Preamble

The Statewide Strategic Plan for Science serves as a planning and implementation guide to support newly adopted P-12 science learning standards. The strategic plan begins with mission and vision statements. The mission statement describes the desired result, and provides a reason for the plan's existence. The vision statement describes how the mission will be achieved. Six critical components – Standards, Curriculum, Professional Development to Enhance Instruction, Assessment, Materials and Resource Support, and Administrative and Community Support – each enhanced by a single goal, focus the vision. Each goal is supported by a number of objectives, which are achieved by successfully completing a number of discrete activities.

Considered in a broad sense, the six critical components are each equally important. One carries no more importance than another, and all six must be considered simultaneously at all stages of implementation. During specific stages of implementation, however, one or more of the six critical components may be deserving of more attention than the others, but the others must still be considered. Achieving the goal of each critical component is dependent upon achieving the goals of the other critical components. Achieving the mission is dependent upon achieving each of the goals of each of the six critical components.

The mission of the Statewide Strategic Plan for Science can only be realized if all of the stakeholders are involved in its implementation. Creating a Statewide learning community involves all stakeholders including, but not limited to, students, parents, other caregivers, teachers, counselors, other supporting educators/mentors, informal educators, administrators, college professors, members of professional associations, institutes, and/or societies, business and industry professionals, and government officials. Each community member is invited and expected to participate in achieving the mission. Collaboration and participation of all community members, as their expertise shall warrant, will provide the most effective avenue to achieving the mission.

In the plan, the term STEM refers to both the individual disciplines associated with science, technology, engineering, and mathematics and the connections between these disciplines.

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Mission

Create a Statewide learning community to enhance science education and improve student achievement of the New York State science learning standards leading to career and college readiness and a scientifically literate population capable of addressing the needs of society, participating in a global economy, and sustaining the physical and living environment.

Vision

Ensure the teaching and learning of science for all P-12 students by providing equitable access to exemplary teachers, science curriculum programming, instructional practices, and standards-based assessments that are reflective of research and best practices, along with quality resources and support from stakeholders at large.

Standards

Goal: Adopt new P-12 NYS science learning standards and 5-year strategic plan.

Objective: Direct the review, revision, and adoption process for identifying new P-12 NYS science learning standards.

Activities:

- Develop a 5-year, statewide strategic plan for science for adoption by the Board of Regents.
- Develop and post a public survey to gather stakeholder feedback on comparing current NYS science learning standards and nationally developed Next Generation Science Standards (NGSS) to research-based standards evaluation criteria.
- Engage science education stakeholders to analyze feedback from the public survey.

Objective: Determine the core science content, conceptual understandings, and practices for all students P-12 that develops scientifically literate citizens who are better prepared to pursue college and/or career pathways.

Activities:

- Convene committees of stakeholders to review feedback from the public survey, other pertinent data, and current research in science and science education, as well as other international, national, and state standards documents.
- Develop a recommendation to the Board of Regents regarding the adoption of a revised set of the current NYS science learning standards, the adoption of a new set of P-12 NYS science learning standards incorporating the tenets of the Framework for K-12

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Science Education, the adoption of a new set of P-12 NYS science learning standards influenced by the NGSS, or the adoption of the NGSS.

- Develop cross-content area benchmarks for use both within and across P-12 grade levels to support horizontal and vertical articulation between the science disciplines and other content areas.
- Identify convergences with engineering, technology, the New York State P-12 Common Core Learning Standards for Mathematics, and the New York State P-12 Common Core Learning Standards for English Language Arts and Literacy.

Objective: Implement and sustain the 5-year strategic plan for transitioning to the new P-12 NYS science learning standards.

Activities:

- Develop a reasonable timeline for the adoption of and transition to implementation of the new P-12 NYS science learning standards.
- Secure funding to support and sustain the implementation process at the State, regional, and local levels.
- Ensure that the six critical components – Standards, Curriculum, Professional Development to Enhance Instruction, Assessment, Materials and Resource Support, and Administrative and Community Support – of the 5-year strategic plan are addressed concurrently during the implementation process.

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Curriculum

Goal: Provide opportunities that are reflective of research and best practices for P-12 students to engage with scientific phenomena through implementation of innovative science curriculum programming that fosters learning, deep understanding, and application of core science content, conceptual understandings, and practices.

Objective: Survey current research pertaining to teaching and learning in science, science education, and cognitive science to develop relevant curriculum guidance and resources.

Activities:

- Explore, identify, and provide access to pertinent research.
- Develop articulated P-12 guidance to support curriculum development and implementation aligned to the new P-12 NYS science learning standards.
- Provide funding opportunities for equitable development and/or adoption of exemplary science curriculum programming.
- Provide funding opportunities for equitable implementation and evaluation of exemplary science curriculum programming at the regional and local levels.
- Align and incorporate relevant connections to engineering, technology, the New York State P-12 Common Core Learning Standards for Mathematics, and the New York State P-12 Common Core Learning Standards for English Language Arts and Literacy.
- Review and update curriculum guidance and resources to be reflective of changes in instructional technology, content, and best educational practices, emphasizing active engagement in STEM.

Objective: Build the capacity of regional centers and local school districts to implement curriculum and instructional programs that are based on the new P-12 NYS science learning standards.

Activities:

- Support the implementation of exemplary, data-informed science curriculum programming and instructional materials, using cross-curricular connections from engineering, technology, the New York State P-12 Common Core Learning Standards for Mathematics, and the New York State P-12 Common Core Learning Standards for English Language Arts and Literacy that strengthen, support, and reinforce the development of scientific literacy.
- Leverage funding opportunities for partnerships and collaborations of science education stakeholders for the development, dissemination, and implementation of local and regional curriculum programming.
- Engage education stakeholders with expertise in various disciplines to support local and regional development, dissemination, and

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implementation of curriculum based on the new P-12 NYS science learning standards.

- Create opportunities that bring students into contact with working scientists, mathematicians, and engineers through innovative curriculum design, internships, and mentorships with institutes of higher education and/or business and industry partners.

Objective: Incorporate the use of technology to expand the development, dissemination, and implementation of curriculum and instructional resources to broaden accessibility.

Activities:

- Leverage existing and seek new funding sources to support the use of technology to develop, disseminate, and implement science curriculum and instructional resources through various delivery platforms.
- Utilize multiple platforms to access exemplary curriculum and instructional resources.
- Build student resources by establishing community-based programs that provide relevant STEM applications in science curriculum and instructional programs.

Professional Development to Enhance Instruction

Goal: Initiate, build, and sustain collaborations and partnerships to provide specific and focused professional development to support the teaching and learning of core science content, conceptual understandings, and practices P-12.

Objective: Provide opportunities for local educational agencies to collaborate and partner with STEM education stakeholders to develop and implement effective professional development models that are based upon the new P-12 NYS science learning standards.

Activities:

- Establish networks of stakeholders in STEM education to provide professional development that enhances the development, dissemination, and implementation of curriculum, instructional and assessment materials, and other resources.
- Engage local, state, and national professional and science education associations to lead and sustain STEM-related professional development opportunities for face-to-face and online collaboration.
- Build the capacity of interested business and industry experts to effectively partner with local educational agencies by promoting pertinent professional learning opportunities and resources.
- Target funding opportunities that support partnerships between business and industry, institutes of higher education, professional and science education associations, local education agencies, and

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other stakeholders to sustain professional development for teachers and leaders in science.
- Promote institutes, courses, and/or workshops that enhance the teaching and learning of the individual disciplines associated with science, technology, engineering, and mathematics and the connections between these disciplines.
- Create access to new and/or existing, online, on-demand venues for specific and focused professional development.

Objective: Increase teacher and leader participation and engagement in professional development opportunities that are based upon the new P-12 NYS science learning standards to build subject knowledge and pedagogical-content knowledge in the sciences by leveraging the expertise of science education stakeholders.

Activities:

- Design opportunities to coordinate professional development that articulates collaborations and partnerships across P-16.
- Target annual professional development in science that builds specific subject knowledge and pedagogical-content knowledge toward fulfilling the 175 hours required for maintenance of certification.
- Provide funding opportunities for teachers and leaders to participate in sustained, online or on-site professional development institutes, professional learning communities, courses, and/or workshops during the school year.
- Incorporate career-ladder incentives for teachers and leaders to provide professional development sessions and engage in professional development opportunities that are related to STEM education.
- Identify or develop and implement a needs assessment to determine the focus of future professional development opportunities.
- Create professional development opportunities that bring teachers and leaders into contact with working scientists, mathematicians, and engineers through internships and mentorships with peer teachers, institutes of higher education, and/or business and industry partners.

Objective: Include components of science and engineering practices for pre-service STEM teacher and leader preparation programs and in continuing professional development opportunities that are based upon the new P-12 NYS science learning standards for in-service teachers and leaders.

Activities:

- Build teacher resources by establishing community-based programs that provide relevant STEM applications in science curriculum and instructional programs.

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- Create or access professional development opportunities that focus on the integration of science and engineering practices in STEM courses.
- Articulate collaborations and partnerships between STEM stakeholders that support curriculum programming and instructional practices that are better aligned to college and career expectations.
- Establish partnership programs between local education agencies and institutes of higher education to foster innovative comprehensive approaches that enhance pre-service and in-service teaching and learning of science and engineering practices.

Assessment

Goal: Support the development of assessments at the state, regional, and local levels that measure student achievement of all new P-12 NYS science learning standards, and use the data resulting from these assessments to enhance teaching and learning.

Objective: Explore established and contemporary science assessment models at the international, national, state, regional, and local levels to implement changes in the P-12 science assessment system that are reflective of the new NYS P-12 science learning standards.

Activities:

- Convene science education stakeholders to review and evaluate New York State's current assessment system for the sciences P-12.
- Collaborate between states to discuss and/or develop science assessments that have common blueprints.
- Propose a P-12 science assessment system that reflects the core science content, conceptual understandings, and practices that are included in the new P-12 NYS science learning standards.
- Develop and recommend an implementation timeline that is based on the Board of Regents' decision regarding the new P-12 NYS science learning standards and assessment system.

Objective: Understand and use relevant student achievement data from State science assessments to initiate data-driven professional development, curriculum, instruction, and assessment.

Activities:

- Collaborate with science education stakeholders statewide, regionally, and locally to provide professional development for teachers and leaders that is focused on understanding and analyzing student achievement data for improving science teaching and learning.
- Provide professional development opportunities for teachers and leaders to better understand the intent and design of an assessment

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system that is aligned to the new P-12 NYS science learning standards.
- Provide professional development on the use of student achievement data to foster the development of formative assessments at the local and regional levels.
- Continue to develop and administer valid and reliable State science assessments to drive professional development to improve teaching and student achievement.

Materials and Resource Support

Goal: Support regular and substantive teaching and learning of core science content, conceptual understandings, and practices through scientific inquiry and authentic engagement with natural phenomena by providing models of effective systems management and dissemination of science materials.

Objective: Create new and identify existing science material centers (regional, district, school-based) and related resources to support the equitable access and implementation of exemplary, cost-effective curriculum programming and instructional materials that are aligned to the new P-12 NYS science learning standards.

Activities:
- Seek funding opportunities to acquire equipment, materials, and supplies to support the development, implementation, and sustainability of P-12 science curriculum and instructional programming at the local and regional levels.
- Identify new or use existing funding streams to support facilities planning to provide physical space that is conducive to teaching and learning in state-of-the-art classrooms and laboratories.
- Develop collaborations and partnerships to promote and support comprehensive systems for the development, implementation, and sustainability of science materials and resources.
- Seek funding opportunities for instructional technologies that support core science and engineering content, conceptual understandings, and practices.

Objective: Build the capacity of local educational agencies, higher education institutions, business and industry partners, and other profit and nonprofit organizations to connect teachers and students to relevant, real-world science applications that are aligned to the new P-12 NYS science learning standards.

Activities:
- Develop partnerships between STEM stakeholders and school districts that collaborate to provide education outreach for science materials and other logistical support.

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- Provide mentorships and research opportunities for teachers and students through incentives to build partnerships between business and industry, higher education institutions, and/or other STEM stakeholders (i.e., museums, nature centers, community organizations, etc.).
- Provide incentives for outreach opportunities and technical support for laboratory experiences and rentals of high-tech research equipment.
- Capitalize on the regional and local capacity to offer distance learning and online courses through partnerships and grants.
- Investigate opportunities to expand access to science content through online resources.

Administrative and Community Support

Goal: Build the capacity to enhance science education and ensure career readiness by involving STEM stakeholder partnerships and alliances between school districts, institutions of higher education, science education professional organizations, business and industry, informal education organizations, government agencies, and the larger learning communities: local, regional, state, national, and international arenas.

Objective: Identify science education stakeholders to lead the development and continued growth of partnerships focused on comprehensive revitalization of science education.

Activities:

- Support collaborations with regional STEM hubs that provide access to various higher education faculty and business and industry experts and their facilities to raise awareness of real-world applications and opportunities in STEM college and career pathways.
- Engage key STEM stakeholders to serve as catalysts in the advancement and implementation process pertaining to NYS science education to build and sustain a STEM talent pipeline.
- Utilize informal (i.e., museums, nature centers, community organizations, etc.) and formal (i.e., P-12 schools, institutes of higher education, business and industry, research centers) STEM education stakeholders and their resources to promote and support new and existing innovative science education initiatives (i.e., fellowships, internships, mentorships, research opportunities).
- Identify models of effective collaborations between departments of science, technology, engineering, and mathematics and teacher education programs of institutes of higher education.
- Provide incentives for institutes of higher education to facilitate collaborations between departments of science, technology,

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engineering, and mathematics and teacher education programs of institutes of higher education.

- Develop and implement career ladder incentives for teachers and administrators that build the leadership capacity and talent pool of STEM departments of school districts and in institutes of higher education.

Objective: Review, revise, and propose regulations that reflect engagement in innovative teaching and learning through authentic experiences with natural phenomena that lead to the achievement of the new P-12 NYS science learning standards by all students.

Activities:

- Solicit input from STEM education stakeholders, ensuring the involvement of experts from P-12 education, institutes of higher education, and business and industry in the advisement and recommendations for regulations addressing qualifications to teach science P-12.
- Convene science education stakeholders to re-examine the alignment of teacher certification P-12 to the structure of the new P-12 NYS science learning standards, the Framework for K-12 Science Education, and the NGSS.
- Re-examine pre-service program requirements to include multiple paths to acquire endorsements of specialization in science education P-12.
- Re-examine the current in-service professional development requirement (175 hours over 5 years) to recommend a minimum allocation of time toward teacher participation in science pedagogical content knowledge-based PD and the distribution of these hours over time.
- Review commissioner's regulations pertaining to science program and diploma requirements P-12 and consider amendments to reflect the knowledge and skills as consumers of scientific and technological information related to their everyday lives and enabling them to enter the colleges and/or careers of their choice.
- Ensure internal collaboration and consultation between various program offices within the NYSED to propose the requisite changes in regulations.

Objective: Leverage fiscal and human resources, through STEM education stakeholder partnerships to catalyze and sustain the revitalization of science education statewide, regionally, and locally.

Activities:

- Explore funding opportunities offered by both public and private sectors to establish STEM stakeholder partnerships that are focused on enhancing programs in STEM education by embracing models

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that are similar to those used in the National Board Certification process.

- Re-evaluate the coordination, allocation, and distribution of state and federal funding streams to better support science education.
- Identify available grants to sustain the implementation of the new P-12 NYS science learning standards through partnerships within the State's established infrastructure, such as BOCES, museums, STEM Hubs, etc.

Objective: Enhance public relations to heighten the importance and strengthen the presence of P-12 science education in New York State.

Activities:

- Develop a statewide plan for improving communication with science stakeholders and the community at large about the benefits of STEM education.
- Develop a plan to build awareness regarding the importance of science education for citizenry and readiness for college and/or careers.
- Build support and enhance knowledge of the public and private sectors to promote effective implementation of science curriculum programming, instructional practices, and standards-based assessments that are aligned to the new P-12 NYS science learning standards.

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