



Science Partnership Toolkit

Created By: The Philadelphia Education Fund
Ecosystem Partnership Workgroup
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This is a toolkit to assist STEM related partners who are looking to offer programs or services to students or staff in Philadelphia schools; it is designed to outline critical dimensions of sustainable collaborations. These dimensions include alignment with the District's strategic plan and curriculum; assessing the needs of the school and the partner's capacity to meet these needs; communicating and asking the right questions; networking; and utilizing the resources available through SDP's Office of Strategic Partnerships and Office of Curriculum, Instruction, and Assessment.

Toolkit Snapshot

- The first dimension assists you in thinking about how your program aligns with SDP's [Action Plan 3.0](#) goals and curriculum.
- The second dimension provides resources to create a network for potential collaborations.
- The third-dimension outlines questions to discuss with your team and partners before the partnership begins so that you can have informative discussions from the start.

Dimension One: Align your project/program align with SDP goals and curriculum

A goal of STEM education partners is to support the learning and achievement within and outside the classroom. Therefore, it is important for programs to think about how they will assist the School District of Philadelphia's strategic goals, outlined in Action Plan 3.0, found at <https://www.philasd.org/about/actionplan/>

For reference, here are the anchor goals from the District's strategic plan:

- Anchor Goal 1 - 100% of students will graduate ready for college or career
- Anchor Goal 2 - 100% of 8-year-olds will read at grade level
- Anchor Goal 3 - 100% of schools will have great principals and teachers
- Anchor Goal 4 - The District will have 100% of the funding we need for great schools and zero deficit

Identify one or more anchor goals that your program supports and outline or be ready to discuss particular program activities that will support the identified goal(s).

Do you have a primary goal that you can emphasize and are there secondary goals?

Some points to consider could be:

- Does your program promote 21st century skills, e.g. collaboration and teamwork; creativity and imagination, critical thinking, problem solving?
- Does your program create a potential pipeline for STEM careers and/ or college readiness?
- Does your program focus on a specific workforce skill in STEM?
- Does your program provide mentorship or role models in STEM careers?
- Does your program provide personnel support for STEM clubs or after-school programs?
- Does your program provide professional development for STEM teaching and learning?

Identifying where your program fits within the SDP curriculum is important. Below is a snapshot of the K-12 science curriculum. For comprehensive information go to the Science [Content Department in the Office of Curriculum, Instruction & Assessment](#)

Grades	Quarter 1	Quarter 2	Quarter 3	Quarter 4
K	Unit 1: Using the 5 Senses (5 weeks) Unit 2: Observing & Predicting the Weather (4 weeks)	Unit 3: Living & Non-Living Things (9-10 weeks)	Unit 4: Life Cycles of Animals (9-10 weeks)	Unit 5: Life Cycles of Plants/Trees (9-10 weeks)
1	Unit 1: Measurement & Tools: Thinking Like a Scientist (9-10 Weeks)	Unit 2: Matter (5 weeks) Unit 3: Waves - Light & Sound (4 weeks)	Unit 4: Space Systems: Patterns and Cycles (9-10 weeks)	Unit 5: Living Things: Structure, Function & Classification (9-10 weeks)
2	Unit 1: Earth Materials (9 weeks)	Unit 2: Air and Weather (4-5 weeks) Unit 3: Habitats (Ecosystems) (4-5 weeks)	Unit 4: Interdependent Relationships in Ecosystems (9-10 weeks)	Unit 5: Force & Motion & Simple Machines (9-10 weeks)
3	Unit 1: Rocks & Minerals (9-10 weeks)	Unit 2: Weather & Climate (9-10 weeks)	Unit 3: Energy (9-10 weeks)	Unit 4: Inheritance & Traits (9-10 weeks)
4 (PSSA)	Unit 1: Land & Water (9-10 weeks)	Unit 2: Intro to Matter (9-10 weeks)	Unit 3: Magnetism & Electricity (9-10 weeks)	Unit 4: Structure and Function of Organisms (9-10 weeks)
5	Unit 1: Forces & Motion (9-10 weeks)	Unit 2: Our Universe (9-10 weeks)	Unit 3: Energy in Ecosystems (9-10 weeks)	Unit 4: Thinking Like a Scientist (9-10 weeks)

6	Unit 1: Landforms (9-10 weeks)	Unit 2: Geological Time (1 week) Unit 3: Minerals and Rocks (4 weeks) Unit 4: The Dynamic Earth (4 weeks)	Unit 5: Intro to Ecology (5 weeks) Unit 6: Human Impact on Ecosystems (5 weeks)	Unit 7: The Atmosphere (3 weeks) Unit 8: Weather (4 weeks) Unit 9: Climate (3 weeks)
7	Unit 1: Astronomy (9-10 weeks)	Unit 2: Matter in Motion (3 weeks) Unit 3: Forces & Motion (3.5 weeks) Unit 4: Forces in Fluids (3.5 weeks)	Unit 5: Work & Machines (3 weeks) Unit 6: Work & Energy Resources (3 weeks) Unit 7: Heat & Heat Technology (3 weeks)	Unit 8: Sound & Light (8 weeks)
8 (PSSA)	Unit 1: Classification of Organisms (4 weeks) Unit 2: Cells to Organ Systems (5 weeks)	Unit 3: Heredity & Evolution (5 weeks) Unit 4: Modern Genetics (6 weeks)	Unit 5: Energy & Cycles in Ecosystems (6 wks) Unit 6: Changes in Ecosystems (6 weeks)	Unit 7: Properties of Matter (6 weeks) Unit 8: Atomic Structure & Periodic Tbl (4 wks)
9-12				
Phys Sci	Unit 1: Scientific Knowledge and the Scientific Method (2 weeks) Unit 2: Matter & Its States (3 weeks) Unit 3: Atoms & the Periodic Table (3-4 weeks)	Unit 4: Chemical Bonding (3 weeks) Unit 5: Chemical Reactions (3 weeks) Unit 6: Solutions, Acids & Bases (3 weeks)	Unit 7: Earth Science (3 weeks) Unit 8: Environmental Science (4 weeks)	Unit 9: Motion & Forces (2 weeks) Unit 10: Work, Power & Energy (3 weeks) Unit 11: Electricity & Magnetism (3 weeks)
Bio (Keystone)	Unit 1: Basic Biological Principles (3 weeks) Unit 2: The Chemical Basis for Life (6 weeks)	Unit 3: Bioenergetics (3.5 weeks) Unit 4: Homeostasis & Transport (3.5 weeks) Unit 5: Cell Growth & Reproduction (3.5 weeks)	Unit 6: Genetics (4 weeks) Unit 7: Theory of Evolution (4 weeks)	Unit 8: Ecology (5 weeks) Unit 9: Environmental Science (3.5 weeks)
Chem	Unit 1: Matter & Energy (2-3 weeks) Unit 2: Atomic Structure (3 weeks) Unit 3: The Periodic Table (2 weeks)	Unit 4: Ionic Bonds & Nomenclature (2 weeks) Unit 5: Covalent Bonds & Nomenclature (2 wks) Unit 6: Moles & Reactions (2 week) Unit 7: Reactions (1 week)	Unit 7: Reactions (continued) (1 week) Unit 8: Stoichiometry (3 weeks) Unit 9: Causes of change & Intermolecular Forces (2 weeks) Unit 10: Gases (1 week)	Unit 10: Gases (continued) (1 week) Unit 10: Properties of Solutions (2 weeks) Unit 11: Equilibrium & Chemical Kinetics (2 weeks) Unit 12: Acids & Bases (2 weeks)

Physics	Unit 1: Scientific Methods & Processes (2 Weeks) Unit 2: Linear Motion (4 Weeks) Unit 3: Vectors, Two Dimensional Motion & Forces (4 Weeks)	Unit 4: Newton's Laws of Motion (3.5 weeks) Unit 5: Linear Momentum (2-3 weeks) Unit 6: Work & Energy (2 weeks)	Unit 7: Circular Motion (3 weeks) Unit 8: Gravitation (3 weeks) Unit 9: Rotational Motion (3.5 weeks)	Unit 10: Simple Harmonic Motion (2 weeks) Unit 11: Waves & Sound (3 weeks) Unit 12: Light & Optics (4 weeks)
Env Sci	Unit 1: Scientific Knowledge & Engineering Practices (1 week) Unit 2: Introduction to Environmental Science (2 weeks) Unit 3: Ecosystem Dynamics (4 weeks) Unit 4: Terrestrial & Aquatic Biomes (2 weeks)	Unit 5: Population Dynamics (3 weeks) Unit 6: Evolution & Diversity (2 weeks) Unit 7: Land & Water Resource Use (2 weeks) Unit 8: Food & Agriculture (2 weeks)	Unit 9: Environment & Human Health (2 weeks) Unit 10: Pollution & Waste (4 weeks) Unit 11: Atmosphere & Climate Change (3 weeks)	Unit 12: Renewable & Nonrenewable Resources (3 weeks) Unit 13: Engineering Practice (3 weeks) Unit 14: Environmental Service Learning (3 weeks)

Some points to consider could be:

- Do your program activities incorporate science practices (i.e. observation; scientific discussion; problem solving; data analysis; collaboration etc.)?
- Does your program fit best as an introduction to a unit or as a conclusion?
- Does your program provide an inquiry-based or hands-on experience to complement a unit?
- Does your program assess students' understanding of the unit content?

Dimension TWO: Identify your stakeholders

A next step would be to identify stakeholders who will help put your program into action. This would include the number of schools, teachers, and students; parents; school district administrators; vendors you want to be involved. Below is a short-list of ways to expand your network of potential collaborators. Remember to identify your resources and then establish a relationship early on.

- School District of Philadelphia Office of Curriculum, Instruction and Assessment Science Department (for curriculum support): <https://www.philasd.org/curriculum/curriculum-and-instruction/core-subjects/science/>
- STEM City PHL: <http://www.stemcityphl.org/>
- Philadelphia STEM Ecosystem: <https://www.philastemeco.org/>
- Reaching out to corporations; informal science institutions, and libraries
- Contacting school leaders or science teachers directly

Dimension Three: Be a participant in a productive conversation

When meeting potential partners, communication of the expectations and roles is essential to the impact of your work. Questions to consider are listed below.

Essential question: What are the school's main goals for the academic year and in the future and how can this collaboration support them?

a. What are questions that STEM providers might want to ask?

- Frequency and duration of STEM classes?
- What supports already exist in STEM at the school that we could build from?
- What in-school or OST STEM programs have partnered before?
- What worked and what didn't?
- Do we have time to work with teachers in the planning and reflection process?
- Can we go over a school calendar together?
- What are the greatest challenges around implementing STEM programs?

b. What would principals/teachers want to know from their partners?

- Cost
- Duration
- Grade span and min/max number of students
- Teacher involvement
- Description of activities and how it supports curricula
- Measures of assessment
- Equipment/Resource needs
- What makes this partnership impactful and unique for our school?
- What does the school need to provide in terms of resources?
- Is there a parental involvement opportunity?
- Other schools/OST programs you have partnered with in the past

c. What are the questions that will help partner organizations navigate school partnerships?

- Who is my point of contact and how best should I communicate with them?
- What are the building entry and exit procedures?
- How should parents be notified or how should we obtain permission?
- How do we access an up-to-date school calendar?
- How do we obtain food for after-school programs?

Evaluating the dimensions outlined above will help build the foundation needed for successful school and STEM partnerships. The ultimate goal is to create experiences that will enhance the understanding of STEM related content as well as increase positive attitudes towards STEM for all stakeholders involved. This begins with defined goals, clear communication, and a shared responsibility for success.

So what could come next?

The *STEM Ecosystem* has created this toolkit and by becoming a member you can network with other STEM professionals who are willing to provide guidance on program development, logistical challenges, funding, and recruitment, etc. We encourage all STEM partners, new and old, to get involved.

At the district, there is a formalized office that supports ready-to-go partners. SDP's *Office of Strategic Partnerships* (OSP) defines partners as organizations providing school-based programs and/or services at no cost to schools or the District. They offer support to any fully funded program looking to provide programs or services to District schools at no cost to schools or the District.

To begin working with OSP please fill out the office's [Partnerships Inquiry Form](https://www.philasd.org/strategicpartnerships/new-partners/) (link: <https://www.philasd.org/strategicpartnerships/new-partners/>). OSP will reach out to you with next steps.

Here are additional resources to help get you started:

- [Partnerships Toolkit](https://www.philasd.org/strategicpartnerships/wp-content/uploads/sites/83/2017/06/SchoolBasedPartnershipsGuide.pdf): <https://www.philasd.org/strategicpartnerships/wp-content/uploads/sites/83/2017/06/SchoolBasedPartnershipsGuide.pdf>
- [OSP School Partner Onboarding Guide](https://www.philasd.org/strategicpartnerships/onboarding-guide/): <https://www.philasd.org/strategicpartnerships/onboarding-guide/>

This toolkit was created by the Philadelphia Education Fund STEM Ecosystem Partnership workgroup which includes STEM outreach professionals and school district administrators and teachers.

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