

2010 Northwestern Science Department Course Outline

8th Grade

- I. Science in our world: scientific methods & models
 - A. Science & scientists
 - 1. Methods of investigation
 - 2. Benefits of science in the world
 - 3. Science careers
 - B. Scientific methods
 - 1. Steps used in scientific methods
 - 2. Formulating testable hypothesis
 - 3. Scientific methods used to answer questions and solve problems
 - C. Scientific models
 - 1. Models represent the natural world
 - 2. Types of models
 - 3. Theories and laws
 - D. Tools, measurement, and safety
 - 1. Tools used to collect and analyze data
 - 2. International System of Units
 - 3. Safety symbols and contracts
- II. Earth Science
 - A. Maps as models of Earth
 - 1. Earth's magnetic poles

2. True North vs. Magnetic North
3. Longitude and latitude
4. Maps projections & distortions
5. Modern methods of map making
6. Topographic maps

B. Plate tectonics

1. Layers of the Earth
 - a. Composition
 - b. Physical properties
2. Tectonic plates
3. Wegener's hypothesis
4. Sea-floor spreading
5. Magnetic reversal
6. Tectonic plate boundaries
7. Forces thought to move tectonic plates
8. Folds, faults, & mountain types

C. Earthquakes

1. Causes of earthquakes
2. Detecting, measuring, and forecasting earthquakes

D. Volcanoes

1. Volcanic eruptions
2. Volcano features
3. Types of lava and pyroclastic material

4. Volcanoes and climate
 5. Types of volcanoes
 6. Compare craters, calderas, and lava plateaus
 7. Formation and movement of magma
 8. Volcano and plate tectonics
- E. Human impact on the Earth
1. Natural resources
 2. Renewable vs. non-renewable resources
 3. Conserving natural resources
 4. Using water wisely
 - a. Forms of water pollution
 - b. Properties of water influences the health of a water system
 - c. Wastewater treatment
 - d. Conserving water
 5. Ocean pollution -- point source & non-point source pollution
 6. Soil conservation
 7. Air pollution
 - a. Primary and secondary pollutants
 - b. Effects on ozone
 - c. Effects of air pollution on humans
 - d. Reducing air pollution
- F. Formation of the solar system
1. Relationships between gravity and pressure in a nebula

2. Solar system formation
3. Small bodies in the solar system
4. Structure and composition of the sun
5. Sun's energy
6. Surface activity of the sun and how it affects Earth
7. Formation of the solid Earth
8. Structure of Earth
9. Development of Earth's atmosphere
10. Formation of Earth's oceans and continents

III. Physical science

A. State of matter

1. Properties & states of matter
2. Behaviors of gases
3. Changes of state
 - a. Energy is involved in changes of state
 - b. Compare evaporation and condensation
 - c. Sublimation

B. Atoms

1. Atomic theory
2. The atom

C. Periodic table

1. Arranging elements
 - a. Mendeleev

- b. Modern periodic tables
- 2. Compare metals, nonmetals, and metalloids based on properties and location in the periodic table
- 3. Grouping elements by properties
- D. Chemical bonding
 - 1. Electrons and chemical bonding
 - 2. Ionic bonds
 - 3. Covalent and metallic bonds
 - 4. Chemical formulas and equations
 - a. Interpret and write simple chemical formulas
 - b. Write and balance simple chemical equations
 - 5. Lavoisier's work
 - 6. Law of Conservation of Mass
- E. Energy & energy resources
 - 1. Compare kinetic and potential energy
 - 2. Forms and relationships of energy
 - 3. Energy conversions
 - 4. Conservation of energy
 - 5. Energy resources
- F. Atomic energy
 - 1. Radioactivity
 - a. Compare alpha, beta, and gamma decay
 - b. Describe penetrating power of three kinds of nuclear radiation

- c. Calculate ages using half-life
- 2. Energy from the nucleus
 - a. Nuclear fission
 - b. Nuclear fusion
- G. Heat & heat technology
 - 1. Temperature
 - a. Temperature relates to kinetic energy
 - b. Compare temperature scales
 - c. Thermal expansion
 - 2. Heat
 - 3. Conduction, convection, and radiation
 - 4. Heat technology
- H. Electricity
 - 1. Electric charge and static electricity
 - a. Law of electric charges
 - b. Compare conductors with insulators
 - c. Static electricity & electric discharge
 - 2. Electric current and electrical energy
 - a. Voltage & electric current
 - b. Resistance & electric current
 - c. Generating electrical energy: thermocouples & photocells
 - 3. Electrical Calculations
 - a. Ohm's Law

- b. Compare power rating of electrical appliances
 - 4. Electric circuits
 - a. Essential parts of a circuit
 - b. Compare series circuit with parallel circuits
- I. Electromagnetism
 - 1. Properties of magnets
 - 2. Kinds of magnets
 - 3. Effects of Earth's magnetic field
 - 4. Electric current and magnetic field
 - 5. Compare solenoids and electromagnets
- J. Electronic technology
 - 1. Electronic devices
 - a. Circuit boards
 - b. Semiconductors
 - c. Diodes
 - d. Transistors
 - 2. Communication technology
 - a. Transmitted signals
 - (1.) Analog
 - (2.) Digital
 - 3. Computers
 - a. Basic functions
 - b. Main components

- c. Software
- d. Networks

IV. Life Science

A. Heredity

1. Mendel and his peas
 - a. Relationship between traits and heredity
 - b. Differences between dominant and recessive traits
2. Traits and Inheritance
 - a. Genes, alleles, genotype, and phenotype
 - b. Punnett square
 - c. Exceptions to Mendel's observations
3. Meiosis
 - a. Differences between mitosis and meiosis
 - b. Chromosomes determine sex

B. Genes & DNA

1. Structure of DNA
2. Copying DNA molecules
3. Relationships among DNA, genes, and proteins
4. Basic steps to make a protein
5. Mutations
6. Uses of genetic knowledge

C. Animals and behavior

1. Differences between vertebrates and invertebrates

2. Five characteristics of animals
3. Animal behaviors—learned and innate
4. Cycles that are influenced by biological clocks
5. Social relationships

D. Cycles in nature

1. Functions of producers, consumers, and decomposers in an ecosystem
2. Distinguish between food chain and food web
3. Energy flow through a food web
4. Cycles of Matter
 - a. Water cycle
 - b. Carbon cycle
 - c. Nitrogen cycle