NM STEM Ready! Science Standards

New Mexico Six Specific Standards and Recommended Course Maps

NMPED
Public Education Department
### 1. Science and Society

**PERFORMANCE EXPECTATIONS**

Students who demonstrate understanding can:

**1-SS-1 NM.** Obtain information about how men and women of all ethnic and social backgrounds in New Mexico have worked together to advance science and technology. [Clarification Statement: Introduce the concept that regardless of ethnicity, gender, or social background, any person can contribute to advances in science and technology.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

**Science and Engineering Practices**

Obtaining, Evaluating and Communicating Information

- Obtain information using various tests, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.
- Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).

**Disciplinary Core Ideas**

ETS1.A Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.

**Crosscutting Concepts**

Patterns

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Connections to Nature of Science

Science Addresses Questions about the Natural and Material World

- Scientists study the natural and material world

Science is a Human Endeavor

- People have practiced science for a long time.
- Men and women of diverse backgrounds are scientists and engineers.

Connections to other DCIs in this grade-band: N/A

Articulation of DCIs across grade-bands: 3-5.ETS1.A

Common Core State Standards Connections:

**ELA/Literacy**

- RI.1.1 Ask and answer questions about key details in the text.
- RI.1.2 Identify the main topic and retell key details of a text.
- RI.1.10 With prompting and support, read informational texts appropriately complex for grade 1.
- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions.)

**Mathematics**
PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

5-SS-1 NM. Communicate information gathered from books, reliable media, or outside sources, that describes how a variety of scientists and engineers across New Mexico have improved existing technologies, developed new ones, or improved society through applications of science.

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

### Science and Engineering Practices

**Obtaining, Evaluating and Communicating Information**

Obtaining, evaluating, and communicating information in 3-5 builds on K-2 experiences and progresses to evaluating the merit and accuracy of ideas and methods:

- Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence.

### Disciplinary Core Ideas

**ETS2.A: Interdependence of Science, Engineering, and Technology**

- Advances in science offer new capabilities, new materials, or new understanding of processes that can be applied through engineering to produce advances in technology.
- Advances in technology, in turn, provide scientists with new capabilities to probe the natural world at larger or smaller scales; to record, manage, and analyze data; and to model ever more complex systems with greater precision.
- In addition, engineers’ efforts to develop or improve technologies often raise new questions for scientists’ investigation.

### Crosscutting Concepts

**Science is a Human Endeavor**

- Men and women from all cultures and backgrounds choose careers as scientists and engineers.
- Most scientists and engineers work in teams.
- Science affects everyday life.
- Creativity and imagination are important to science.

**Science is a Way of Knowing**

- Science is both a body of knowledge and processes that add new knowledge.
- Science is a way of knowing that is used by many people.

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**Connections to other DCIs in this grade-band:** N/A

**Articulation of DCIs across grade-bands:** N/A

**Common Core State Standards Connections:**

**ELA/Literacy –**

RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

**W.5.9** Draw evidence from literary or informational texts to support analysis, reflection, and research.

**SL.5.5** Include multimedia components (e.g., graphics, sounds) and visual displays in presentations when appropriate to enhance the development of main ideas or themes

**Mathematics –**
PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

MS-ESS3-3 NM. Describe the advantages and disadvantages associated with technologies related to local industries and energy production. [Clarification Statement: Examples may include examining short- and long-term impacts of related technologies on water usage (such as the withdrawal of water from streams and aquifers, the construction of dams and levees, or sewage treatment plants), land usage (such as urban development, agriculture, the removal of wetlands, or solar panel installation), pollution (such as of the air, water, or land), local employment, and economic stimulus.]

The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education:

**Science and Engineering Practices**

**Engaging in Argumentation from Evidence**

Engaging in argument from evidence in 6–8 builds on K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

- Compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts.

**Obtaining, Evaluating and Communicating Information**

Obtaining, evaluating, and communicating information in 6–8 builds on K-5 experiences and progresses to evaluating the merit and validity of ideas and methods.

- Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.

**Disciplinary Core Ideas**

**ESS3.A Natural Resources**

- Humans depend on Earth’s land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.

**ESS3.C Human Impacts on Earth Systems**

- The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.

**ETS2.B Influence of Engineering, Technology, and Science on Society and the Natural World**

- The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

**Crosscutting Concepts**

**Cause and Effect**

- Cause and effect relationships may be used to predict phenomena in natural or designed systems.

**Systems and System Models**

- Models can be used to represent systems and their interactions—such as inputs, processes, and outputs—and energy, matter, and information flows within systems.

Connections to other DCIs in this grade-band: MS.LS2.A; MS.LS2.C; MS.LS4.D


Common Core State Standards Connections:

**ELA/Literacy -**

- **MP 3** They respond to the varying demands of audience, task, purpose, and discipline.

- **RST 6-8.2** Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

- **RST 6-8.9** Compare and contrast the information gain from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

- **WHST 6-8.B** Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

- **WHST 6-8.9** Mathematics - **MP 3** Construct viable arguments and critique the reasoning of others.

STEM Ready!
## HS.Interdependent Relationships in Ecosystems

### PERFORMANCE EXPECTATIONS

**Students who demonstrate understanding can:**

**HS-LS2-7 NM.** Using a local issue in your solution design, describe and analyze the advantages and disadvantages of human activities that support the local population such as reclamation projects, building dams, and habitat restoration.*

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

<table>
<thead>
<tr>
<th>Science and Engineering Practices</th>
<th>Disciplinary Core Ideas</th>
<th>Crosscutting Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constructing Explanations and Designing Solutions</strong></td>
<td><strong>LS2.C: Ecosystem Dynamics, Functioning, and Resilience</strong></td>
<td><strong>Stability and Change</strong></td>
</tr>
<tr>
<td>Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</td>
<td>Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species.</td>
<td>Much of science deals with constructing explanations of how things change and how they remain stable.</td>
</tr>
<tr>
<td>• Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.</td>
<td><strong>LS4.D: Biodiversity and Humans</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>ETS1.B: Developing Possible Solutions</strong></td>
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<tr>
<td></td>
<td>• When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. (secondary)</td>
<td></td>
</tr>
</tbody>
</table>

Connections to other DCIs in this grade-band: HS.ESS2.D ; HS.ESS2.E ; HS.ESS3.A ; HS.ESS3.D


Common Core State Standards Connections:

ELA/Literacy -

RST.9-10.8 Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Mathematics -

MP.2 Reason abstractly and quantitatively.

HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.

HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

*The performance expectation marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.
PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

HS-SS-1 NM. Obtain and communicate information about the role of New Mexico in nuclear science and 21st century innovations including how the national laboratories have contributed to theoretical, experimental, and applied science; have illustrated the interdependence of science, engineering, and technology; and have used systems involving hardware, software, production, simulation, and information flow. [Clarification Statement: Sandia National Laboratory, Los Alamos National Laboratory, Very Large Array, White Sands, Air Force Research Laboratory, Genome Research, New Mexico Tech, New Mexico State University, University of New Mexico, New Mexico Highlands University, etc.]

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<td>Obtaining, Evaluating, and Communicating Information</td>
<td>ETS1.A Defining and Delimiting Engineering Problems</td>
<td>Cause and Effect</td>
</tr>
<tr>
<td>• Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.</td>
<td>• Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.</td>
<td>• Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</td>
</tr>
<tr>
<td></td>
<td>• Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges may also have manifestations in local communities.</td>
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<td>ETS1.B Developing Possible Solutions</td>
<td>Science is a Way of Knowing</td>
</tr>
<tr>
<td>• When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.</td>
<td>• New technologies can have deep impacts on society and the environment, including some that were not anticipated.</td>
<td>• Science is both a body of knowledge that represents a current understanding of natural systems and the processes used to refine, elaborate, revise, and extend this knowledge.</td>
</tr>
<tr>
<td></td>
<td>ETS2.B Influence of Engineering, Technology, and Science on Society and the Natural World</td>
<td>• Science distinguishes itself from other ways of knowing through use of empirical standards, logical arguments, and skeptical review.</td>
</tr>
<tr>
<td>• New technologies can have deep impacts on society and the environment, including some that were not anticipated.</td>
<td></td>
<td>• Science knowledge has a history that includes the refinement of, and changes to, theories, ideas, and beliefs over time.</td>
</tr>
</tbody>
</table>

Connections to other DCIs in this grade-band: PS 1.A; PS 1.B; PS 1.C

Articulation of DCIs across grade-bands: N/A

Common Core State Standards Connections:

- ELA/Literacy -
  - RST HS.1: They demonstrate independence
  - SL 9-12.1A: Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
  - SL 9-12.4: Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
  - SL 9-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
  - WHST 9-12.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

Mathematics -
PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

**HS-SS-2 NM.** Construct an argument using claims, scientific evidence, and reasoning that helps decision makers with a New Mexico challenge or opportunity as it relates to science.  
[Clarification Statement: Examples may include, but are not limited to, the Waste Isolation Pilot Plant (WIPP), mining, oil and gas production, solar energy, production, environmental remediation, urbanization, water scarcity, forest fires, or flash floods.]
Connections to Common Core math standards were considered in course map development.
Connections to Common Core math standards were considered in course map development.
High School Recommended Integrated Course Map

Integrated Science I
Matter and Its Interactions
HS-PS1-1
HS-PS1-2
HS-PS1-3
HS-PS1-4
HS-PS1-5
HS-PS1-6
HS-PS1-7
HS-ETS1-4

Matter and Energy
HS-PS2-1
HS-PS2-2
HS-PS2-3
HS-PS2-4
HS-PS2-5
HS-PS2-6

Earth’s Systems
HS-ESS2-1
HS-ESS2-2
HS-ESS2-3
HS-ESS2-4
HS-ETS1-1

Earth and Human Activity
HS-ESS3-1
HS-ESS3-2
HS-ESS3-3
HS-ESS3-4

Integrated Science II
From Molecules to Organisms: Structure and Processes
HS-LS1-1
HS-LS1-2
HS-LS1-3
HS-LS1-4
HS-LS1-5
HS-LS1-6
HS-LS1-7
HS-LS1-8
HS-ETS1-4

Ecosystem: Interaction, Energy, and Dynamics
HS-LS2-1
HS-LS2-2
HS-LS2-3
HS-LS2-4
HS-LS2-5
HS-LS2-6
HS-LS2-7
HS-LS2-7 NM
HS-LS2-8
HS-ETS1-1
HS-ETS1-2

Waves and Their Applications in Technologies
HS-PS4-1
HS-PS4-2
HS-PS4-3
HS-PS4-4
HS-PS4-5
HS-ETS1-2

Earth and Human Activity
HS-ESS3-1
HS-ESS3-2
HS-ESS3-3
HS-ESS3-4
HS-ESS3-5
HS-ESS3-6

Integrated Science III
Motion and Stability: Forces and Interactions
HS-PS2-1
HS-PS2-2
HS-PS2-3
HS-PS2-4
HS-PS2-5
HS-PS2-6

Earth’s Place in the Universe
HS-ESS1-1
HS-ESS1-2
HS-ESS1-3
HS-ESS1-4
HS-ESS1-5
HS-ESS1-6
HS-ESS2-7
HS-SS-1
HS-ETS1-2

Biological Evolution: Unity and Diversity
HS-LS4-1
HS-LS4-2
HS-LS4-3
HS-LS4-4
HS-LS4-5
HS-LS4-6
HS-ETS1-1

Heredity: Inheritance and Variation of Traits
HS-LS1-4
HS-LS3-1
HS-LS3-2
HS-LS3-3
HS-LS3-4
HS-ETS1-3
High School Recommended Discipline Specific Course Map

Biology

- Engineering Design
  - HS-ETS1-1
  - HS-ETS1-2
  - HS-ETS1-3
  - HS-ETS1-4
  - From Molecules to Organisms: Structures and Processes
    - HS-LS1-1
    - HS-LS1-2
    - HS-LS1-3
  - Matter and Energy in Organisms and Ecosystems
    - HS-LS1-5
    - HS-LS1-6
    - HS-LS1-7
    - HS-LS2-3
    - HS-LS2-4
    - HS-LS2-5
  - Interdependence in Ecosystems
    - HS-LS2-1
    - HS-LS2-2
    - HS-LS2-6
    - HS-LS2-7
    - HS-LS2-7 NM
    - HS-LS2-8
    - HS-LS4-6

Inheritance and Variation of Traits
- HS-LS1-4
- HS-LS3-1
- HS-LS3-2
- HS-LS3-3

Matter and Energy in Organisms and Ecosystems
- HS-LS1-4
- HS-LS1-5
- HS-LS1-6
- HS-LS1-7
- HS-LS2-3
- HS-LS2-4
- HS-LS2-5
- HS-LS2-6

Earth’s Systems
- HS-ESS2-4
- HS-ESS2-5
- HS-ESS2-6

Earth and Human Activity
- HS-ESS3-1
- HS-ESS3-3
- HS-ESS3-4

Waves and Electromagnetic Radiation
- HS-PS4-1
- HS-PS4-2
- HS-PS4-3
- HS-PS4-4
- HS-PS4-5

Physics

- Engineering Design
  - HS-ETS1-1
  - HS-ETS1-2
  - HS-ETS1-3
  - HS-ETS1-4
  - Space Systems
    - HS-ESS1-1
    - HS-ESS1-2
    - HS-ESS1-3
    - HS-ESS1-4
  - Forces and Interactions
    - HS-PS2-1
    - HS-PS2-2
    - HS-PS2-3
    - HS-PS2-4
    - HS-PS2-5
    - HS-PS2-6

Energy
- HS-PS3-1
- HS-PS3-2
- HS-PS3-3
- HS-PS3-4
- HS-PS3-5

New Mexico Specific Standard
- HS-SS-2

Chemistry

- Engineering Design
  - HS-ETS1-1
  - HS-ETS1-2
  - HS-ETS1-3
  - HS-ETS1-4
  - Structures and Properties of Matter
    - HS-ESS3-2
    - HS-ESS3-5
    - HS-ESS3-6
  - Human Sustainability
    - HS-ESS3-2
    - HS-ESS3-5
    - HS-ESS3-6

Chemical Reactions
- HS-PS1-1
- HS-PS1-2
- HS-PS1-4
- HS-PS1-5
- HS-PS1-6
- HS-PS1-7

Energy (repeat)
- HS-PS3-1
- HS-PS3-2
- HS-PS3-3
- HS-PS3-4
- HS-PS3-5

New Mexico Specific Standard
- HS-SS-1

Earth’s Systems
- HS-ESS2-4 (repeat)
- HS-ESS2-5
- HS-ESS2-6

*Biology, Physics, and Chemistry may be taken in any sequence.*