

2020 ARIdeas Science, STEM Course List for Educators

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Category	Course Number	Title	Brief Description
Science	SIC15047	Elementary Science Safety and Lab Guidelines	Science safety issues and concerns presented in 3 lessons with graded assessment, survey and certificate.
STEM	TCJ14010	Integrating Technology in Classroom: Butterflies and Moths	This ASU Delta STEM Education Center course is an-depth study of butterflies native to Arkansas including a technological emphasis on websites that teachers and students will find helpful throughout their investigations.
STEM	IAB14087	STEM Foundations 2	Critical and Close Reading of Nonfiction Text
STEM	IAB14088	STEM Foundations 3	Writing Across Content Areas
STEM	IAB14089	STEM Foundations 4	Problem Solving and Mathematical Practices
STEM	IAB14090	STEM Foundations 5	Historical Thinking and Document Analysis Skills
STEM	IAB14091	STEM Foundations 6	Use of Technology for Project Based/Problem-based Learning
STEM	IAB14087	STEM Foundations 7	Science Content Knowledge and Inquiry Skills
STEM	IAB14086	STEM Foundations 1	Academic Language Proficiency
Science	LAC15041	Shifts in Science Education	Older Cathy Mackey Video but still relates to STEM teaching and learning. This course demonstrates the application of these changes using a model learning investigation. In addition to exploring the major instructional shifts, the presenters provide background information on the development of the standards, recommendations for curriculum planning and development, and resources helpful for implementing the three dimensions of science education.
Science	SIB15038	A Framework for K-12 Science Education and the NGSS: A New Vision for Science Education	Listed under subject area "State Standards"
Science	SIB15039	Scientific and Engineering Practices in the Classroom	Listed under subject area "State Standards"
Science	SIB15040	Crosscutting Concepts	Listed under subject area "State Standards"
Science	SSC15028	A Vision and Plan for Science Teaching and Learning	Listed under subject area "State Standards"
Science	SIE14001	Journey North: Introduction	The Journey North program is a free resource for elementary and middle school classes that is comprised of a variety of topics, lessons, and activities.

** If you search for STEM, anything with a STEM Center or the letters "stem" such as system is tagged.*

Science	SIE14002	Journey North: Seasonal Migrations-Monarch Butterflies	While the Journey North program provides opportunities for exploring dozens of different animal migrations, this workshop focuses on the most popular migration--that of monarch butterflies. Participants use some of the lessons from Journey North resources to study migration while using prediction as an inquiry tool, exploring the Journey North website, and correlating the Journey North investigations with life science curriculum.
Science	SIE14003	Journey North: Plants and the Seasons-Tulip Gardens	This workshop follows several classes around the country as they explore plant growth and seasonal change through individual student investigations and through Journey North's International Tulip Study. Participants learn the importance of experimental protocols, as well as how Journey North integrates process skills into inquiry-based activities.
Science	SIE14004	Journey North: Sunlight and the Seasons-Mystery Class	Journey North's investigation into sunlight's seasonal changes takes students on an eleven-week-long investigative hunt known as Mystery Class. This workshop presentation chronicles the students' adventures as they track and analyze changes in sunlight north and south of the equator and follow a series of clues to locate the ten Journey North Mystery Classes around the world.
Science	SIE14005	Learning Science Through Inquiry:What Is Inquiry and Why Do It?	This introductory workshop presents an overview of why inquiry is such a powerful approach to teaching and learning science-how it enables you to assess and meet the needs of a wide range of learners, how it taps children's natural curiosity, and how it deepens their understanding of science.
Science	SIE14006	Learning Science Through Inquiry: Setting the Stage-Creating a Learning Community	At the heart of inquiry teaching and learning is a positive environment that encourages and supports students on their learning paths. This course looks at what is needed for building that foundation and preparing your students for inquiry investigations.
Science	SIE14007	Learning Science Through Inquiry: The Process Begins-Launching the Inquiry	To inquire into specific scientific phenomena, students need to draw upon a foundation of experience. This course shows how you can encourage students to share and discuss what they already know, and to explore the materials and phenomena in an open-ended manner.
Science	SIE14008	Learning Science Through Inquiry: Focus the Inquiry-Designing the Exploration	Students' open exploration leads to a range of interests and questions that lead in turn to deeper investigation. This course looks at the design process-how you can guide students to plan and begin their investigations.

Science	SIE14010	Learning Science Through Inquiry: Processing for Meaning During Inquiry	Making meaning from investigations and experience requires that you guide student dialogue, encouraging your students to make connections, draw conclusions, and ask new questions. This course looks at the rationale for this kind of processing, and strategies that can help students construct new mental frameworks.
Science	SIE14011	Learning Science Through Inquiry: Assessing Inquiry	Assessment is an ongoing process in the classroom. This course looks at a variety of assessment strategies that range from the very informal formative assessments to formal summative assessments, and explores the purposes each can serve.
Science	SIE14012	Learning Science Through Inquiry: Connecting Other Subjects to Inquiry	How to use subjects like mathematics and language to further scientific inquiry and understanding of science concepts,
Science	SIE14013	Essential Science for Teachers: Physical Science-Properties and Classification of Matter	Physical Science Content with emphasis on Matter
Science	SIE14014	Essential Science for Teachers: Physical Science-The Particle Nature of Matter: Solids, Liquids, and Gases	participants learn how the "particle model" can be turned into a powerful tool for generating predictions about the behavior of matter under a wide range of conditions.
Science	SIE14015	Essential Science for Teachers: Physical Science-Physical Changes and Conservation of Matter	Participants learn how the principles of the particle model are consistent with conservation of matter.
Science	SIE14016	Essential Science for Teachers: Physical Science-Chemical Changes and Conservation of Matter	Physical Science Content with emphasis on chemical changes and the conservation of Matter
Science	SIE14017	Essential Science for Teachers: Physical Science-Density and Pressure	Physical Science Content with emphasis on density and pressure
Science	SIE14018	Essential Science for Teachers: Physical Science-Rising and Sinking	Physical Science content with emphasis on the balancing of forces
Science	SIE14019	Essential Science for Teachers: Physical Science-Heat and Temperature	Physical Science content with emphasis on heat and temperature
Science	SIE14020	Essential Science for Teachers: Physical Science-Extending the Particle Model of Matter	Physical science content with emphasis on the electrical properties of matter

Science	SIE14021	Essential Science for Teachers: Life Science--What is Life?	What distinguishes living things from dead and nonliving things? No single characteristic is enough to define what is meant by "life." In this session, five characteristics are introduced as unifying themes in the living world.
Science	SIE14022	Essential Science for Teachers: Life Science-Classifying Living Things	Life Science content with emphasis on the classification of living things
Science	SIE14023	Essential Science for Teachers: Life Science-Animal Life Cycles	Life Science content with emphasis on animal life cycles
Science	SIE14024	Essential Science for Teachers: Life Science-Plant Life Cycles	Life Science content with emphasis on plant life cycles
Science	SIE14025	Essential Science for Teachers: Life Science- Variation, Adaptation, and Natural Selection	Life Science content with emphasis on adaption and natural selection
Science	SIE14026	Essential Science for Teachers: Life Science-Evolution and the Tree of Life	Life Science with emphasis on Evolution
Science	SIE14027	Essential Science for Teachers: Life Science-Energy flow in Communities	Life Science content with emphasis on energy flow in communities
Science	SIE14028	Essential Science for Teachers: Life Science-Material Cycles in Ecosystems	Life Science content with emphasis on the ecosystems
Science	SIE14029	Essential Science for Teachers: Earth and Space Science--Earth's Solid Membrane Soil	Earth and Space Science content with emphasis on the formation of soil
Science	SIE14030	Essential Science for Teachers: Earth and Space Science--Every Rock Tells a Story	Earth and Space Science content with emphasis on the composition of rocks
Science	SIE14031	Essential Science for Teachers: Earth and Space Science-- Journey to the Earth's Interior	Earth and Space Science content with emphasis on the Earth's interior
Science	SIE14032	Essential Science for Teachers: Earth and Space Science--The Engine That Drives the Earth	Earth and Space Science content with emphasis on the Earth's plate tectonics and the formation of volcanoes and earthquakes
Science	SIE14033	Essential Science for Teachers: Earth and Space Science--When Continents Collide	Earth and Space Science content with emphasis on plate tectonics and the connection between plate boundaries and mountain formation

Science	SIE14034	Essential Science for Teachers: Earth and Space Science-- Restless Landscapes	Earth and Space Science content with emphasis of forces sculpting the ever-changing landscape of the Earth. One particular landform, Cape Cod, a peninsula off Massachusetts
Science	SIE14035	Essential Science for Teachers: Earth and Space Science--Our Nearest Neighbor: The Moon	Earth and Space science content with emphasis of the Moon
Science	SIE14036	Essential Science for Teachers: Earth and Space Science--Order Out of Chaos: Our Solar System	Earth and Space science content with emphasis on the solar system
Science	SIE14037	Science in Focus: Energy-What is Energy	Introduction to What is Energy
Science	SIE14038	Science in Focus: Energy-Force and Work	This session examines how energy and work are related; Scientists define energy as the ability to do work
Science	SIE14039	Science in Focus: Energy-Transfer and Conversion of Energy	Change happens when energy is transferred or converted. In this session, examine conversion between potential and kinetic energy.
Science	SIE14040	Science in Focus: Energy-Energy in Cycles	Energy can be seen in cycles every day, from the bouncing of balls to the swinging of pendulums. In this session, further explore the relationship between kinetic and potential energy to understand how cycles begin and are sustained, and why they decay.
Science	SIE14041	Science in Focus: Energy-Energy in Food	All life forms use energy. Explore the transfer and conversion of the potential energy in food, and see how that energy is stored.
Science	SIE14042	Science in Focus: Energy- Energy and Systems	Physicists use the concept of a system to trace and quantify the flow of energy. Take a close look at a number of energy systems and see how this concept is closely linked to the principle of conservation of energy.
Science	SIE14043	Science in Focus: Energy- Heat, Work and Efficiency	A machine's energy output cannot be greater than its input. Look at the energy that goes into useful work, examine how some always ends up as heat, and see why systems are never 100% efficient.
Science	SIE14044	Science in Focus: Energy Understanding Energy	This workshop for elementary and middle school science teachers was produced by the Harvard-Smithsonian Center for Astrophysics. It provides a model lesson that takes a look at the global impact of the limits of our energy sources and examines how being smart about using energy will become more and more important in our daily lives.

Science	SIE14045	Science in Focus: Force and Motion-Making an Impact	Introduces the concepts of force and motion as seventh-grade students drop balls to simulate asteroid impacts. The students explore what factors affect the size of a resulting crater by varying the ball's mass, the height from which it is dropped, and the material being struck. They also learn about data collection and units of measurement.
Science	SIE14046	Science in Focus: Force and Motion-Drag Races	Facilitates fifth-grade students' exploration of the physics of motion using plastic cars with strings and washers attached to provide a pulling force. The students test the speed of the vehicles and explain what forces bring the vehicles to a stop when the cars collide with and displace barriers at the end of their run. Finally, the students discuss their findings to help solidify their understanding of the effect of forces on motion.
Science	SIE14047	Science in Focus: Force and Motion-When Rubber Meets the Road	Fifth-grade students to explore force and motion by recording and comparing the distance a vehicle travels under various conditions. Students predict the distance the car will travel by counting the number of twists in the rubber band, and observe the car's speed as it rolls across the floor. When the force of the rubber band stops acting, the force of friction slows the car to a stop.
Science	SIE14048	Science in Focus: Force and Motion-On a Roll	First-grade students rolling balls of different sizes, masses, and materials down ramps of varying heights in order to compare their speeds. The students then experiment by replacing the ramp with a cardboard tube, and try to determine how the tube must be oriented to allow the ball to roll as it did down the ramp.
Science	SIE14049	Science in Focus: Force and Motion-Keep on Rolling	First-grade students to build on their prior experience with rolling objects. By designing and constructing their own roller coaster made from ramps, cardboard tubes, and flexible tubes, the students experiment with ways to get a marble from the top of a table into a bucket on the floor some distance away.
Science	SIE14050	Science in Focus: Force and Motion-Force Against Force	fourth-grade students explore ways to balance the force of magnetism against the force of gravity. A magnet placed in a cup on one side of a pan-balance is stuck to a stationary magnet beneath the cup. The students experiment in order to find out when enough washers will have been placed on the opposite side of the balance in order for the magnets to separate
Science	SIE14051	Science in Focus: Shedding Light on Science (K-5)-Shine and Shadow	Students to the idea that light is a form of energy that affects all facets of our lives. In order to understand light, the students explore how shadows are formed, as well as the role of light in seeing.
Science	SIE14052	Science in Focus: Shedding Light on Science (K-5)-Laws of Light	How light energy interacts with matter and how it has predictable properties that we refer to as reflection and refraction

Science	SIE14053	Science in Focus: Shedding Light on Science (K-5)-Pigments, Paint and Printing	Students to the rich visual world we experience due to the diversity of the colors that surround us. In this segment, students create rainbows and learn how and why these magnificent phenomena occur in the sky. After looking at the Sun's electromagnetic spectrum we examine the reflection and refraction of photons of light and investigate the primary colors of light and pigments.
Science	SIE14054	Science in Focus: Shedding Light on Science (K-5)-Color, Cones and Corneas	Use models to study the function of the major parts of the human eye and we explore refraction by following the path of light through various lenses
Science	SIE14055	Science in Focus: Shedding Light on Science (K-5)-Sunlight to Starch	An exploration into how plants get their food.
Science	SIE14056	Science in Focus: Shedding Light on Science (K-5)-Energy and Ecosystems	Exploration into how light energy that has been absorbed by plants during photosynthesis and transformed into chemical energy can now be transferred to other organisms.
Science	SIE14057	Science in Focus: Shedding Light on Science (K-5)-Sun and Seasons	Introduction to how the tilt of the Earth's axis causes the cycle of the seasons. Participants discuss how different parts of the Earth receive different amounts of light energy and, in particular, we look at the tilt of the Earth's axis and how the hours of daylight change throughout the year.
Science	SIE14058	Science in Focus: Shedding Light on Science (K-5)-Wind and Weather	Exploration of the climactic conditions of each season. In particular, the effect of light on our weather.
Science	SIE14060	Reactions in Chemistry: Macro to Micro Structures	This program deals with the conceptualization of micro processes and environments. It involves teaching chemistry through macro phenomena, which can be observed, and micro processes, which occur on the molecular level and can only be imagined. Conceptual change must occur in order for students to understand chemical phenomena.
Science	SIE14061	Reactions in Chemistry: Energetics and Dynamics	This program emphasizes the importance of learning about energetics and dynamics in order to improve students' understanding of basic principles of chemistry. The complexity of teaching concepts such as the collisions theory, reaction kinetics, and electronic energy levels is introduced using a variety of teaching strategies.
Science	SIE14062	Reactions in Chemistry Theory and Practice in Chemical Systems	This program shows how a theoretical understanding of the driving force for chemical systems can lead to further development of new technologies and to the discovery of new phenomena, in practice. In teaching, this is done through the creation of a close relationship between the science and mathematics of chemical processes, through problem-solving activities.

Science	SIE14068	Teaching High School Science: Thinking Like Scientists	How to integrate science standards and inquiry into the curricula
Science	SIE14068	Teaching High School Science: Thinking Like Scientists	The Teaching High School Science course will help new and veteran science teachers integrate national science standards and inquiry learning into their curricula.
Science	SIE14069	Teaching High School Science: Chemical Reactions	The Teaching High School Science course will help new and veteran science teachers integrate national science standards and inquiry learning into their curricula. In this course students in a ninth-grade Principles of Science and Technology class formulate and explore their own questions about a chemical reaction.
Science	SIE14070	Teaching High School Science: Investigating Crickets	This course will help new and veteran science teachers integrate national science standards and inquiry learning into their curricula. Ninth-grade biology students design and conduct experiments about crickets.
Science	SIE14071	Teaching High School Science: Exploring Mars	This course will help new and veteran science teachers integrate national science standards and inquiry learning into their curricula. Eleventh-grade integrated science class explore how the Mars landscape may have formed.
Science	SIE14072	Teaching High School Science: The Physics of Optics	This course will help new and veteran science teachers integrate national science standards and inquiry learning into their curricula. Eleventh and twelfth grade physics class looks at light, lenses, and the human eye.
Science	SIE18011	Physics for the 21st Century: String Theory and Extra Dimensions	Physics content with the emphasis on string theory in relation to other theories, e.g. Einsteins theory of relativity
Science	SIE18012	Physics for the 21st Century: Macroscopic The Quantum World	The performance of laser cooling and trapping of atoms and ions at Massachusetts Institute of Technology (MIT). Laser cooling and trapping techniques are used to create ultra precise atomic clocks and research possible time variations.
Science	SIE18013	Physics for the 21st Century: Macroscopic Quantum Mechanics	Models of superconductors that may one day be used for room temperature superconductivity
Science	SIE18014	Physics for the 21st Century: Manipulating Light	Manipulating particles to understand the potential of quantum computing logic. Storing, computing, and transmitting information through the manipulation of light speed.
Science	SIE18015	Physics for the 21st Century: Emergent Behavior in Quantum	The understanding the practical applications and behaviors of emergent materials.

Science	SIE18016	Physics for the 21st Century: Biophysics	Exploration of particle self-assembly. Understanding the intricate details of proton assimilation to assist in the treatment of diseases. The use of proton therapy on cancer treatment and tumor reduction.
Science	SIE18017	Physics for the 21st Century: Dark Matter	Explores the effort to understand matter in the universe, specifically dark matter.
Science	SIE18018	Physics for the 21st Century: Dark Energy	Exploring the cosmic microwave background in order to understand the physics of the universe and the effects of the Big Bang.
Science	SIE18019	Earth Science: Soil Formation	Earth Science content area
Science	SIE18020	Earth Science: Plate Tectonics	Earth Science content area
Science	SIE18021	Earth Science: Volcanoes	Earth Science content area
Science	SIE18042	Chemistry: Challenges and Solutions-Quantifying Chemical Reactions	Connects chemical theory and the science of stoichiometry as chemists plan and perform the precise measurements that allow them to manipulate and predict the outcomes of chemical reactions. The goal is precision, efficiency, and quality for scientists pursuing renewable, clean energy, creating sodium iodide for radiation detectors, and producing environmentally friendly chemicals.
Science	SIE18040	Chemistry: Challenges and Solutions-Organizing Atoms and Electrons	Connects chemical theory and the work of scientists discovering new elements.
Science	SIE18041	Chemistry: Challenges and Solutions-Making Molecules	Connects chemical theory and scientists fighting disease as well as studying the structure of molecules and how they combine with other molecules
Science	SIE18043	Chemistry: Challenges and Solutions-The Energy in Chemical Reactions	Measuring, predicting, and controlling the heat and energy of chemical reactions are an important part of the work chemists do. These principles are used to find better biofuels, study the bond enthalpies of rocket fuels, and create cleaner, more efficient engines.
Science	SIE18037	Chemistry: Challenges and Solutions-Matter and the Rise of Atomic Theory	Connects the history of chemical theory and the work of scientists in the field of solar energy and explore ways to make solar cells more efficient.
Science	SIE18038	Chemistry: Challenges and Solutions-The Behavior of Atoms	Connects chemical theory and the work of scientists finding cleaner ways to power the world. Exploring ways to efficiently store hydrogen for use in fuel cells. And plan to prevent carbon dioxide emissions from contributing to climate change.
Science	SIE18039	Chemistry: Challenges and Solutions-Atoms and Light	Understanding of how light interacts with atoms in order to further scientific discoveries, create art, and even explore mysteries of the past.