CHINO VALLEY UNIFIED SCHOOL DISTRICT
INSTRUCTIONAL GUIDE
SCIENCE 7
SCIENCE GATE/HONORS 7

Course number	3040-Science 7 3041-Science GATE/Honors 7
Department	Science
Length of course	One (1) year
Grade Level	7
Board Approved	June 19, 2008

Description of Course - This course presents an introductory general science curriculum with an emphasis on life science.

Rationale of Course - This course fulfills the requirement for promotion to high school. This course also presents standards that will be tested in the 10th grade life science test as required by NCLB.

Standard 1 (Cell Biology) - Students will demonstrate a working knowledge that all living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope.

1.1 Objective: Understand that cells function similarly in all living organisms.

1.1.1 Performance Indicator: Students will be able to explain what cells are.

1.1.2 Performance Indicator: Students will be able to state the cell theory.

1.1.3 Performance Indicator: Students will be able to explain how the cells of multicellular organisms are specialized.

1.1.4 Performance Indicator: Students will be able to describe how most small molecules cross the cell membrane.

1.1.5 Performance Indicator: Students will be able to explain why osmosis is important to cells.

1.1.6 Performance Indicator: Students will be able to discuss the difference between passive transport and active transport.

1.1.7 Performance Indicator: Students will be able to explain how water is important to the function of cells.

1.1.8 Performance Indicator: Students will be able to identify the characteristics that all plant cells share.

1.2 Objective: Understand that the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.

1.2.1 Performance Indicator: Students will be able to identify the role of the cell wall and the cell membrane in the cell.

1.2.2 Performance Indicator: Students will be able to name the organelles found in cytoplasm and describe their functions.

1.3 Objective: Understand that the nucleus is the repository for genetic information plant and animal cells.

1.3.1 Performance Indicator: Students will be able to identify the role of the nucleus in the cell.

1.3.2 Performance Indicator: Students will be able to describe how eukaryotic and prokaryotic cells differ.

1.4 Objective: Understand that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.

1.4.1 Performance Indicator: Students will be able to explain how the sun supplies living things with the energy they need.

1.4.2 Performance Indicator: Students will be able to describe what happens during the process of photosynthesis.

1.4.3 Performance Indicator: Students will be able to describe the events that occur during respiration.

1.4.4 Performance Indicator: Students will be able to describe what fermentation is.

1.5 Objective: Understand that cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.

1.5.1 Performance Indicator: Students will be able to identify the events that take place during the three stages of the cell cycle.

1.5.2 Performance Indicator: Students will be able to explain how the structure of DNA helps account for the way in which DNA copies itself.

1.6 Objective: Understand that as multicellular organisms develop, their cells differentiate.

1.6.1 Performance Indicator: Students will be able to explain what cell differentiation is.

Standard 2 (Genetics) - Students will demonstrate a working knowledge that a typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences.

2.1 Objective: Understand the differences between the life cycles and reproduction methods of sexual and asexual organisms.

2.1.1 Performance Indicator: Students will be able to compare autotrophs to heterotrophs, and explain how energy is released through respiration.

2.2 Objective: Understand how sexual reproduction produces offspring that inherit half their genes from each parent.

2.2.1 Performance Indicator: Students will be able to describe the role chromosomes play in inheritance.

2.2.2 Performance Indicator: Students will be able to identify the events that occur during meiosis.

2.2.3 Performance Indicator: Students will be able to explain the relationship between chromosomes and genes.

2.3 Objective: Understand how an inherited trait can be determined by one or more genes.

2.3.1 Performance Indicator: Students will be able to identify some patterns of inheritance in humans.

2.3.2 Performance Indicator: Students will be able to describe the functions of the sex chromosomes.

2.3.3 Performance Indicator: Students will be able to explain the relationship between genes and the environment.

2.4 Objective: Understand that plant and animal cells contain many thousands of different genes and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.

2.4.1 Performance Indicator: Students will be able to describe the results of Mendel's experiments.

2.4.2 Performance Indicator: Students will be able to identify what controls the inheritance of traits in organisms.

2.4.3 Performance Indicator: Students will be able to define probability and describe how it helps explain the results of genetic crosses.

2.4.4 Performance Indicator: Students will be able to explain what is meant by genotype and phenotype.

2.4.5 Performance Indicator: Students will be able to explain co dominance.

2.5 Objective: Know DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell.

2.5.1 Performance Indicator: Students will be able to explain what forms the genetic code.

2.5.2 Performance Indicator: Students will be able to describe how a cell produces proteins.

2.5.3 Performance Indicator: Students will be able to identify how mutations can affect an organism.

Standard 3 (Evolution) – Students will demonstrate a working knowledge of biological evolution accounts for the diversity of species developed through gradual process over many generations.

3.1 Objective: Know both genetic variation and environmental factors are causes of evolution and diversity of organisms.

3.1.1 Performance Indicator: Students will be able to explain how natural selection leads to evolution.

3.1.2 Performance Indicator: Students will be able to identify factors that have contributed to the diversity of species.

3.1.3 Performance Indicator: Students will be able to explain how new species form.

3.2 Objective: Know the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.

3.2.1 Performance Indicator: Students will be able to state how Darwin explained differences between similar species.

3.2.2 Performance Indicator: Students will be able to explain how scientists infer evolutionary relationships among species.

3.3 Objective: Know how independent lines of evidence from geology, fossils, and comparative anatomy provide the bases for the theory of evolution.

3.3.1 Performance Indicator: Students will be able to state evidence that supports the theory of evolution.

3.3.2 Performance Indicator: Students will be able to describe how fossils form.

3.4 Objective: Know how to construct a simple branching diagram to classify living groups of organisms by shared derived characteristics and how to expand the diagram to include fossil organism.

3.4.1 Performance Indicator: Students will be able to explain how a branching tree diagram shows evolutionary relationships.

3.4.2 Performance Indicator: Students will be able to explain why biologists classify organisms.

3.5 Objective: Know that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

3.5.1 Performance Indicator: Students will be able to explain what causes the extinction of a species.

3.5.2 Performance Indicator: Students will be able to describe one environmental change that may have caused the extinction of dinosaurs.

Standard 4 (Earth and Life History—Earth Science) - Students will demonstrate a working knowledge that evidence from rocks allows us to understand the evolution of life on Earth.

4.1 Objective: Know Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time.

4.1.1 Performance Indicator: Students will be able to explain the process of uniformitarianism.

4.2 Objective: Know the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids.

4.2.1 Performance Indicator: Students will be able to discuss events such as the Permian extinction that resulted from a major catastrophic event.

4.2.2 Performance Indicator: Students will be able to discuss the Cretaceous-Tertiary extinction that occurred at the close of the Cretaceous Period.

4.3 Objective: Know that the rock cycle includes the formation of new sediment and rocks and that rocks are often found in layers, with the oldest generally on the bottom.

4.3.1 Performance Indicator: Students will be able to describe the rock cycle.

4.3.2 Performance Indicator: Students will be able to state the law of superposition.

4.3.3 Performance Indicator: Students will be able to describe how geologists determine the relative age of rocks.

4.3.4 Performance Indicator: Students will be able to explain how index fossils are useful to geologists.

4.4 Objective: Know that evidence from geologic layers and radioactive dating indicated Earth is approximately 4.6 billion years old and that life on this planet has existed for more than 3 billion years.

4.4.1 Performance Indicator: Students will be able to explain what happens during radioactive decay.

4.4.2 Performance Indicator: Students will be able to describe what can be learned from radioactive dating.

4.4.3 Performance Indicator: Students will be able to state the probable age of the Earth.

4.5 Objective: Know fossils provide evidence of how life and environment conditions have changed.

4.5.1 Performance Indicator: Students will be able to give examples of the types of information scientists have learned from the fossil record.

4.6 Objective: Know how movements of Earth's continental and oceanic plates through time, with associated changes in climate and geographic connections, have affected the past and present distribution of organisms.

4.6.1 Performance Indicator: Students will be able to describe how the movement of Earth's plates has affected organisms.

4.7 Objective: Explain significant developments and extinctions of plant and animal life on the geologic time scale.

4.7.1 Performance Indicator: Students will be able to explain why the geologic time scale is used to show Earth's history.

4.7.2 Performance Indicator: Students will be able to describe what early Precambrian organisms were like.

4.7.3 Performance Indicator: Students will be able to describe major events of the Paleozoic, Mesozoic, and Cenozoic Eras.

Standard 5 (Structure and Function in Living Systems) - Students will demonstrate a working knowledge of how the anatomy and physiology of plants and animals illustrate the complementary nature of structure and function.

5.1 Objective: Know how plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.

5.1.1 Performance Indicator: Students will be able to identify the characteristics that all plants share.

5.1.2 Performance Indicator: Students will be able to name the things that a plant needs to live successfully on land.

5.1.3 Performance Indicator: Students will be able to describe the stages of a plant's life cycle.

5.1.4 Performance Indicator: Students will be able to describe levels of organization in animal bodies.

5.1.5 Performance Indicator: Students will be able to identify four functions that enable animals to meet their basic needs.

5.1.6 Performance Indicator: Students will be able to list the systems of the human body and their functions.

5.2 Objective: Students will know organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.

5.2.1 Performance Indicator: Students will describe the functions of the respiratory system.

5.2.2 Performance Indicator: Students will describe what happens during gas exchange and breathing.

5.2.3 Performance Indicator: Students will be able to identify the functions of the nervous system.

5.2.4 Performance Indicator: Students will be able to identify two ways in which the nervous system can be injured.

5.2.5 Performance Indicator: Students will be able to describe the endocrine system controls body processes.

5.3 Objective: Know how bones and muscles work together to provide a structural framework for movement.

5.3.1 Performance Indicator: Students will be able to identify the functions of the skeleton.

5.3.2 Performance Indicator: Students will be able to explain the role that joints play in the body.

5.3.3 Performance Indicator: Students will be able to describe the characteristics of bone and how to keep bones strong and healthy.

5.3.4 Performance Indicator: Students will be able to identify the types of muscles found in the body.

5.3.5 Performance Indicator: Students will be able to explain why skeletal muscles work in pairs.

5.4 Objective: Know how the reproductive organs of the human female and male generate eggs and sperm and how sexual activity may lead to fertilization and pregnancy.

5.4.1 Performance Indicator: Students will be able to define sexual reproduction.

5.4.2 Performance Indicator: Students will be able to describe the structures and functions of the male and female reproductive systems.

5.4.3 Performance Indicator: Students will be able to sequence the events that occur during the menstrual cycle.

5.5 Objective: Know the function of the umbilicus and placenta during pregnancy.

5.5.1 Performance Indicator: Students will be able to explain how the developing embryo is protected and nourished.

5.6 Objective: Know the structures and processes by which glowering plants generate pollen, ovules, sees, and fruit.

5.6.1 Performance Indicator: Students will be able to identify the characteristics of gymnosperms and describe how they reproduce.

5.6.2 Performance Indicator: Students will be able to describe the characteristics of angiosperms and their flowers.

5.6.3 Performance Indicator: Students will be able to explain how angiosperms reproduce.

5.7 Objectives: Know how to relate the structures of the eye and ear to their functions.

5.7.1 Performance Indicator: Students will be able to explain how one sees objects.

5.7.2 Performance Indicator: Students will be able to explain how the eyes sense light.

5.7.3 Performance Indicator: Students will be able to describe how the ears sense sound and help maintain balance.

Standard 6 (Physical Principles in Living Systems) - Students will demonstrate a working knowledge of physical principles that underlie biological structures and functions.

6.1 Objective: Know visible light is a small band within a very broad electromagnetic spectrum.

6.1.1 Performance Indicator: Students will be able to explain what causes waves.

6.1.2 Performance Indicator: Students will be able to describe the basic properties of waves.

6.1.3 Performance Indicator: Students will be able to state what an electromagnetic wave consists of.

6.1.4 Performance Indicator: Students will be able to name the waves that make up the electromagnetic spectrum.

6.2 Objective: Know that for an object to be seen, light emitted by or scattered form it must be detected by the eye.

6.2.1 Performance Indicator: Students will be able to explain how one sees objects.

6.3 Objective: Know light travels in straight lines if the medium it travels through does not change.

6.3.1 Performance Indicator: Students will be able to define mechanical waves.

6.3.2 Performance Indicator: Students will be able to define electromagnetic waves.

6.4 Objective: Know how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.

6.4.1 Performance Indicator: Students will be able to identify the types of lenses that are used to correct vision problems.

6.4.2 Performance Indicator: Students will be able to describe how lenses are used in telescopes, microscopes, and cameras.

6.5 Objective: Know that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths.

6.5.1 Performance Indicator: Students will be able to describe how white light interacts with an object.

6.6 Objective: Know that light can be reflected, refracted, transmitted, and absorbed by matter.

6.6.1 Performance Indicator: Students will be able to describe what determines the color of an opaque object.

6.6.2 Performance Indicator: Students will be able to explain how missing pigments is different from mixing colors of light.

6.7 Objective: Know how to compare joints in the body (wrist, shoulder, and thigh) with structures used in machines and simple devices (hinge, ball-and-socket, and sliding joints).

6.7.1 Performance Indicator: Students will be able to explain the role that joints lay in the body.

6.7.2 Performance Indicator: Students will be able to explain how force and work are related.

6.7.3 Performance Indicator: Students will be able to explain how a lever makes work easier.

6.8 Objective: Know how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.

6.8.1 Performance Indicator: Students will be able to describe how bones and muscles function as levers in the body.

6.9 Objective: Know that contractions of the heart generate blood pressure and that heart valves prevent back flow of blood in the circulatory system.

6.9.1 Performance Indicator: Students will be able to explain the functions of the cardiovascular system.

6.9.2 Performance Indicator: Students will be able to describe the function and structure of the heart.

6.9.3 Performance Indicator: Students will be able to explain the actions of the atria and ventricles of the heart.

6.9.4 Performance Indicator: Students will be able to explain the role of the heart valves and blood flow.

6.9.5 Performance Indicator: Students will be able to sequence the path taken by blood through the cardiovascular system.

6.9.6 Performance Indicator: Students will be able to describe the functions and structures of arteries, capillaries, and veins.

Investigation and Experimentation

Objective: Scientific progress is made by asking meaningful questions and conducting careful investigations. In addition, students will develop their own questions and perform investigations.

1.a Performance Indicator: Students will be able to select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.

1.b Performance Indicator: Students will be able to use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.

1.c Performance Indicator: Students will be able to communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn form the scientific evidence.

1.d Performance Indicator: Students will be able to construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).

1.e Performance Indicator: Students will be able to communicate the steps and results from an investigation in written reports and oral presentations.