



# Mesquite ISD Curriculum Sequence

## High School Science - Biology

### 1st Six Weeks

Students will investigate the following:

**Biomolecules and Enzymes:**

Students will compare the structures and functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids.

Students will identify and investigate the role of enzymes.

**Cellular Processes:**

Students will investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules.

Students will compare and contrast prokaryotic and eukaryotic cells.

Students will compare the reactants and products of photosynthesis and cellular respiration in terms of energy and matter.

**Genetics Unit:**

Student will identify components of DNA, and describe how information for specifying the traits of an organism is carried in the DNA.

Student will recognize that components that make up the genetic code are common to all organisms.

Student will explain the purpose and process of transcription and translation using models of DNA and RNA.

Student will recognize that gene expression is a regulated process.

### 2nd Six Weeks

Students will investigate the following:

**Genetics Unit (Continued):**

Student will identify and illustrate changes in DNA and evaluate the significance of these changes.

Student will explain the purpose and process of transcription and translation using models of DNA and RNA.

**Cell Division and Differentiation:**

Students will describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms.

Students will examine specialized cells, including roots, stems, and leaves of plants. and animal cells such as blood, muscle, and epithelium.

Students will describe the roles of DNA, ribonucleic acid (RNA), environmental factors in cell differentiation.

Students will recognize that disruptions of the cell cycle lead to diseases such as cancer.

**Body Systems:**

Students will describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals.

Students will analyze the levels of organization in biological systems and relate the levels to each other and to the whole system.

Students will summarize the role of microorganisms in both maintaining and disrupting the health of both organisms and ecosystems.

### 3rd Six Weeks

Students will investigate the following:

**Body Systems (Continued):**

Students will describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals.

Students will describe the role of internal feedback mechanisms in the maintenance of homeostasis.

Students will investigate and analyze how organisms, populations, and communities respond to external factors.

**Genetic Combinations:**

Students will predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses and non-Mendelian inheritance.

Students will recognize the significance of meiosis to sexual reproduction.

Students will describe how techniques such as DNA fingerprinting, genetic modifications, and chromosomal analysis are used to study the genomes of organisms.



# Mesquite ISD Curriculum Sequence

## High School Science - Chemistry

### 1st Six Weeks

#### Students will investigate the following:

##### Safety and Math

The student will demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers.

The student will express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation, and significant figures.

##### Physical and Chemical Properties

The student will differentiate between physical and chemical changes and properties.

The student will identify extensive and intensive properties.

The student will compare solids, liquids, and gases in terms of compressibility, structure, shape, and volume. The student will classify matter as pure substances or mixtures through investigation of their properties.

##### Atomic Structure

The student will understand the experimental design and conclusions used in the development of modern atomic theory, including Dalton's Postulates, Thomson's discovery of electron properties, Rutherford's nuclear atom, and Bohr's nuclear atom.

The student will understand the electromagnetic spectrum and the mathematical relationships between energy, frequency, and wavelength of light.

The student will calculate the wavelength, frequency, and energy of light using Planck's constant and the speed of light.

The student will use isotopic composition to calculate average atomic mass of an element.

### 2nd Six Weeks

#### Students will investigate the following:

##### Periodic Table

The student will explain the use of chemical and physical properties in the historical development of the Periodic Table.

The student will use the Periodic Table to identify and explain the properties of chemical families, including alkali metals, alkaline earth metals, halogens, noble gases, and transition metals.

The student will use the Periodic Table to identify and explain periodic trends, including atomic and ionic radii, electronegativity, and ionization energy.

The student will express the arrangement of electrons in atoms through electron configurations and Lewis valence electron dot structures.

##### The Mole

The student will define and use the concept of a mole.

The student will use the mole concept to calculate the number of atoms, ions, or molecules in a sample of material.

##### Lewis Dot Diagrams for Compounds

The students will construct electron dot formulas to illustrate ionic and covalent bonds.

### 3rd Six Weeks

#### Students will investigate the following:

##### Naming Compounds

The student will name ionic compounds containing main group or transition metals, covalent compounds, acids, and bases, using International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules.

The student will write the chemical formulas of common polyatomic ions, ionic compounds containing main group or transition metals, covalent compounds, acids, and bases.

##### Bonding

The student will describe the nature of metallic bonding and apply the theory to explain metallic properties such as thermal and electrical conductivity, malleability, and ductility. and

The student will predict molecular structure for molecules with linear, trigonal planar, or tetrahedral electron pair geometries using Valence Shell Electron Pair Repulsion (VSEPR) theory.

The student will calculate percent composition and empirical and molecular formulas.



# Mesquite ISD Curriculum Sequence

## High School Science - Physics

### 1st Six Weeks

**Students will investigate the following:**

#### Physics Skills

(2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to:

(J) organize and evaluate data and make inferences from data, including the use of tables, charts, and graphs;

(L) express and manipulate relationships among physical variables quantitatively, including the use of graphs, charts, and equations.

(3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:

(F) express and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically, including problems requiring proportional reasoning and graphical vector addition.

#### Laws of Motion

(4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to:

**(A) generate and interpret graphs and charts describing different types of motion, including the use of real-time technology such as motion detectors or photogates;**

(D) calculate the effect of forces on objects, including the law of inertia, the relationship between force and acceleration, and the nature of force pairs between objects;

(E) develop and interpret free-body force diagrams; and

### 2nd Six Weeks

**Students will investigate the following:**

#### Laws of Motion – Continued from 1<sup>st</sup> six weeks

(4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to:

**(A) generate and interpret graphs and charts describing different types of motion, including the use of real-time technology such as motion detectors or photogates;**

**(B) describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration;**

(E) develop and interpret free-body force diagrams; and

#### Momentum

(6) Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum. The student is expected to:

**(C) calculate the mechanical energy of, power generated within, impulse applied to, and momentum of a physical system;**

**(D) demonstrate and apply the laws of conservation of energy and conservation of momentum in one dimension;**

### 3rd Six Weeks

**Students will investigate the following:**

#### Projectile and Circular Motion

(4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to:

**(A) generate and interpret graphs and charts describing different types of motion, including the use of real-time technology such as motion detectors or photogates;**

(C) analyze and describe accelerated motion in two dimensions using equations, including projectile and circular examples;

(E) develop and interpret free-body force diagrams; and

(F) identify and describe motion relative to different

#### Law of Gravitation

(4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to:

(C) analyze and describe accelerated motion in two dimensions using equations, including projectile and circular examples;

(5) Science concepts. The student knows the nature of forces in the physical world. The student is expected to:

**(B) describe and calculate how the magnitude of the gravitational force between two objects depends on their masses and the distance between their centers;**

frames of reference.



# Mesquite ISD Curriculum Sequence

## High School Science - IPC

### 1st Six Weeks

**Students will investigate the following:**

#### Nature of Science

- Students will demonstrate safe practices during laboratory and field investigations.
- Students will collect data and make measurements with precision.
- Students will plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology.

#### Position, Time, and Speed

- Students will describe, calculate, and graph an object's motion in terms of position, displacement, speed, and acceleration.
- Students will investigate how an object's motion changes only when a net force is applied.

#### Inertia, Mass, and Acceleration

- Students will assess the relationship between force, mass, and acceleration, noting the relationship is independent of the nature of the force, using equipment.
- Students will apply the concept of conservation of momentum using action and reaction forces such as students on skateboards.

#### Action/Reaction

- Students will assess the relationship between force, mass, and acceleration, noting the relationship is independent of the nature of the force.

#### Gravitational and Electrical Forces

Students will describe the gravitational attraction between objects of different masses at different distances. Students will examine electrical force as a universal force between any two charged objects and compare the relative strength of the electrical force and gravitational force.

#### Potential and Kinetic Energy/Work & Power

- Students will recognize and demonstrate that objects in motion have kinetic energy.
  - Students will demonstrate many common forms of potential energy, including gravitational, elastic, chemical, batteries.
- Students will investigate the law of conservation of energy.

### 2nd Six Weeks

**Students will investigate the following:**

#### Energy Movement

- Students will investigate the law of conservation of energy.
- Students will investigate and demonstrate the movement of thermal energy through solids, liquids, and gases by convection, conduction, and radiation such as in weather, living, and mechanical systems.

#### Energy Conversion

- Students will demonstrate common forms of potential energy, including gravitational, elastic, and chemical, such as a ball on an inclined plane, springs, and batteries.
- Students will demonstrate that moving electric charges produce magnetic forces and moving magnets produce electric forces.
- Students will investigate the law of conservation of energy
- Students will evaluate the transfer of electrical energy in series and parallel circuits and conductive materials.
- Students will analyze energy conversions such as those from radiant, nuclear, and geothermal sources; fossil fuels such as coal, gas, oil and the movement of water or wind.

#### Electric and Magnetic Forces

- Students will demonstrate common forms of potential energy.
- Students will demonstrate that moving electric charges produce magnetic forces and moving magnets produce electric forces.

#### Wave Structure/Wave Interaction

- Students will explore the characteristics and behaviors of energy transferred by waves, including acoustic, seismic, light, and waves on water as they superpose on one another, bend around corners, reflect off surfaces, are absorbed by materials, and change direction when entering new materials.
- Students will analyze energy conversions such as those from radiant, nuclear, and geothermal sources.; fossil fuels such as coal, gas, oil, and the movement of water or wind, and movement of water or wind.

### 3rd Six Weeks

**Students will investigate the following:**

#### Environment and Economic Impact of Energy Resources

- Students will recognize multiple forms of energy and will understand the impact of energy transfer and energy conservation in everyday life.
  - Students will analyze energy conversions such as those from radiant, nuclear, and geothermal sources; fossil fuels such as coal, gas, oil; and the movement of water or wind.
  - Students will critique the advantages and disadvantages of various energy sources and their impact on society and the environment.
  - Students will use critical thinking, scientific reasoning, and problem solving to make informed decisions.
  - Students will analyze, evaluate, and critique scientific explanations by using empirical evidence.
- Students will analyze, evaluate, and critique scientific explanations by using logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the students.