# First Semester – Geology

## Matter

* + 1. The student will identify, describe, and understand the structure and changes for the states of matter:
       1. Solid
       2. Liquid
       3. Gas
       4. Plasma
  1. Minerals
     1. The student will define minerals and identify tests for physical properties.
        1. Color
        2. Luster
        3. Texture
        4. Streak
        5. Cleavage/fracture
        6. Hardness
  2. Rocks
     1. The student will compare the origin and structure of igneous, metamorphic and sedimentary rock
        1. Structure of matter (atoms, molecules, isotopes)
        2. Physical properties (density) and chemical composition of common rock-forming mineral groups
        3. Origin, texture (crystal size, shape) and mineral compositi8on of common rock groups
  3. Weathering & Erosions
     1. The student will explain how the transfer of energy drives the rock cycle
        1. Destructive processes
           1. Weathering
           2. Erosion
           3. Subsidence
           4. Melting
        2. Constructive processes
           1. Lithification
           2. Deformation
           3. Metamorphism
           4. Volcanism
           5. Cooling/crystallization
           6. Deposition
        3. Landform change
           1. Surface & groundwater
           2. Coasts
           3. Glacial processes
           4. Desert processes
  4. Fossil & Geo. Dating
     1. The student will apply geologic principles used to date Earth’s geologic and biologic events
        1. Relative dating
           1. Superposition in rock columns

Core samples

Unconformities

* + - * 1. Uniformitarianism
        2. Crosscutting relationships
        3. Correlation of rock layers, fossils
      1. Absolute dating
         1. Radioactive dating
  1. Geo. Time
     1. The student will compare events in Earth’s history that have been grouped according to similarities
        1. Geologic time
           1. Scale
           2. Magnitude
        2. Era, period, epoch
  2. Plate Tectonic, Earthquakes, and Volcanoes
     1. The student will explain changes in Earth’s surface using plate tectonics
        1. Continental drift
           1. Rock/structure/climate/fossil evidence
           2. Jigsaw fit
        2. Sea floor spreading
           1. Age evidence
           2. Mantle circulation
           3. Outer core circulation/magnetic reversals
           4. Seismic activity
           5. Volcanism
           6. Mountain building
           7. Ocean ridges
        3. Theory of Plate Tectonics
           1. Crustal plate composition
           2. Mantle circulation
           3. Divergent/convergent/transform fault boundaries
           4. Subduction zones
           5. Trenches
           6. Island arcs
           7. Seismic activity
           8. Volcanism
           9. Mountain building

1. Second Semester – Meteorology/Oceanography (Space Science)
   1. Atmosphere
      1. The student will explain how global conditions are affected when natural and human-induced change alter the transfer of energy and matter
         1. Atmospheric composition and structure
            1. Greenhouse gases
            2. Stratospheric ozone concentration and distribution
            3. Aerosols
            4. Temperature
         2. Pollutants
            1. Particulates
            2. Tropospheric ozone concentration and distribution
            3. Acid rain
         3. Ocean-atmosphere-land interactions
            1. Current changes
            2. Continental movement
            3. El Nino
            4. La Nina
   2. Weather
      1. The student will explain how global conditions are affected when natural and human-induced change alter the transfer of energy and matter
         1. Clouds
         2. Precipitation
         3. Weather Patters (masses & fronts, thunderstorms, tornadoes, hurricanes)
         4. Forecasting weather (watch/warming, weather maps)
   3. Climate
      1. The student will explain how global conditions are affected when natural and human-induced change alter the transfer of energy and matter.
         1. Climate type and distribution
            1. Temperature
            2. Precipitation
         2. Sea level, glaciers and sea ice, biome location and distribution
         3. Climate change (Seasons, El Nino, Ice Age, Global Warming)
   4. Oceanography
      1. The student will describe how energy and matter transfer affect Earth systems
         1. Atmospheric circulation
            1. Heat transfer systems – conduction/convection/radiation
            2. Phase change
            3. Latent heat
            4. Pressure gradients
            5. General global circulation
            6. Coriolis effect
         2. Oceanic circulation
            1. Density differences
            2. Daily and seasonal land/sea breezes
            3. Coriolis effect
   5. Astronomy
      1. The student will describe the purpose and advantage of current tools, delivery systems and techniques used to study the universe
         1. Tools
            1. Optical and radio telescopes
            2. Spectrometers
         2. Delivery systems
            1. Satellite-based
            2. Ground-based
            3. Space probe
         3. Techniques
            1. Imaging
            2. Spectroscopy
      2. The student will describe the purpose and advantage of current tools, delivery systems and techniques used to study the atmosphere, land and water on Earth
         1. Tools
            1. Spectrometers
            2. Seismograph
         2. Delivery systems
            1. Satellite-based
            2. Ground-based
         3. Techniques
            1. Imaging
            2. Geographic Information System
            3. Global Positioning System
            4. Spectroscopy
            5. Doppler
            6. Epicenter location/time-travel graphs
      3. The student will explain the role of forces in the formation and operation of the universe
         1. Newton’s Universal Law of Gravitation
         2. Structure and evolution of galaxies and the universe
            1. Big Bang Theory
         3. Stellar structure and evolution
            1. Life cycle of stars
            2. Stellar systems
            3. H-R diagram
         4. Formation and evolution of the solar system
            1. Nebular theory
            2. Small bodies
         5. Kepler’s 3 Laws of Planetary Motion
         6. Sun-Earth connection
            1. Thermonuclear process
            2. Sunspot cycle
            3. Coronal mass ejection
            4. Flairs
            5. Solar wind
            6. Auroras
      4. The student will explain the role and interaction of revolution, rotation, and gravity on the Sun-Earth-Moon system
         1. Seasons
            1. Change in solar angle
            2. Yearly variation in length of day/night
            3. Absorption/reflection/scattering of insolation
            4. Solstices and equinoxes
            5. Rotation/revolution/precession
            6. Yearly variation of the sun’s altitude and azimuth
         2. Eclipses
            1. Lunar
            2. Solar
            3. Total
            4. Annular
            5. Partial
            6. Umbra
            7. Penumbra
            8. 2 eclipse “seasons” per Earth year
            9. Yearly/monthly variations in lunar position and length of visibility of the moon
         3. Earth-moon interactions
            1. Relationship between lunar phase and tide
            2. Tidal bulge and rate of lunar revolution
            3. Tides and Earth-moon distance
            4. Sidereal and synodic lunar months
   6. Environmental Impact
      1. The student will explain how global conditions are affected when natural and human-induced change alter the transfer of energy and matter
         1. Pollutants
            1. Particulate
            2. Tropospheric ozone concentration and distribution
            3. Acid rain