

Science Content Specifications

Part 1: Content Domains	
Domain 1: Physical Science	
1.1 Structure and Properties of Matter	Courses that address this content
a. Physical properties of solids, liquids, gases <ul style="list-style-type: none"> • Color •Electrical conductivity • Mass •Thermal conductivity • Hardness 	CHEM 100, 100L, 102, 115 PHYS 101, 101L, 102 GEOL 410
b. Physical changes	CHEM 100, 102, 111, 115 PHYS 101, 102 GEOL 410
c. Chemical changes	CHEM 100, 102, 111, 115 PHYS 102 GEOL 410
d. Atomic Theory of Matter	CHEM 100, 102, 115 PHYS 101, 102 GEOL 410
e. Subatomic structure – protons, electrons, neutrons	CHEM 100, 102, 111, 115 PHYS 101, 102 GEOL 410
f. Describe constituents of molecules and compounds	CHEM 100, 102, 111, 115 GEOL 410
g. Name common elements <i>e.g.</i> hydrogen, oxygen, iron	CHEM 100, 102, 115 GEOL 410
h. Periodic Table	CHEM 100, 102, 115
i. Periodic Trends	CHEM 100, 102, 115
j. Characteristics of solutions	CHEM 100, 100L, 102, 115
k. Acid-Base Character	CHEM 100, 100L, 102, 111, 115 GEOL 410
l. pH	CHEM 100, 100L, 102, 115
m. Mixtures/Separation of mixture components	CHEM 100, 100L, 102, 115
1.2 Principles of Motion and Energy	
a. Describe motion based on <ul style="list-style-type: none"> • Position • Velocity • Displacement • Acceleration • Speed 	PHYS 101, 101L, 115
b. Forces <ul style="list-style-type: none"> • Gravity • Friction • Magnetism 	PHYS 101, 101L, 115, 120
c. Basic Laws of Electrostatics	CHEM 102 PHYS 101, 101L, 115, 120
d. Identify forms of energy such as solar, chemical, electrical, magnetic, nuclear, sound, light, electromagnetic	CHEM 100, 100L, 102, 111, 115 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410
e. Conservation of energy and energy transformations	CHEM 100, 100L, 102, 111, 115 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410

f. Heat and Temperature; Temperature measurement systems	CHEM 100, 100L, 102, 115 PHYS 101, 101L, 102, 115 GEOL 410
g. Thermal energy transfer modes <ul style="list-style-type: none"> • Conduction • Convection • Radiation 	CHEM 102 GEOL 102 PHYS 101, 101L, 102, 115, 301 GEOL 410
h. Describe sources of light and interaction of light with matter	CHEM 102, 115 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410
i. Optical properties of waves <ul style="list-style-type: none"> • Reflection • Refraction 	PHYS 115, 120
j. Renewable and non-renewable energy sources and conservation of energy	CHEM 100, 100L, 102, 111, 115 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410

Domain 2: Life Science	Courses that address this content
1. Structure of Living Organisms and Their Function (Physiology and Cell Biology)	
a. Describe levels of organization and related functions in plants and animals such as <ul style="list-style-type: none"> • Organ systems • Organs, tissues • Cell • Organelles. 	BIOL 101, 102 BIOL 453
b. Structures and related functions of systems in plants and animals such as <ul style="list-style-type: none"> • Reproductive • Respiratory • Circulatory • Digestive 	BIOL 101, 102 BIOL 453
c. Principles of chemistry underlying the functioning of biological systems <ul style="list-style-type: none"> • Central role of carbon • Water • Salt • DNA • Energetics of photosynthesis 	BIOL 101, 101L, 102 BIOL 453
2.2 Living and Nonliving Components in Environments (Ecology)	
a. Characteristics of living organisms <ul style="list-style-type: none"> • Growth • Reproduction • Stimulus response 	BIOL 101, 101L, 102 BIOL 453
b. Basic needs of all living organisms <ul style="list-style-type: none"> • Food • Water • Space 	BIOL 101, 102 BIOL 453
c. Relationship between the number and types of organisms and ecosystem can support	BIOL 101, 102 BIOL 453
d. Relationships among members of a species and across species	BIOL 102 BIOL 453

e. Flow of energy and matter through an ecosystems from sunlight to food chains and food webs <ul style="list-style-type: none"> • Primary producers • Consumers • Decomposers 	BIOL 101, 102 BIOL 453
f. Identify the resources available in an ecosystem	BIOL 102 BIOL 453
g. Describe environmental factors that support an ecosystem <ul style="list-style-type: none"> • Temperature • Water • Soil composition 	BIOL 101, 102 BIOL 453
2.3 Life Cycle, Reproduction, and Evolution (Genetics and Evolution)	
a. Diagram life cycles of familiar organisms <ul style="list-style-type: none"> • Butterfly • Frog • Mouse 	BIOL 102 BIOL 453
b. Explain factors that affect the growth and development of plants <ul style="list-style-type: none"> • Light • Gravity • Stress 	BIOL 101 BIOL 102 BIOL 453
c. Distinguish between sexual and asexual reproduction	BIOL 101, 102 BIOL 453
d. Mitosis	BIOL 101, 102 BIOL 453
e. Replication of plants and animals	BIOL 101, 102 BIOL 453
f. Distinguish between environmental and genetic sources of variation	BIOL 101, 102 BIOL 453
g. Principles of natural and artificial selection	BIOL 101, 102 BIOL 453
h. Evidence that supports the theory that life gradually evolved <ul style="list-style-type: none"> • Fossil record • Comparative anatomy • DNA sequences 	BIOL 101, 102
i. Darwin's theory of species evolution by natural selection	BIOL 101, 102

Domain 3: Earth and Space Science	
3.1 The Solar System and the Universe (Astronomy)	Courses that address this content
a. Planets and planetary motion <ul style="list-style-type: none"> • Comets • Asteroids 	GEOL 102 PHYS 120 GEOL 410
b. Explain time zones in terms of longitude and rotation of Earth	GEOL 102, 101L PHYS 120 GEIL 410
c. Seasons	GEOL 102 PHYS 120

	GEOL 410
d. Describe bodies in the universe <ul style="list-style-type: none"> • Sun • Stars • Galaxies 	GEOL 102 PHYS 120 GEOL 410
3.2 The Structure and Composition of the Earth (Geology)	
a. Formation and observable physical properties of minerals <ul style="list-style-type: none"> • Quartz • Calcite • Hornblende • Mica • Common ore minerals 	GEOL 101, 101L, 102
b. Formation and observable physical properties of rocks <ul style="list-style-type: none"> • Sedimentary • Igneous • Metamorphic 	GEOL 101, 101L, 102
c. Characteristics of landforms <ul style="list-style-type: none"> • Mountains • Rivers • Deserts • Oceans 	GEOL 101, 101L, 102
d. Rock cycle <ul style="list-style-type: none"> • Weathering • Erosion • Deposition • Soils 	GEOL 101, 101L, 102
f. Structure of the Earth <ul style="list-style-type: none"> • Crust • Lithosphere • Mantle • Core 	GEOL 101, 101L, 102 GEOL 410
g. Plate tectonics and convection	GEOL 101, 101L, 102 GEOL 410
h. Volcanic activity	GEOL 101, 101L, 102 GEOL 410
i. Mountain formation	GEOL 101, 102
j. Evidence for plate tectonics <ul style="list-style-type: none"> • Factors that influence location and intensity of earthquakes • Effect of plate motion over time of climate and geography • Distribution of organisms • Changes on Earth over geologic time 	GEOL 101, 101L, 102 GEOL 410
3.3 The Earth's Atmosphere (Meteorology)	
a. Role of sun and oceans in weather and climate	GEOL 102
b. Water cycle	GEOL 102
c. Causes and effects of air movements and ocean currents on daily and seasonal weather and on the climate.	GEOL 102
3.4 Earth's Water (Oceanography)	
a. Compare characteristics of bodies of water <ul style="list-style-type: none"> • Rivers • Lakes • Oceans • Estuaries 	GEOL 101, 101L, 102

b. Mechanisms causing and modifying tides <ul style="list-style-type: none"> • Gravitational attraction of moon and sun • Coastal topography 	GEOL 102 PHYS 120
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Part II: Subject Matter Skills and Abilities Applicable to the Content Domains in Science	
Subject Matter Skills and Abilities	Courses that address these skills and abilities
a. Plan and conduct a scientific investigation to test a hypothesis	BIOL 101L, 102 CHEM 100L, 102, 115 GEOL 101L, 102 PHYS 101L, 102, 115, 120, 301 GEOL 410, BIOL 453
b. Apply principles of experimental design <ul style="list-style-type: none"> • Formulation of testable questions and hypotheses • Evaluation of accuracy and reproducibility of data 	BIOL 101L, 102 CHEM 100L, 102, 115 GEOL 101L, 102 PHYS 101L, 102, 115, 120, 301 GEOL 410, BIOL 453
c. Distinguish between dependent and independent variables, and controlled parameters	BIOL 101, 101L, 102 CHEM 100, 100L, 102, 111, 115 GEOL 101, 101L, 102 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410, BIOL 453
d. Distinguish between linear and nonlinear relationships of data on a graph.	BIOL 101, 101L, 102 CHEM 100, 100L, 102, 111, 115 GEOL 101, 101L, 102 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410, BIOL 453
e. Use scientific vocabulary appropriately <ul style="list-style-type: none"> • Observation • Organization • Experimentation • Inference • Prediction • Evidence • Opinion • Hypothesis • Theory • Law 	BIOL 101, 101L, 102 CHEM 100, 100L, 102, 111, 115 GEOL 101, 101L, 102 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410, BIOL 453
f. Select and use a variety of scientific tools	BIOL 101L, 102 CHEM 100L, 102, 115 GEOL 101L, 102 PHYS 101L, 102, 115, 120, 301 GEOL 410, BIOL 453
g. Record length, mass, and volume measurements using the metric system.	BIOL 101L, 102 CHEM 100L, 102, 115 GEOL 101L, 102 PHYS 101L, 102, 115, 120, 301 GEOL 410, BIOL 453
h. Interpret results of experiments and events by sequence and time from evidence of natural phenomena.	BIOL 101, 101L, 102 CHEM 100, 100L, 102, 111, 115 GEOL 101, 101L, 102 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410, BIOL 453

i. Communicate the steps in an investigation, record data, interpret and analyze numerical and non-numerical results using charts, maps, tables, models, graphs, and labeled diagrams.	BIOL 101, 101L, 102 CHEM 100, 100L, 102, 111, 115 GEOL 101, 101L, 102 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410, BIOL 453
j. Make appropriate use of print and electronic resources in preparing for investigative activity.	BIOL 101, 101L, 102 CHEM 100, 100L, 102, 111, 115 GEOL 101, 101L, 102 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410, BIOL 453
k. Communicate steps and results of scientific investigation in both verbal and written formats.	BIOL 101, 101L, 102 CHEM 100, 100L, 102, 111, 115 GEOL 101, 101L, 102 PHYS 101, 101L, 102, 115, 120, 301 GEOL 410, BIOL 453

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