban smog.	Lesson 4, Chapter 8 (194-201)
2	3.03	Students understand a large number of important reactions involve the transfer of either electrons (oxidation/reduction reactions) or hydrogen ions (acid/base reactions) between reacting ions, molecules, or atoms; understand that in other reactions, chemical bonds are broken by heat or light to form very reactive radicals with electrons ready to form new bonds; and understand that radical reactions control many processes such as the presence of ozone and greenhouse gases in the atmosphere, burning and processing of fossil fuels, the formation of polymers, and explosions.	N/A
2	3.04	Students understand chemical reactions can take place in time periods ranging from the few femtoseconds (10^-15 seconds) required for an atom to move a fraction of a chemical bond distance to geologic time scales of billions of years; and understand reaction rates depend on how often the reacting atoms and molecules encounter one another, on the temperature, and on the properties – including shape – of the reacting species.	N/A
2	3.05	Students understand catalysts, such as metal surfaces, accelerate chemical reactions; and understand chemical reactions in living systems are catalyzed by protein molecules called enzymes.	N/A
2	4.00	Students understand motions and forces.	Lessons 2 & 3, Chapter 7 (177-187), Chapter 8 (201-209); Lesson 5, Chapter 8 (207-213); Lesson 6; Lesson 7, Chapters 7 & 8 (179-193); Lesson 8

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard B: Physical Science (cont.)	
2	4.01	Students understand objects change their motion only when a net force is applied; understand laws of motion are used to calculate precisely the effects of forces on the motion of objects; understand the magnitude of the change in motion can be calculated using the relationship F = ma, which is independent of the nature of force; and understand whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted on the first object.	Lessons 2 & 3, Chapter 7 (177-187), Chapter 8 (201-209); Lesson 7, Chapters 7 & 8 (179-193); Lesson 8
2	4.02	Students understand gravitation is a universal force that each mass exerts on any other mass and understands the strength of the gravitational attractive force between two masses is proportional to the masses and inversely proportional to the square of the distance between them.	Lesson 7, Chapters 7 & 8 (179-193); Lesson 8
2	4.03	Students understand the electric force is a universal force that exists between any two charged objects; understands opposite charges attract while like charges repel; and understand the strength of the force is proportional to the charges, and, as with gravitation, inversely proportional to the square of the distance between them.	Lesson 5, Chapter 8 (207-213)
2	4.04	Students understand between any two charged particles, electric force is vastly greater than the gravitational force; and understand that most observable forces such as those exerted by a coiled spring or friction may be traced to electric forces acting between atoms and molecules.	N/A
2	4.05	Students understand electricity and magnetism are two aspects of a single electromagnetic force, and understand moving electric charges produce magnetic forces, and moving magnets produce electric forces.	Lesson 6
2	5.00	Students understand conservation of energy and the increase in disorder.	Lessons 2 & 3, Chapter 7 (173-189); Lesson 3, Chapter 8 (201-209); Lesson 4, Chapter 8 (194-201); Lesson 7, Chapters 7 & 8 (179-193); Lesson 8, Chapter 15 (331-339); Lesson 13, Chapters 19 & 20 (380-422)
2	5.01	Students understand the total energy of the universe is constant; understand energy can be transferred by collisions in chemical and nuclear reactions, by light waves and other radiations, and in many other ways; understand energy can never be destroyed; and understand as these transfers occur, the matter involved becomes steadily less ordered.	N/A
2	5.02	Students understand all energy can be considered to be either kinetic energy, which is the energy of motion; potential energy, which depends on relative position; or energy contained by a field, such as electromagnetic waves.	Lessons 2 & 3, Chapter 7 (173-189); Lesson 3, Chapter 8 (201-209); Lesson 4, Chapter 8 (194-201); Lesson 7, Chapters 7 & 8 (179-193); Lesson 8, Chapter 15 (331-339)

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard B: Physical Science (cont.)	
2	5.03	Students understand heat consists of random motion and the vibrations of atoms, molecules, and ions and understand the higher the temperature, the greater the atomic or molecular motion.	Lesson 4, Chapter 8 (194-201); Lesson 13, Chapters 19 & 20 (380-422)
2	5.04	Students understand everything tends to become less organized and less orderly over time and thus in all energy transfers, the overall effect is that the energy is spread out uniformly.	N/A
2	6.00	Students understand interactions of energy and matter.	Lesson 2, Chapter 7 (173-176); Lesson 13, Chapters 19 & 20 (380-422)
2	6.01	Students understand waves, including sound and seismic waves, waves on water, and light waves, have energy and can transfer energy when they interact with matter.	Lesson 2, Chapter 7 (173-176); Lesson 13, Chapters 19 & 20 (380-422)
2	6.02	Students understand electromagnetic waves result when a charged object is accelerated or decelerated; understand electromagnetic waves include radio waves (the longest wavelength), microwaves, infrared radiation (radiant heat), visible light, ultraviolet radiation, x-rays, and gamma rays; and understand the energy of electromagnetic waves is carried in packets whose magnitude is inversely proportional to the wavelength.	N/A
2	6.03	Students understand each kind of atom or molecule can gain or lose energy only in particular discrete amounts and thus can absorb and emit light only at wavelengths corresponding to these amounts and understand these wavelengths can be used to identify the substance.	N/A
2	6.04	Students understand in some materials, such as metals, electrons flow easily, whereas in insulating materials such as glass they can hardly flow at all; understand semiconducting materials have intermediate behavior; and understand at low temperatures some materials become superconductors and offer no resistance to the flow of electrons.	N/A
		Standard C: Life Science	
3	1.00	Students understand the cell.	N/A
3	1.01	Students understand cells have particular structures that underlie their functions, understand every cell is surrounded by a membrane that separates it from the outside world, and understand inside the cell is a concentrated mixture of thousands of different molecules which form a variety of specialized structures that carry out such cell functions as energy production, transport of molecules, waste disposal, synthesis of new molecules, and the storage of genetic material.	N/A
3	1.02	Students understand most cell functions involve chemical reactions; understand food molecules taken into cells react to provide the chemical constituents needed to synthesize other molecules; understand both breakdown and synthesis are made possible by a large set of protein catalysts, called enzymes; and understand the breakdown of some of the food molecules enables the cell to store energy in specific chemicals that are used to carry out the many functions of the cell.	N/A

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard C: Life Science (cont.)	
3	1.03	Students understand cells store and use information to guide their functions and understand the genetic information stored in DNA is used to direct the synthesis of the thousands of proteins that each cell requires.	N/A
3	1.04	Students understand cell functions are regulated, understand regulation occurs both through changes in the activity of the functions performed by proteins and through the selective expression of individual genes, and understand this regulation allows cells to respond to their environment and to control and coordinate cell growth and division.	N/A
3	1.05	Students understand plant cells contain chloroplasts, the site of photosynthesis; understand plants and many microorganisms use solar energy to combine molecules of carbon dioxide and water into complex, energy rich organic compounds and release oxygen to the environment; and understand this process of photosynthesis provides a vital connection between the Sun and the energy needs of living systems.	N/A
3	1.06	Students understand cells can differentiate and complex multicellular organisms are formed as a highly organized arrangement of differentiated cells; understand in the development of these multicellular organisms, the progeny from a single cell form an embryo in which the cells multiply and differentiate to form the many specialized cells, tissues, and organs that comprise the final organism; and understand this differentiation is regulated through the expression of different genes.	N/A
3	2.00	Students understand the molecular basis of heredity.	N/A
3	2.01	Students understand in all organisms, the instructions for specifying the characteristics of the organism are carried in DNA, a large polymer formed from subunits of four (A, G, C and T); understand the chemical and structural properties of DNA explain how the genetic information that underlies heredity is both encoded in genes (as a string of molecular "letters") and replicated (by a templating mechanism); and understand each DNA molecule in a cell forms a single chromosome.	N/A
3	2.02	Students understand most of the cells in a human contain two copies of each of 22 different chromosomes; understand in addition, there is a pair of chromosomes that determines sex: a female contains two X chromosomes and a male contains one X and one Y chromosome; understand transmission of genetic information to offspring occurs through egg and sperm cells that contain only one representative form each chromosome pair; understand an egg and sperm unite to form a new individual; and understand the fact that the human body is formed from cells that contain two copies of each chromosome – and therefore two copies of each gene – explains many features of human heredity, such as how variations that are hidden in one generation can be expressed in the next.	N/A
3	2.03	Students understand changes in DNA (mutations) occur spontaneously at low rates; understand some of these changes make no difference to the organism, whereas others can change cells and organisms; and understand only mutations in germ cells can create the variation that changes an organism's offspring.	N/A
3	3.00	Students understand biological evolution.	N/A

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard C: Life Science (cont.)	
3	3.01	Students understand species evolve over time and that evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.	N/A
3	3.02	Students understand the great diversity of organisms is the result of more than 3.5 billion years of evolution that has filled every available niche with life forms.	N/A
3	3.03	Students understand natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of living organisms	N/A
3	3.04	Students understand the millions of different species of plants, animals, and microorganisms that live on Earth today are related by descent from common ancestors.	N/A
3	3.05	Students understand biological classifications are based on how organisms are related, understand organisms are classified into a hierarchy of groups and subgroups based on similarities which reflect their evolutionary relationships, and understand species is the most fundamental unit of classification.	N/A
3	4.00	Students understand the interdependence of organisms.	N/A
3	4.01	Students understand the atoms and molecules on the Earth cycle among the living and nonliving components of the biosphere.	N/A
3	4.02	Students understand energy flows through ecosystems in one direction, from photosynthetic organisms to herbivores to carnivores and decomposers.	N/A
3	4.03	Students understand organisms both cooperate and compete in ecosystems and understand the interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.	N/A
3	4.04	Students understand living organisms have the capacity to produce populations of infinite size, but environments and resources are finite and understand this fundamental tension has profound effects on the interactions between organisms.	N/A
3	4.05	Students understand human beings live within the world's ecosystems; understand that increasingly, humans modify ecosystems as a result of population growth, technology, and consumption; and understand that human destruction of habitats through direct harvesting, pollution, atmospheric changes and other factors is threatening current global stability, and if not addressed, ecosystems will be irreversibly affected.	N/A
3	5.00	Students understand matter, energy, and organization in living systems.	N/A
3	5.01	Students understand all matter tends toward more disorganized states; understand living systems require a continuous input of energy to maintain their chemical and physical organizations; and understand with death, and the cessation of energy input, living systems rapidly disintegrate.	N/A

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard C: Life Science (cont.)	
3	5.02	The energy for life primarily derives from the Sun, understand plants capture energy by absorbing light and using it to form strong (covalent) chemical bonds between the atoms of carbon-containing (organic) molecules, understand these molecules can be used to assemble larger molecules with biological activity (including proteins, DNA, sugars, and fats), and understand the energy stored in bonds between atoms (chemical energy) can be used as sources of energy for life processes.	N/A
3	5.03	Students understand the chemical bonds of food molecules contain energy, understand energy is released when the bonds of food molecules are broken and new compounds with lower energy bonds are formed, and understand cells usually store this energy temporarily in phosphate bonds of a small high-energy compound called ATP.	N/A
3	5.04	Students understand the complexity and organization of organisms accommodates the need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain the organism.	N/A
3	5.05	Students understand the distribution and abundance of organisms and populations in ecosystems are limited by the availability of matter and the energy and the ability of the ecosystem to recycle materials.	N/A
3	5.06	Students understand as matter and energy flows through different levels of organization of living systems – cells, organs, organisms, communities – and between living systems and the physical environment, chemical elements are recombined in different way; understand that each recombination results in storage and dissipation of energy into the environment as heat; and understand matter and energy are conserved in each change.	N/A
3	6.00	Students understand the behavior of organisms.	N/A
3	6.01	Students understand multicellular animals have nervous systems that generate behavior; understand nervous systems are formed from specialized cells that conduct signals rapidly through the long cell extensions that make up nerves; understand the nerve cells communicate with each other by secreting specific excitatory and inhibitory molecules; and understand in sense organs, specialized cells detect light, sound, and specific chemicals and enable animals to monitor what is going on in the world around them.	N/A
3	6.02	Students understand organisms have behavioral responses to internal changes and to external stimuli; understand responses to external stimuli can result from interactions with the organism's own species and others, as well as environmental changes – these responses can be innate or learned; understand the broad patterns of behavior exhibited by animals have evolved to ensure reproductive success; understand animals often live in unpredictable environments and so their behavior must be flexible enough to deal with uncertainty and change; and understand that plants also respond to stimuli.	N/A
3	6.03	Students understand like other aspects of an organism's biology, behaviors have evolved through natural selection and behaviors often have an adaptive logic when viewed in terms of evolutionary principles.	N/A
3	6.04	Students understand behavioral biology has implications for humans, as it provides links to psychology, sociology, and anthropology.	N/A

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
Standard D: Earth and Space Science			
4	1.00	Students understand energy in the Earth system.	Lesson 13, Chapters 19 & 20 (380-422)
4	1.01	*(**Note:** Only the portion of the standard highlighted below is addressed by the curriculum.)* **Students** understand Earth systems have internal and external sources of energy, both of which create heat; **understand the Sun is the major external source of energy;** and understand two primary sources of internal energy are the decay of radioactive isotopes and the gravitational energy from the Earth's original formation.	Lesson 13, Chapters 19 & 20 (380-422)
4	1.02	Students understand the outward transfer of Earth's internal heat drives convection circulation in the mantle that propels the plates comprising Earth's surface across the face of the globe.	N/A
4	1.03	Students understand heating of Earth's surface and atmosphere by the Sun drives convection within the atmosphere and oceans, producing winds and ocean currents.	Lesson 13, Chapters 19 & 20 (380-422)
4	1.04	Students understand global climate is determined by energy transfer from the Sun at and near the Earth's surface; and understand this energy transfer is influenced by dynamic processes such as cloud cover and the Earth's rotation, and static conditions such as the position of mountain ranges and oceans.	Lesson 13, Chapters 19 & 20 (380-422)
4	2.00	Students understand geochemical cycles.	N/A
4	2.01	Students understand the Earth is a system containing essentially a fixed amount of each stable chemical atom or element, understand each element can exist in several different chemical reservoirs, and understand each element on Earth moves among reservoirs in the solid earth, oceans, atmosphere, and organisms as part of geochemical cycles.	N/A
4	2.02	Students understand movement of matter between reservoirs is driven by the Earth's internal and external sources of energy and understand these movements are often accompanied by a change in the physical and chemical properties of the matter.	N/A
4	3.00	Students understand the origin and evolution of the Earth system.	N/A
4	3.01	Students understand the Sun, the Earth, and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago and understand the early Earth was very different from the planet we live on today.	N/A
4	3.02	Students understand geologic time can be estimated by observing rock sequences and using fossils to correlate the sequences at various locations and understand current methods include using the known decay rates of radioactive isotopes present in rocks to measure the time since the rock was formed.	N/A
4	3.03	Students understand interactions among the solid earth, the oceans, the atmosphere, and organisms have resulted in the ongoing evolution of the Earth system; and understand we can observe some changes such as earthquakes and volcanic eruptions on a human time scale, but many processes such as mountain building and plate movements take place over hundreds of millions of years.	N/A
4	3.04	Students understand evidence for one-celled forms of life – the bacteria – extends back more than 3.5 billion years and understand the evolution of life caused dramatic changes in the composition of the Earth's atmosphere, which did not originally contain oxygen.	N/A
4	4.00	Students understand the origin and evolution of the universe.	N/A

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard D: Earth and Space Science (cont.)	
4	4.01	Students understand the origin of the universe remains one of the greatest questions in science and understand the "big bang" theory places the origin between 10 and 20 billion years ago, when the universe began in a hot dense state; according to this theory, the universe has been expanding ever since.	N/A
4	4.02	Students understand early in the history of the universe, matter, primarily the light atoms hydrogen and helium, clumped together by gravitational attraction to form countless trillions of stars and understand billions of galaxies, each of which is a gravitationally bound cluster of billions of stars, now form most of the visible mass in the universe.	N/A
4	4.03	Students understand stars produce energy from nuclear reactions, primarily the fusion of hydrogen to form helium and understand these and other processes in stars have led to the formation of all the other elements.	N/A
		Standard E: Science and Technology	
5	1.00	Students understand the abilities of technological design.	All 17 lessons
5	1.01	Students identify a problem or design an opportunity.	N/A
5	1.02	Students propose designs and choose between alternative solutions.	N/A
5	1.03	Students implement a proposed solution..	All 17 lessons
5	1.04	Students evaluate the solution and its consequences.	All 17 lessons
5	1.05	Students communicate the problem, process and solution.	All 17 lessons
5	2.00	Students understand about science and technology.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
5	2.01	Students understand scientists in different disciplines ask different questions, use different methods of investigation, and accept different types of evidence to support their explanations; understand many scientific investigations require the contributions of individuals from different disciplines, including engineering; and understand new disciplines of science, such as geophysics and biochemistry often emerge at the interface of two older disciplines.	Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
5	2.02	Students understand science often advances with the introduction of new technologies, understand solving technological problems often result in new scientific knowledge, and understand new technologies often extend the current levels of scientific understanding and introduce new areas of research.	Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
5	2.03	Students understand creativity, imagination, and a good knowledge base are all required in the work of science and engineering.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
5	2.04	Students understand science and technology are pursued for different purposes and understand scientific inquiry is driven by the desire to understand the natural world and technological design is driven by the need to meet human needs and solve human problems.	Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard E: Science and Technology (cont.)	
5	2.05	Students understand technological knowledge is often not made public because of patents and the financial potential of the idea or invention and understand scientific knowledge is made public through presentations at professional meetings and publications in scientific journals.	Lesson 9
		Standard F: Science in Personal and Social Perspectives	
6	1.00	Students understand personal and community health.	Lesson 15
6	1.01	Students understand hazards and the potential for accidents exist; understand regardless of the environment, the possibility of injury, illness, disability or death may be present; and understand humans have a variety of mechanisms – sensory, motor, emotional, social, and technological – that can reduce and modify hazards.	N/A
6	1.02	Students understand the severity of disease symptoms is dependent on many factors, such as human resistance and the virulence of the disease-producing organism; understand many diseases can be prevented, controlled, or cured; and understand some diseases, such as cancer, result from specific body dysfunctions and cannot be transmitted.	N/A
6	1.03	Students understand personal choice concerning fitness and health involves multiple factors and understand personal goals, peer and social pressures, ethnic and religious beliefs, and understanding of biological consequences can all influence decisions about health practices.	N/A
6	1.04	Students understand an individual's mood and behavior may be modified by substances; understand the modification may be beneficial or detrimental depending on the motives, type of substance, duration of use, pattern of use, level of influence, and short-and long-term effects; and understand that drugs can result in physical dependence and can increase the risk of injury, accidents, and death.	Lesson 15
6	1.05	Students understand selection of foods and eating patterns determine nutritional balance, understand nutritional balance has a direct effect on growth and development and personal well-being, and personal and social factors – such as habits, family income, ethnic heritage, body size, advertising, and peer pressure – influence nutritional choices.	N/A
6	1.06	Students understand families serve basic health needs, especially for young children and understand regardless of the family structure, individuals have families that involve a variety of physical, mental, and social relationships that influence the maintenance and improvement of health.	N/A
6	1.07	Students understand sexuality is basic to the physical, mental, and social development of humans; understand human sexuality involves biological functions, psychological motives, and cultural, ethnic, religious, and technological influences; understand sex is a basic and powerful force that has consequences to individuals' health and to society; and understand various methods of controlling the reproduction process and that each method has a different type of effectiveness and different health and social consequences.	N/A
6	2.00	Students understand population growth.	N/A

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
Standard F: Science in Personal and Social Perspectives (cont.)			
6	2.01	Students understand populations grow or decline through the combined effects of births and deaths and through emigration and immigration and understand populations can increase through linear or exponential growth, with effects on resource use and environmental pollution.	N/A
6	2.02	Students understand various factors influence birth rates and fertility rates, such as average levels of affluence and education, importance of children in the labor force, education and employment of women, infant mortality rates, cost of raising children, availability and reliability of birth control methods, and religious beliefs and cultural norms that influence personal decisions about family size.	N/A
6	2.03	Students understand populations can reach limits to growth understand carrying capacity is the maximum number of individuals that can be supported in a given environment, understand the limitation is not the availability of space but the number of people in relation to resources and the capacity of Earth systems to support human beings, and understand changes in technology can cause significant changes, either positive or negative, in carry capacity.	N/A
6	3.00	Students understand natural resources.	N/A
6	3.01	Students understand human populations use resources in the environment in order to maintain and improve their existence and understand natural resources have been and will continue to be used to maintain human populations.	N/A
6	3.02	Students understand the Earth does not have infinite resources; increasing human consumption places severe stress on the natural processes that renew some resources, and it depletes those resources that cannot be renewed.	N/A
6	3.03	Students understand humans use many natural systems as resources, understand natural systems have the capacity to reuse waste, but that capacity is limited, and understand natural systems can change to an extent that exceeds the limits of organisms to adapt naturally or humans to adapt technologically.	N/A
6	4.00	Students understand environmental quality.	N/A
6	4.01	Students understand natural ecosystems provide an array of basic processes that affect humans; understand those processes include maintenance of the quality of the atmosphere, generation of soils, control of the hydrologic cycle, disposal of wastes, and recycling of nutrients; and understand humans are changing many of these basic processes and the changes may be detrimental to humans.	N/A
6	4.02	Students understand materials from human societies affect both physical and chemical cycles of the Earth.	N/A
6	4.03	Students understand many factors influence environmental quality; factors that students might investigate include population growth, resource use, population distribution, overconsumption, the capacity of technology to solve problems, poverty, the role of economic, political, and religious views, and different ways humans view the Earth.	N/A
6	5.00	Students understand natural and human-induced hazards.	Lesson 12, Chapter 9 (236-239); Lesson 15

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard F: Science in Personal and Social Perspectives (cont.)	
6	5.01	Students understand normal adjustments of Earth may be hazardous for humans, understand humans live at the interface between the atmosphere driven by solar energy and the upper mantle where convection creates change in the Earth's solid crust, and understand as societies have grown, become stable, and come to value aspects of the environment, vulnerability to natural processes of change has increased.	N/A
6	5.02	*(**Note:** Only the portion of the standard highlighted below is addressed by the curriculum.)* **Students understand human activities can enhance potential for hazards** and understand acquisition of resources, urban growth, and waste disposal can accelerate rates of natural changes.	Lesson 12, Chapter 9 (236-239); Lesson 15
6	5.03	Students understand some hazards, such as earthquakes, volcanic eruptions, and severe weather, are rapid and spectacular, but there are slow and progressive changes that also result in problems for individuals and societies.	N/A
6	5.04	Students understand natural human-induced hazards present the need for humans to assess potential danger and risk; understand many changes in the environment designed by humans bring benefits to society, as well as cause risks; understand the costs and trade-offs of various hazards – ranging from those with minor risk to a few people to major catastrophes with major risk to many people; and understand the scale of events and the accuracy with which scientists and engineers can (and cannot) predict events are important considerations.	Lesson 12, Chapter 9 (236-239); Lesson 15
6	6.00	Students understands science and technology in local, national, and global challenges.	Lesson 9; Lesson 11, Chapters 12 & 13 (284-312); Lesson 15
6	6.01	Students understand science and technology are essential social enterprises, but alone they can only indicate what can happen, not what should happen; the latter involves human decisions about the use of knowledge.	Lesson 11, Chapters 12 & 13 (284-312); Lesson 15
6	6.02	Students understand basic concepts and principles of science and technology should precede active debate about the economics, policies, politics and ethics of various science and technology related challenges; however, understanding science alone will not resolve local, national, or global challenges.	N/A
6	6.03	*(**Note:** Only the portion of the standard highlighted below is addressed by the curriculum.)* **Students understand progress in science and technology can be affected by social issues and challenges** and understand funding priorities for specific health problems serve as examples of ways that social issues influence science and technology.	Lesson 9; Lesson 11, Chapters 12 & 13 (284-312)
6	6.04	Students understand individuals and society must decide on proposals involving new research and the introduction of new technologies into society; understand decisions involve assessment of alternatives, risks, costs and benefits and who suffers, who pays and gains, and what the risks are and who bears them; and understand the appropriateness and value of basic questions – "What can happen?" – "What are the odds?" – and "How do scientists and engineers know what will happen?"	Lesson 9; Lesson 11, Chapters 12 & 13 (284-312)

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard F: Science in Personal and Social Perspectives (cont.)	
6	6.05	Students understand humans have a major effect on other species, for example, the influence of humans on other organisms occurs through land use – which decreases space available to other species – and pollution – which changes the chemical composition of air, soil and water.	N/A
		Standard G: History and Nature of Science	
7	1.00	Students understand science as a human endeavor.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
7	1.01	Students understand individuals and teams have contributed and will continue to contribute to the scientific enterprise, understand doing science or engineering can be as simple as an individual conducting field studies or as complex as hundreds of people working on a major scientific question or technological problem, and understand pursuing science as a career or as a hobby can be both fascinating and intellectually rewarding.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
7	1.02	Students understand scientists have ethical traditions; understand scientists value peer review, truthful reporting about the methods and outcomes of investigations, and making public the results of work; and understand violations of such norms do occur, but scientists responsible for such violations are censured by their peers.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
7	1.03	Students understand scientists are influenced by societal, cultural, and personal beliefs and ways of viewing the world and understand science is not separate from society, but rather science is a part of society.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
7	2.00	Students understand the nature of scientific knowledge.	All 17 lessons
7	2.01	Students understand science distinguishes itself from other ways of knowing and from other bodies of knowledge through the use of empirical standards, logical arguments, and skepticism, as scientists strive for the best possible explanations about the natural world.	All 17 lessons
7	2.02	Students understand scientific explanations must meet certain criteria; understand first and foremost, they must be consistent with experimental and observational evidence about nature, and must make accurate predictions, when appropriate, about systems being studied; understand they should also be logical, respect the rules of evidence, be open to criticism, report methods and procedures, and make knowledge public; and understand explanations on how the natural world changes based on myths, personal beliefs, religious values, mystical inspiration, superstition, or authority may be personally useful and socially relevant, but they are not scientific.	All 17 lessons

Major	Minor	NSTA Standard	Fundamentals of Aviation Science
		Standard G: History and Nature of Science (cont.)	
7	2.03	Students understand because all scientific ideas depend on experimental and observational confirmation, all scientific knowledge is, in principle, subject to change as new evidence becomes available; understand the core ideas of science such as the conservation of energy or the laws of motion have been subject to a wide variety of confirmations and are therefore unlikely to change in the areas in which they have been tested; understand in areas where data or understanding are incomplete, such as the details of human evolution or questions surrounding global warming, new data may well lead to changes in current ideas or resolve current conflicts; and understand in situations where information is still fragmentary, it is normal for scientific ideas to be incomplete, but this is also where the opportunity for making advances may be greatest.	All 17 lessons
7	3.00	Students understand historical perspectives.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
7	3.01	Students understand in history, diverse cultures have contributed scientific knowledge and technological inventions; understand modern science began to evolve rapidly in Europe several hundred years ago; understand during the past two centuries, it has contributed significantly to the industrialization of Western and non-Western cultures; and understand however, that other non-European cultures have developed scientific ideas and solved human problems through technology.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
7	3.02	Students understand, usually, changes in science occur as small modifications in extant knowledge, understand the daily work of science and engineering results in incremental advances in our understanding of the world and our ability to meet human needs and aspirations, and understand much can be learned about the internal workings of science and the nature of science from study of individual scientists, their daily work, and their efforts to advance scientific knowledge in their area of study.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
7	3.03	Students understand that occasionally there are advances in science and technology that have important and long-lasting effects on science and society.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)
7	3.04	Students understand the historical perspective of scientific explanations demonstrates how scientific knowledge changes by evolving over time, almost always building on earlier knowledge.	Lesson 2, Chapter 1 (2-21); Lesson 9; Lesson 10, Chapter 6 (159-171); Lesson 11, Chapters 12 & 13 (284-312)