

## 2010 Northwestern Science Department Course Outline

### 7<sup>th</sup> Grade

#### I. Science in our World

##### A. Science and Scientists

1. Methods of scientific investigation
2. Benefits of science
3. Jobs that utilize science

##### B. Scientific Methods

1. Why we use scientific methods
2. Designing and implementing controlled experiments
3. Analyzing data in the form of tables and graphs

##### C. Scientific Models

1. Physical, mathematical, and conceptual
2. Benefits and limits of models
3. Hypotheses, theories, and laws

##### D. Tools, Measurement, and Safety

1. SI units
2. Calculate area and density
3. Identify safety symbols and discuss issues

#### II. Physical Science

##### A. Measuring Motion

1. Speed
2. Average speed
3. Velocity
4. Acceleration
5. Force
6. Newton (SI unit)

7. Net Force
8. Balanced and unbalance forces
9. Gravity, static, magnetic, and nuclear forces
10. Friction
11. Difference between weight and mass

## B. Forces and Motion

1. Gravity
2. Air resistance
3. Terminal velocity
4. Free fall
5. Orbiting
6. Projectile motion
7. Newton's 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> laws
8. Inertia
9. Law of Conservation of Momentum

## C. Sound

1. Sound waves
2. Vibrations
3. Medium
4. Parts of the ear
5. Hearing loss
6. Pitch and frequency
7. Doppler Effect
8. Loudness and amplitude
9. Echoes and echolocation
10. Ultrasound
11. Interference – destructive and constructive

12. Sonic boom
13. Resonance
14. Sound quality
15. Sound versus noise

#### D. Light

1. Electromagnetic waves
2. Speed of light
3. Electromagnetic spectrum
4. Visible light
5. Reflection and Law of Reflection
6. Absorption
7. Scattering
8. Refraction
9. Lenses and mirrors
10. Diffraction
11. Optical illusions
12. Interference
13. Transmission (transparent, translucent, and opaque)
14. Color addition and color subtraction
15. Pigment
16. Parts of the eye
17. Vision problems (nearsightedness, farsightedness, and astigmatism)

### III. Earth Science

#### A. Rocks and Minerals

1. Rock cycle
2. Erosion
3. Deposition

4. Composition
5. Texture
6. Igneous rock
7. Differentiate between felsic and mafic
8. Differentiate between coarse-grained and fine-grained
9. Intrusive and extrusive
10. Sedimentary rock
11. Clastic rock
12. Chemical rock
13. Organic rock
14. Stratification
15. Metamorphic rock
16. Contact metamorphism
17. Regional metamorphism
18. Index minerals
19. Foliated rocks
20. Non-foliated rocks
21. Deformation

#### B. Rock and Fossil Record

1. Uniformitarianism- James Hutton
2. Catastrophism- Charles Lyell
3. Relative dating
4. Superposition
5. Geologic column
6. Disturbed rock layers
7. Unconformity
8. Disconformities

9. Nonconformities
10. Angular unconformities

#### C. Absolute Dating

1. Isotopes
2. Radiometric dating
3. Radiometric decay
4. Half-life
5. Types of radiometric dating

#### D. Geologic Time

1. Fossils
2. Divisions of time (eons, eras, periods, epochs)
3. Energy and resources
4. Renewable
5. Nonrenewable
6. Recycling
7. Conservation
8. Petroleum
9. Natural gas
10. Fossil fuels
11. Pollution from fossil fuels
12. Alternatives to fossil fuels (nuclear, chemical, solar, wind, hydroelectric, biomass, and geothermal)

#### E. Inside the Earth

1. Composition of crust, mantle, core
2. Lithosphere, asthenosphere, mesosphere
3. Plate tectonics
4. Continental drift
5. Sea-floor spreading

6. Types of plate boundaries

F. Deformation of Earth's Crust

1. Compression
2. Tension
3. Folding
4. Fault types
5. Types of mountains
6. Uplift
7. Subsidence
8. Earthquakes
9. Seismology
10. Elastic rebound
11. Seismic waves (P and S)
12. Volcanoes
13. Explosive and nonexplosive volcanoes
14. Parts of a volcano
15. Types of lava
16. Types of pyroclastic material
17. Effects from volcanoes
18. Types of volcanoes
19. Where volcanoes form

G. Stars

1. Colors of
2. Composition of
3. Types of
4. Brightness of
5. Apparent magnitude

6. Absolute magnitude
7. Light year
8. Parallax
9. Motion of stars
10. Life cycles

#### H. Sun

1. Structure of
2. Nuclear fusion
3. Sunspots
4. Solar flares

#### IV. Chemical Science

- A. Chemical reactions
- B. Precipitants
- C. Breaking and making bonds
- D. Writing formulas
- E. Reactants and products
- F. Law of conservation of mass
- G. Balancing equations
- H. Solubility and melting points
- I. Acids and bases
- J. Fundamentals of pH scale

#### V. Life Science

- A. Exchange With the Environment
  1. Diffusion
  2. Osmosis
  3. Passive and active transport
  4. Endocytosis and exocytosis

## B. Cell Energy

1. Photosynthesis
2. Cellular respiration
3. Fermentation

## C. Cell Cycle

1. Homologous chromosomes
2. Binary fission
3. Mitosis
4. Meiosis
5. Inherited traits
6. Punnett squares
7. Gregor Mendel
8. Sex chromosomes
9. Sex-linked disorders
10. Pedigrees
11. Selective breeding

## D. Bacteria

1. Shapes of bacteria
2. Prokaryotes
3. Bacterial reproduction
4. Endospores
5. Eubacteria classifications
6. Cyanobacteria
7. Archaeobacteria
8. Bioremediation
9. Nitrogen fixation
10. Bacteria in foods



11. Antibiotics
12. Harmful bacteria
13. Joseph Lister
14. Louis Pasteur
15. Germ Theory

#### E. Viruses

1. Hosts
2. Shapes and classifying viruses
3. Lytic cycle
4. Types of viruses

#### F. Interaction of living organisms

1. Biotic and abiotic factors
2. Population
3. Community
4. Ecosystem
5. Biosphere
6. Food chains and webs
7. Balance in ecosystems
8. Carrying capacity
9. Competition
10. Predators and prey