



Curriculum

Science

Scope and Sequence P-8

2701 South York Street
Denver, CO 80210
(303) 756-9481
Fax: (303) 756-5512
www.st-annes.org

Rationale for the Science Department

Science is a way of thinking and a way of asking questions. Science students need to think critically, all within an ethical framework, as they construct their own knowledge in elementary and middle school.

Science at St Anne's creates an atmosphere that nurtures the natural curiosity our students have for the world around them. In their investigations into the physical, life, environmental, earth, and space sciences, we must encourage our students to be aware of the beauty and balance that exist and how to use and preserve them responsibly.

Science has technology as its partner. Students are challenged to use the proper tools of technology, including the Internet, in a constructive way.

Goals of the Science Department

In an effort to give our students the tools needed to think critically about the increasingly complex issues they will face and to appreciate the beauty and wonder around them, the science program at St. Anne's is focused on:

- 1) creating excitement through many hands-on, minds-on activities;
- 2) developing critical thinking skills;
- 3) constructing knowledge through inquiry;
- 4) promoting the use and value of the scientific method not only as the core of scientific inquiry, but additionally as an instrument to be used in everyday problem solving;
- 5) nurturing the students ability to ask questions;
- 6) providing students with access to the appropriate tools of technology.

	PRESCHOOL	KINDERGARTEN	GRADE ONE	GRADE TWO	GRADE THREE
Life Science	<p>Plant Life</p> <ul style="list-style-type: none"> exploring trees and gardens of SAES, observation of seasonal plants, making individual collections and collage construction using fall leaves, making individual seed sprouting experiments. <p>Animal Life</p> <ul style="list-style-type: none"> exploring the life cycles, habitat, diet of a variety of animals including those in campus, three largest bears <p>Insects</p> <ul style="list-style-type: none"> introduction to basic insects and spiders raising live Painted Lady butterflies <p>Human Body</p> <ul style="list-style-type: none"> introduction to the parts of the human body, basic nutrition <p>Birds</p> <ul style="list-style-type: none"> introduction to basic bird behavior, observation of Robins, owls, turkeys, Canada Geese, habitat, diet, migration <p>Hygiene</p> <ul style="list-style-type: none"> individual exploration of hand washing techniques using black light, individual mouth hygiene <p>Ocean Life</p> <ul style="list-style-type: none"> introduction to 5 major oceans and location on the globe individual investigation of various shells using magnifying glass observation of sea life on Monterey Bay Aquarium web site 	<p>Plant Life</p> <ul style="list-style-type: none"> exploring trees and gardens of SAES, observation of seasonal plants, making individual collections and collage construction using fall leaves, making individual seed sprouting experiments, seed mosaics <p>Animal Life</p> <ul style="list-style-type: none"> exploring the life cycles, habitat, diet of a variety of animals including those living on campus study of 8 bears including live observation of bear behavior at San Diego Zoo farm and farm animals, slide tour of Littleton, Colorado Historical farm <p>Insects</p> <ul style="list-style-type: none"> building on foundation of basic habitat, diet, life cycle, Tiger Swallowtail Butterfly raising live Painted Lady Butterflies <p>Human Body</p> <ul style="list-style-type: none"> building on basic skills, introduction to basic systems, use of flannel body with basic parts, examination of skeleton model, examination of X-Rays, listening to individual hears with stethoscope <p>Ocean Life</p> <ul style="list-style-type: none"> re- introduction to 5 major oceans and location on the globe individual investigation of various shells using magnifying glass observation of sea life on Monterey Bay Aquarium computer site observation of whales and sea life at San Diego Sea World via live "cams, 	<p>Animal Life</p> <ul style="list-style-type: none"> exploration of animal behavior, life cycles, and diet, characteristics of mammals, animal adaptations, observation of animals on campus, observation of various animal's behavior on live cams from the San Diego Zoo. <p>Plant Life</p> <ul style="list-style-type: none"> review of basic plant parts, observation and identification of trees and seasonal flowers on Campus, individual planting of Red Emperor tulip garden in coordination with International Tulip Study of Journey North, continued observation of tulip growth during the full life cycle, seasonal observation walks on SAES campus <p>Human Body</p> <ul style="list-style-type: none"> further study of brain, heart, circulation, skeleton, muscles, digestion, nutrition, observation of human X-Rays and model replications, listening to individual heart with stethoscope <p>Ocean Life</p> <ul style="list-style-type: none"> further exploration of ocean properties, life in the three ocean zones, examination of sea stars <p>Dinosaurs</p> <ul style="list-style-type: none"> exploration of most recognized dinosaurs, Colorado dinosaurs, examination of photographs of Dinosaur prints from Dinosaur Ridge, Morrison, Colorado, magnifying glass examination of dinosaur fossil castings, hands on examination of actual fish fossil from Morrison, Colorado. <p>Birds</p> <ul style="list-style-type: none"> observation of Colorado birds, introduction of general bird parts, habitat, diet, observation of birds at SAES maintain bird feeders on campus. <p>Insects</p> <ul style="list-style-type: none"> review of basic insect parts, ladybug safari (capture, observation, release) on campus, exploration of bat behavior, visiting bat box mounted on SAES building, raising live Painted Lady butterflies individual participation in sending and receiving butterfly pictures from Mexican students living in the Monarch Butterfly Sanctuary <p>Reptiles</p> <ul style="list-style-type: none"> foundation of basic common reptiles, observation of garter snakes on SAES campus <p>Rainforest</p> <ul style="list-style-type: none"> in corroboration with 1st grade home rooms exploration of elogogy, native residents, flora and fauna of the typical Rainforest. 	<p>Antarctica</p> <ul style="list-style-type: none"> exploration of marine, bird, and human life, e-mail contact with worker at McMurdo Station, observation of penguin behavior at Monterey Bay Aquarium live "penguin cam". <p>Plant Life</p> <ul style="list-style-type: none"> review of plant parts, individual dissection of Astromeria blossoms, individual planting of Red Emperor tulips in coordination with the International Tulip Study of Journey North, observation of located on SAES campus <p>Insects</p> <ul style="list-style-type: none"> review of basic insect parts, habitat, and diet, raising live Painted Lady butterflies. Individual participation in sending and receiving butterfly pictures from Mexican students living in the Monarch Butterfly Sanctuary <p>Animal Life</p> <ul style="list-style-type: none"> focus on 8 types of recognized bears, exploration of Woo Lon, China Panda Bear conservation station, observation of Polar and Panda bear behavior at San Diego Zoo live cam, general mammal behavior, habitat, and diet. <p>Ocean Life</p> <ul style="list-style-type: none"> focus on Galapagos Islands marine, volcanic, land, bird, native inhabitant life, and interactive activity with American Museum of Natural History, sideshow enrichment 	<p>Ecosystems</p> <ul style="list-style-type: none"> food chains/food webs looking at how abiotic and biotic factors affect each ecosystem. each student creates their own make-up ecosystem with all factors involved. <p>Insects</p> <ul style="list-style-type: none"> students are given six mealworm larva to study the changes in life cycle.

	GRADE FOUR	GRADE FIVE	GRADE SIX	GRADE SEVEN	GRADE EIGHT
<i>Life Science</i>	<p>Human Body</p> <ul style="list-style-type: none"> students look at different types of cells under the micro scope. cell structures are identified. students design and construct their own “cell” out of household materials. <p>Circulatory System</p> <ul style="list-style-type: none"> students test their heart rates at rest and at play. <p>Respiratory System</p> <ul style="list-style-type: none"> students build a “lung” to illustrate the expansion and contraction of the lungs. <p>Digestion System</p> <ul style="list-style-type: none"> students construct a life size body and identify the parts of the digestion system. <p>Frog Dissection</p> <ul style="list-style-type: none"> lab technique and proper dissecting methods are stressed. <p>Personal Hygiene Day</p> <ul style="list-style-type: none"> a look at body changes, and age appropriate hygiene. 	<p>Botany</p> <ul style="list-style-type: none"> photosynthesis patterns in plants and associated botanical vocabulary leaf collecting, mounting, and labeling <p>Human Skeletal System</p> <ul style="list-style-type: none"> functions of bones human bone identification joints and tissues associated with joints fractures and bone health <p>Owl Pellet Dissection</p> <ul style="list-style-type: none"> owl ecology adaptations of owls skeletal comparative anatomy 	<p>Entomology</p> <ul style="list-style-type: none"> Taxonomy, scientific classification of insects insect collecting and mounting insect collection labeling, maintenance and storage insect adaptations cultural entomology <p>Circulatory System</p> <ul style="list-style-type: none"> heart function and anatomy, sheep heart anatomy labeling lab types of blood vessels functions of blood and types of blood cells, blood types circulatory system health <p>Reproductive System</p> <ul style="list-style-type: none"> anatomy and function puberty <p>St. Anne’s in the Hills</p> <ul style="list-style-type: none"> mountain life zones 	<p>Ecology</p> <ul style="list-style-type: none"> life zones, biotic and abiotic factors <p>Genetics</p> <ul style="list-style-type: none"> Mendal, DNA structure – ethical issues related to DNA and genetic research <p>Cells</p> <ul style="list-style-type: none"> Organelles and their functions cell types and their functions <p>Mitosis and Meiosis</p> <ul style="list-style-type: none"> students learn the differences between these processes and perform experiments to help illustrate these concepts <p>Dissection</p> <ul style="list-style-type: none"> earthworm, fish, and anthropods 	<p>Human Body</p> <ul style="list-style-type: none"> eukaryote and prokaryote cells, cell parts, stem cells, osmosis and diffusion, cellular respiration, skeletal system <p>Circulatory System</p> <ul style="list-style-type: none"> functions of blood, types of blood cells and vessels, heart, EKG, blood pathways, blood type, Rh factor, diseases of the circulatory system, lymphatic system <p>Internal Body Processes</p> <ul style="list-style-type: none"> respiratory, digestive systems, metabolism <p>Nervous System</p> <ul style="list-style-type: none"> central and autonomic nervous systems, neurons, sense organs, hormones, cellular respiration <p>Endocrine system</p> <ul style="list-style-type: none"> hormones, endocrine glands, glycogen, diabetes <p>Nutrition</p> <ul style="list-style-type: none"> nutrients in food, food additives, calories, nutritional facts on labels, food groups, eating disorders <p>Disease</p> <ul style="list-style-type: none"> Jenner, Koch’s Postulates, Immune system, cancer, AIDS, natural defenses, antibodies, pasteurization <p>Drugs</p> <ul style="list-style-type: none"> stimulant, depressants, antibiotics, tobacco, alcohol, narcotics, cocaine, amphetamines, marijuana, ecstasy <p>Human Reproduction</p> <ul style="list-style-type: none"> stem cells, mitosis and meiosis, fertilization, menstrual cycle, STDs <p>Genetics</p> <ul style="list-style-type: none"> Human Genome Project, ATGC, genes, Heredity, Punnett Squares, Mendel, Pedigree <p>Dissection</p> <ul style="list-style-type: none"> frog, cow eye, cow brain, sheep heart, fetal pig

	PRESCHOOL	KINDERGARTEN	GRADE ONE	GRADE TWO	GRADE THREE
<i>Physical Science</i>	<p>Physical Science</p> <ul style="list-style-type: none"> • observation of class radiometer using solar energy • use of sunscreen on Frisbee • individual necklaces of “sun beads” changing color in sunlight • individual blueprint paper pictures developed in sunlight • goldenrod paper • properties of water, magnets, flotation • properties of matter • bubble exploration 	<p>Physical Science</p> <ul style="list-style-type: none"> • magnets • properties of light, air, water • color mixing and separation • bubble exploration <p>Microscopes</p> <ul style="list-style-type: none"> • introduce “talking microscopes” • individual viewing of a variety of slides and forms of transportation 	<p>Physical Science</p> <ul style="list-style-type: none"> • observation of solar energy in classroom radiometer • properties of light and water • air pressure experiments with “Stomp Rockets” • magnets • rock explorations including volcanoes • bubble exploration <p>Microscopes</p> <ul style="list-style-type: none"> • use “talking microscopes” for individual viewing and exploration • coordination with technology instructor for technology class period demonstration to access web sites pertinent to science class 	<p>Physical Science</p> <ul style="list-style-type: none"> • observation of solar energy in classroom radiometer, properties of light and water, • air pressure experiments with “Stomp Rockets” • advanced magnets • rock explorations including volcanoes, • bubble exploration • reinforce observation of solar system • further experiments with “Stomp Rockets” 	<p>Machines / Technology</p> <ul style="list-style-type: none"> • students build simple machines • students experiment with pulleys, sprockets, and levers <p>Energy and Motion</p> <ul style="list-style-type: none"> • Newton’s laws of motion • gravity, Inertia, Friction, and other outside forces. <p>Electricity</p> <ul style="list-style-type: none"> • students build simple circuits to explore the differences between parallel and series circuits. • switches, conductors, insulators. <p>Magnetism</p> <ul style="list-style-type: none"> • students experiment with a wide range of magnetic materials. • a brief look at our planets magnetic field. • comparisons between magnetism and electricity. <p>Chemistry</p> <ul style="list-style-type: none"> • atomic structure, electrons, protons, and molecules • chemical reactions, making and breaking bonds. <p>Scientific Method</p> <ul style="list-style-type: none"> • students do a wide range of experiments all designed to illustrate the steps of the Scientific Method.

Physical Science

	GRADE FOUR	GRADE FIVE	GRADE SIX	GRADE SEVEN	GRADE EIGHT
	<p>Characteristic Properties</p> <ul style="list-style-type: none"> • melting point, boiling point, and density. • a series of experiments to illustrate specific physical and chemical properties. • graphing <p>Newton's Laws of Motion</p> <ul style="list-style-type: none"> • the text book ScienceSaurus is the backbone of our experiments and discussions. <p>Earth Layers</p> <ul style="list-style-type: none"> • a computer simulation helps lead our discussions and experiments. <p>Scientific Method</p> <ul style="list-style-type: none"> • a series of hands-on experiments designed to illustrate each step of the scientific method. • students use plants to design an experiment to test a hypothesis. • students perform their own experiment based on Scientific method. • students present their findings and posters. 	<p>Metric System</p> <ul style="list-style-type: none"> • metric basics 	<p>Electricity</p> <ul style="list-style-type: none"> • atomic structure, atomic number, ions • static electricity, developing charges, static discharge • lightning and lightning safety • current electricity, circuits, conductors and insulators • electricity game construction <p>Scientific Method</p> <ul style="list-style-type: none"> • formulate and test hypotheses, collect data, share results 	<p>Newton's Laws of Motion</p> <ul style="list-style-type: none"> • a series of experiments and demonstrations help illustrate Newton's laws. • inertia, friction, gravity, and other outside forces are explored. <p>Bridge Building</p> <ul style="list-style-type: none"> • students design and build their own bridges <p>Energy and Motion</p> <ul style="list-style-type: none"> • students design and build a Trebuchet. • data collection and problem solving are stressed. <p>Snow Science</p> <ul style="list-style-type: none"> • Keystone Science School • a three day trip to the Keystone science school. • team building, avalanche dynamics, and snow metamorphosis. 	<p>Matter</p> <ul style="list-style-type: none"> • atoms, energy levels, states of matter, properties of matter, compounds, mixtures, solutions <p>Elements</p> <ul style="list-style-type: none"> • Periodic Table, elements, electron configuration, sublevels, bonds, acids and bases, indicators, pH, neutralization, fuel cell <p>Chemical Reactions</p> <ul style="list-style-type: none"> • ions, isotopes, oxidation numbers, balancing formulas, polyatomics, diatomics, coefficients, balancing equations, types of chemical reactions, exothermic and endothermic <p>Chemistry for Life</p> <ul style="list-style-type: none"> • molecules of life – proteins, carbohydrates, lipids, nucleic acids, reactions of life – cellular respiration, photosynthesis, fermentation, krebs cycle, probiotics <p>Heat</p> <ul style="list-style-type: none"> • types of energy, work, temperature, heat of vaporization, heat of fusion, calories, transfer of heat, insulation <p>Sound and Light</p> <ul style="list-style-type: none"> • waves, doppler effect, speed of sound and light, fiber optics, reflection, refraction, electromagnetic waves, white light, prisms, human ear, human eye <p>Electricity and Magnetism</p> <ul style="list-style-type: none"> • electric current, potential difference, conductors, insulators, semiconductors, circuits, ampere, voltage, resistance, power, electromagnets, batteries, bionic chips <p>Nuclear Energy</p> <ul style="list-style-type: none"> • fission, fusion, decay, kinds of nuclear energy, half-life, carbon 14 dating, cosmic rays <p>Science & Technology</p> <ul style="list-style-type: none"> • scientific method, metric system

	PRESCHOOL	KINDERGARTEN	GRADE ONE	GRADE TWO	GRADE THREE
<i>Earth/Space Science</i>	<p>Space Exploration</p> <ul style="list-style-type: none"> • introduction to the planets, current space projects, Space Shuttle, International Space Station • construction of individual solar systems using current photographs from NASA <p>Earth Study</p> <ul style="list-style-type: none"> • introduction to “green” practices • basic weather, seasons • properties of light and color • introduction to basic rocks through individual exploration with magnifying glasses 	<p>Earth Study</p> <ul style="list-style-type: none"> • weather, seasons, basic conservation, globes and maps”, “This is where I live.” <p>Solar System</p> <ul style="list-style-type: none"> • development of foundation relating to the planets, current space projects, Space Shuttle, International Space Station • construction of individual solar systems using current photographs from NASA 	<p>Space Exploration</p> <ul style="list-style-type: none"> • development of foundation relating to the planets, current space projects, Space Shuttle, International Space Station • observation of current space photographs from NASA <p>Earth Awareness</p> <ul style="list-style-type: none"> • introduce seasons, “green” practices, our earth, weather, continuation of rock studies 	<p>Space Exploration</p> <ul style="list-style-type: none"> • development of foundation relating to the planets, current space projects, Space Shuttle, International Space Station, using current photographs from NASA, Mars focus, making individual Mars “stations” <p>Earth Awareness</p> <ul style="list-style-type: none"> • reinforce seasons, “green” practices, conservation, weather, continuation of rock studies 	<p>Solar System</p> <ul style="list-style-type: none"> • The Great Solar System Rescue Game, an interactive computer simulation. • students test different rocket designs using straws and paper wings. • students design and build their own rockets

	GRADE FOUR	GRADE FIVE	GRADE SIX	GRADE SEVEN	GRADE EIGHT
<i>Earth/Space Science</i>	<p>Rocks, Minerals, and Geology</p> <ul style="list-style-type: none"> • igneous, sedimentary, metamorphic rocks • plate tectonics, earth layers, continental drift <p>Oceans</p> <ul style="list-style-type: none"> • great ocean rescue: hands-on, interactive group laserdisc activity 	<p>Earth's Atmosphere</p> <ul style="list-style-type: none"> • properties of air • characteristics of the atmosphere • hot air balloon construction and launch <p>Astronomy</p> <ul style="list-style-type: none"> • measuring distances in space • deep space research projects 	<p>Orienteering Compass Use</p>	<p>Changing Surface of the Earth</p> <ul style="list-style-type: none"> • a look at the sometime violent changes in the earth's surface <p>Geologic Time</p> <ul style="list-style-type: none"> • students create their own geologic time lines <p>Minerals</p> <ul style="list-style-type: none"> • students perform a series of test to identify their own minerals <p>Dinosaurs</p> <ul style="list-style-type: none"> • Each student researches and presents a keynote presentation on their own dinosaur <p>Tasa Software</p> <ul style="list-style-type: none"> • computer simulations and interactive games are the catalyst of our Earth Science Units 	<p>Astronomy and the Moon</p> <ul style="list-style-type: none"> • telescopes, moon, moon phases, eclipse <p>Our Solar System</p> <ul style="list-style-type: none"> • Galileo, Copernicus, Ptolemy, Kepler, Sun, planets, Big Bang theory, meteroids, comets, asteroids <p>Stars and Galaxies</p> <ul style="list-style-type: none"> • stars, parallax, novas, supernovas, nebulas, pulsars, galaxies, universe, black holes <p>Space Exploration</p> <ul style="list-style-type: none"> • satellites, thrust, rockets, shuttle, Sky Lab, heat of reentry, gyroscope