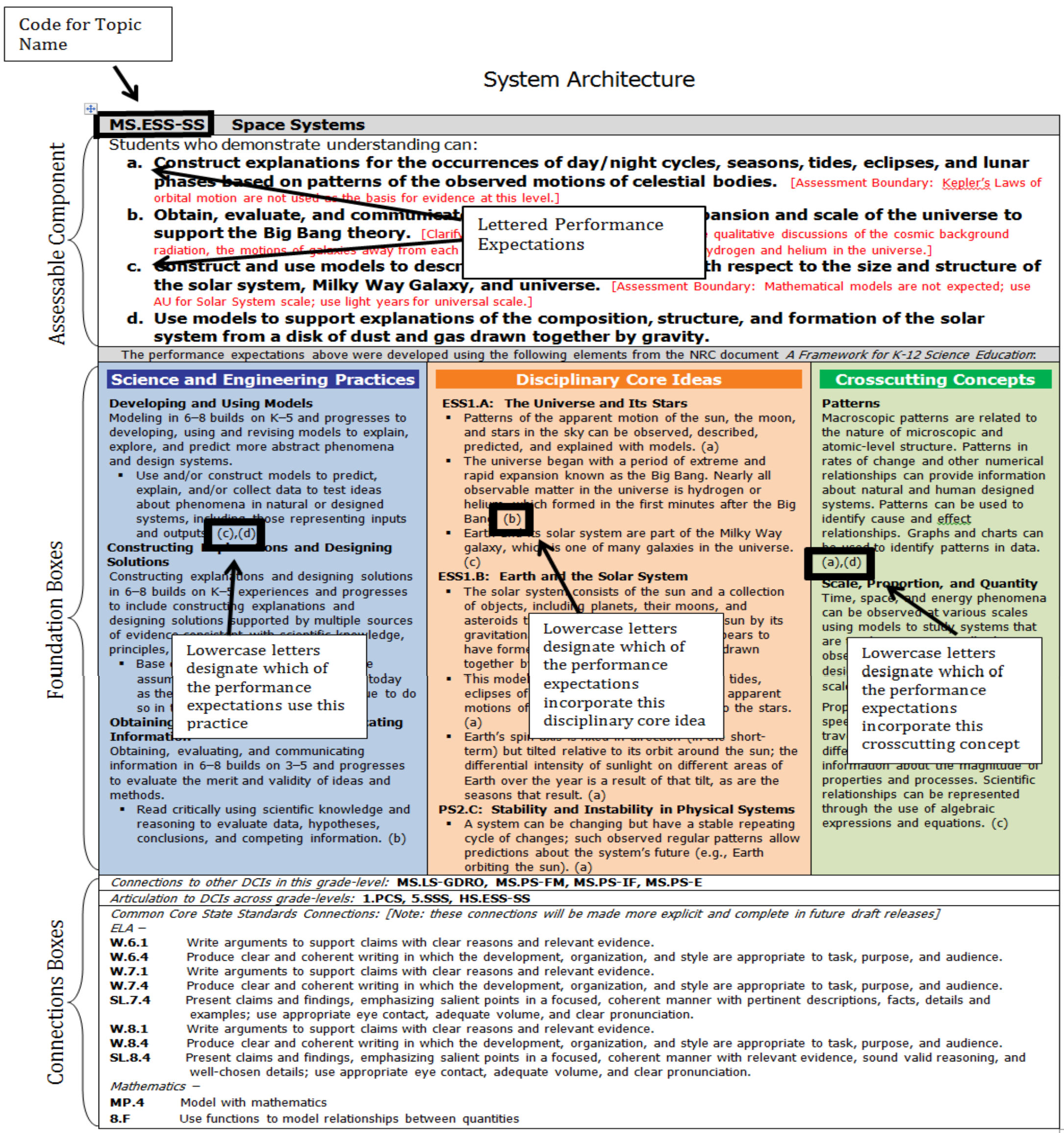
How to Read the *Next Generation Science Standards (NGSS)*

The Next Generation Science Standards (NGSS) are distinct from prior science standards in that they integrate three dimensions within each standard and have intentional connections across standards. To provide guidance and clarification to all users of the standards, the writers have created a System Architecture that highlights the NGSS as well as each of the three integral dimensions and connections to other grade bands and subjects. The standards are organized in a table with three main sections:

1) Performance expectation(s)
2) The foundation boxes, and
3) The connection boxes

<u>Reading the Elements of the System Architecture</u>

In the figure below, from top to bottom are seen the title, the topic label row, the performance expectation(s) (the assessable component), the foundation boxes (containing Practices, Disciplinary Core Ideas and Crosscutting Concepts), and the connection boxes.



A detailed explanation of the elements of the System Architecture follows:

1. Performance Expectations
   The standards are written as student performance expectations. These statements each incorporate a practice, a disciplinary core idea, and a crosscutting concept. The performance expectations are the assessable components of the NGSS architecture identified with lowercase letters, and each combines Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas. The performance expectations were initially written in topical groupings, but can also be viewed independently. Topical groupings of performance expectations do not imply a preferred ordering for instruction—nor should all performance expectations under one topic necessarily be taught in one course. There are two additional statements associated with the performance expectations that are meant to render additional support and clarity:
   a. *Assessment Boundary Statements* are included with individual performance expectations where appropriate, to provide further guidance or to specify the scope of the expectation at a particular grade level.
   b. *Clarification Statements* are designed to supply examples or additional clarification to the performance expectations.

2. Foundation Boxes
   Foundation boxes provide additional information, expanding and explaining the performance expectations in relation to the three dimensions: Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts. Each statement in any one of the three foundation boxes is coded to the performance expectation(s) that embody it by a lowercase letter in parentheses.

   a. *Science and Engineering Practice Statements*: These statements are derived from and grouped by the eight categories detailed in the *Framework* to further explain the science and engineering practices important to emphasize in each grade band. Most topical groupings of performance expectations emphasize only a few of the practice categories; however, all practices are emphasized within a grade band. Teachers should be encouraged to utilize several practices in any instruction. The purpose is to demonstrate the specific practice for which students will be held accountable.
   b. *Disciplinary Core Ideas (DCIs)*: These statements are taken verbatim from the *Framework*, and detail the sub supporting ideas necessary for student mastery of the core idea.
   c. *Crosscutting Concept Statements*: These statements were derived from the *Framework* to further explain the crosscutting concepts important to emphasize in each grade band. The crosscutting concepts are grouped by the categories detailed in the *Framework*. Most topical groupings of performance expectations emphasize only a few of the crosscutting concept categories, however all are emphasized within a grade band. Again, the list is not exhaustive nor is it intended to limit instruction.

3. Connection Boxes
   a. *Connections to other DCIs in this grade level*: This box will contain the names of science topics in other disciplines that have corresponding disciplinary core ideas at the same grade level. For example, both Physical Science and Life Science standards contain core ideas related to Photosynthesis, and could be taught in relation to one

another. As the standards move toward completion, this box will provide links to specific performance expectations.

b. *Articulation of DCIs across grade levels*: This box will contain the names of other science topics that either 1) provide a foundation for student understanding of the core ideas in this standard (usually standards at prior grade levels) or 2) build on the foundation provided by the core ideas in this standard (usually standards at subsequent grade levels). As the standards move toward completion, this box will provide links to specific performance expectations.
c. *Connections to the Common Core State Standards*: This box will contain the coding and names of Common Core State Standards in English Language Arts & and Literacy and Mathematics that align to the performance expectations. For example, performance expectations that require student use of exponential notation will align to the corresponding CCSS mathematics standards.

Color Coding

Online versions of the standards display color coding of the words within each standard statement. The colors represent the three dimensions: blue for Science and Engineering Practices, orange for Disciplinary Core Ideas, and green for Crosscutting Concepts. Clarification Statements and Assessment Boundaries are red. Printed versions of the standards do not have color coding of the three dimensions; in these cases the coding for the three dimensions will be accomplished through the lowercase letters found after each foundation box statement.