# SCIENCE

Based on the 2020 National Science Teachers Association (NSTA) / Association for Science Teacher Education (ASTE)  
[Standards for Science Teacher Preparation](https://static.nsta.org/pdfs/2020NSTAStandards.pdf)

## 1. CONTENT KNOWLEDGE

Effective teachers of science understand and articulate the knowledge and practices of contemporary science and engineering. They connect important disciplinary core ideas, crosscutting concepts, and science and engineering practices for their fields of licensure.

| Based on the preponderance of Evidence: | Meets | Does Not Meet | Reviewer Feedback |
| --- | --- | --- | --- |
| 1a. Use and apply the major concepts, principles, theories, laws, and interrelationships of  their fields of licensure and supporting  fields. Explain the nature of science and the cultural norms and values inherent to the current and historical development of  scientific knowledge. |  |  |  |
| 1b. Demonstrate knowledge of crosscutting concepts, disciplinary core ideas, practices  of science and engineering, the supporting role of science-specific technologies, and contributions of diverse populations  to science. |  |  |  |
| 1c. Demonstrate knowledge of how to implement science standards, learning progressions, and sequencing of science content for teaching their licensure level PK-12 students. |  |  |  |

## 2. CONTENT PEDAGOGY EFFECTIVE

Teachers of science plan learning units of study and equitable, culturally-responsive opportunities for all students based upon their understandings of how students learn and develop science knowledge, skills, and habits of mind. Effective teachers also include appropriate connections to science and engineering practices and crosscutting concepts in their instructional planning.

| Based on the preponderance of Evidence: | Meets | Does Not Meet | Reviewer Feedback |
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| 2a. Using science standards and a variety of appropriate, student-centered, and culturally-relevant science disciplinary-based instructional approaches that follow safety procedures and incorporate science and engineering practices, disciplinary core ideas, and crosscutting concepts. |  |  |  |
| 2b. Incorporating appropriate differentiation strategies, wherein all students develop conceptual knowledge and an understanding of the nature of science. Lessons should engage students in applying science practices, clarifying relationships, and identifying natural patterns from empirical experiences. |  |  |  |
| 2c. Using engineering practices in support of science learning wherein all students design, construct, test and optimize possible solutions to a problem. |  |  |  |
| 2d. Aligning instruction and assessment strategies to support instructional decision making that identifies and addresses student misunderstandings, prior knowledge, and naïve conceptions. |  |  |  |
| 2e. Integrating science-specific technologies  to support all students’ conceptual understanding of science and engineering. |  |  |  |

## 3. LEARNING ENVIRONMENTS

Effective teachers of science are able to plan for engaging all students in science learning by identifying appropriate learning goals that are consistent with knowledge of how students learn science and are aligned with standards. Plans reflect the selection of phenomena appropriate to the social context of the classroom and community, and safety considerations, to engage students in the nature of science and science and engineering practices. Effective teachers create an anti-bias, multicultural, and social justice learning environment to achieve these goals.

| Based on the preponderance of Evidence: | Meets | Does Not Meet | Reviewer Feedback |
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| 3a. Plan a variety of lesson plans based on science standards that employ strategies that demonstrate their knowledge and understanding of how to select appropriate teaching and motivating learning activities that foster an inclusive, equitable, and anti-bias environment. |  |  |  |
| 3b. Plan learning experiences for all students  in a variety of environments (e.g., the laboratory, field, and community) within  their fields of licensure. |  |  |  |
| 3c. Plan lessons in which all students have a variety of opportunities to investigate, collaborate, communicate, evaluate, learn from mistakes, and defend their own explanations of scientific phenomena, observations, and data. |  |  |  |

## 4. SAFETY

Effective teachers of science demonstrate biological, chemical, and physical safety protocols in their classrooms   
and workspace. They also implement ethical treatment of living organisms and maintain equipment and chemicals  
as relevant to their fields of licensure.

| Based on the preponderance of evidence: | Meets | Does Not Meet | Reviewer Feedback |
| --- | --- | --- | --- |
| 4a. Implement activities appropriate for the abilities of all students that demonstrate safe techniques for the procurement, preparation, use, storage, dispensing, supervision, and disposal of all chemicals/materials/equipment used within their fields of licensure. |  |  |  |
| 4b. Demonstrate an ability to: recognize hazardous situations including overcrowding; implement emergency procedures; maintain safety equipment; provide adequate student instruction and supervision; and follow policies and procedures that comply with established state and national guidelines, appropriate legal state and national safety standards (e.g., OSHA, NFPA, EPA), and best professional practices (e.g., NSTA, NSELA). |  |  |  |
| 4c. Demonstrate ethical decision-making with respect to safe and humane treatment of all living organisms in and out of the classroom and comply with the legal restrictions and best professional practices on the collection, care, and use of living organisms as relevant to their fields of licensure. |  |  |  |

## 5. IMPACT ON STUDENT LEARNING

Effective teachers of science provide evidence that students have learned and can apply disciplinary core ideas, crosscutting concepts, and science and engineering practices as a result of instruction. Effective teachers analyze learning gains for individual students, the class as a whole, and subgroups of students disaggregated by demographic categories, and use these to inform planning and teaching.

| Based on the preponderance of evidence: | Meets | Does Not Meet | Reviewer Feedback |
| --- | --- | --- | --- |
| 5a. Implement assessments that show all  students have learned and can apply disciplinary knowledge, nature of science, science and engineering practices, and crosscutting concepts in practical, authentic, and real-world situations. |  |  |  |
| 5b. Collect, organize, analyze, and reflect on formative and summative evidence and  use those data to inform future planning  and teaching. |  |  |  |
| 5c. Analyze science-specific assessment data based upon student demographics, categorizing the levels of learner knowledge, and reflect on results for subsequent  lesson plans. |  |  |  |

## 6. PROFESSIONAL KNOWLEDGE AND SKILLS

Effective teachers of science strive to continuously improve their knowledge of both science content and pedagogy, including approaches for addressing inequities and inclusion for all students in science. They identify with and conduct themselves as part as part of the science education community.

| Based on the preponderance of evidence: | Meets | Does Not Meet | Reviewer Feedback |
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| 6a. Engage in critical reflection on their own science teaching to continually improve their instructional effectiveness. |  |  |  |
| 6b. Participate in professional development opportunities to deepen their science content knowledge and practices. |  |  |  |
| 6c. Participate in professional development opportunities to expand their science-specific pedagogical knowledge. |  |  |  |

## APPLICABLE STIPULATIONS

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