

# Course Syllabus

## Science, Science-Grade 8

Morgan County Curriculum 4.1 Middle Sch., Final  
Morgan County School District

### Physical Science (25%)

- The learner will be able to \* Interpret models/representations of elements;  
\* Classify elements based upon patterns in their physical (e.g., density, point, solubility) and chemical (e.g., flammability, reactivity) properties.  
Models enhance understanding that an element is composed of a single type of atom.  
Organization/interpretation of data illustrates that when elements are listed according to the number of protons, repeating patterns of physical (e.g., density, boiling point, solubility) and chemical properties (e.g., flammability, reactivity), can be used to identify families of elements with similar properties.
- The learner will be able to understand that matter is made of minute particles called atoms, and atoms are composed of even smaller components. The components of an atom have measurable properties such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by negatively charged electrons. The electric force between the nucleus and the electrons holds the atom together.
- The learner will be able to understand that the atom's nucleus is composed of protons and neutrons that are much more massive than electrons.
- The learner will be able to describe interactions which cause the movement of each element among the solid Earth, oceans, atmosphere, and organisms (biogeochemical cycles).
- The learner will be able to describe and explain the effects of balanced and unbalanced forces on motion as found in real-life phenomena.

### Earth/Space Science (16%)

- The learner will be able to describe various techniques for estimating geological time (radioactive dating, observing rock sequences, comparing fossils);  
Techniques used to estimate geological time include using radioactive dating, observing rock sequences, and comparing fossils to correlate the rock sequences at various locations. Deductions can be made based on

available data and observation of models as to the age of rocks/fossils.

- The learner will be able to understand that earthquakes and volcanic eruptions can be observed on a human time scale, but many processes, such as mountain building and plate movements, take place over hundreds of millions of years.
- The learner will be able to \* Explain the transfer of Earth's internal heat in the mantle (crustal movement, hotspots, geysers);  
\* Describe the interacting components (convection currents) within the Earth's system. The outward transfer of Earth's internal heat drives convection circulation in the mantle. This causes the crustal plates to move on the face of the Earth.
- The learner will be able to understand that the Sun, Earth, and the rest of the solar system formed approximately 4.6 billion years ago.

### Biological Science (25%)

- The learner will be able to explain the relationship between structure and function of the cell components using a variety of representations.  
Observations of cells and analysis of cell representations point out that cells have particular structures that underlie their function. Every cell is surrounded by a membrane that separates it from the outside world. Inside the cell is a concentrated mixture of thousands of different molecules that form a variety of specialized structures. These structures carry out specific cell functions.
- The learner will be able to understand that in the development of multicellular organisms, cells multiply (mitosis) and differentiate to form many specialized cells, tissues, and organs. The differentiation is regulated through the expression of different genes.
- The learner will be able to form or justify conclusions as to whether a response is innate or learned using data/evidence on behavioral responses to internal and external stimuli. Behavioral responses to internal changes and external stimuli can be innate or learned. Responses to external stimuli can

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result from interactions with the organism's own species or other species, as well as environmental changes.

- The learner will be able to describe and explain patterns found within groups of organisms in order to make biological classifications of those organisms. Observations and patterns found within groups of organisms allow for biological classifications based on how organisms are related.
- The learner will be able to understand that multicellular animals have nervous systems that generate behavior. Nerve cells communicate with each other by secreting specific molecules.
- The learner will be able to draw conclusions and make inferences about the consequences of change over time that can account for the similarities among diverse species. The consequences of change over time provide a scientific explanation for the fossil record of ancient life forms and for the striking molecular similarities observed among the diverse species of living organisms.

### Unifying Ideas (34%)

- The learner will be able to \* Explain the cause and effect relationships between global climate and energy transfer; \* Use evidence to make inferences or predictions about global climate issues. Global climate is determined by energy transfer from the Sun at the near Earth's surface.
- The learner will be able to \* Describe or explain energy transfer and energy conservation; \* Evaluate alternative solutions to energy problems. Energy can be transferred in many ways, but it can neither be created nor destroyed.
- The learner will be able to understand that all energy can be considered to be kinetic energy, potential energy, or energy contained by a field (e.g., electric, magnetic, gravitational).

- The learner will be able to \* Analyze information/data about waves and energy transfer; \* Describe the transfer of energy via waves in real life phenomena. Waves, including sound and seismic waves, waves on water, and electromagnetic waves, can transfer energy when they interact with matter.
- The learner will be able to \* Describe the relationships between organisms and energy flow in ecosystems (food chains and energy pyramids); \* Explain the effects of change to any component of the ecosystem. Energy flows through ecosystems in one direction from photosynthetic organisms to herbivores to carnivores and decomposers.
- The learner will be able to describe the interrelationships and interdependencies within an ecosystem and predict the effects of change on one or more components within an ecosystem. Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.
- The learner will be able to \* Explain the interactions of the components of the Earth system (e.g., solid Earth, oceans, atmosphere, living organisms); \* Propose solutions to detrimental interactions. Interactions among the solid Earth, the oceans, the atmosphere, and living things have resulted in the ongoing development of a changing Earth system.