# Curriculum Units and Learning Outcomes

| **Content Area: Science** | **Grade Level: 7** |
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| **Unit Title: Systems** | |
| **Unit Summary:**<br>**Students analyze systems and develop an understanding that systems interact with other systems, have subsystems and can be part of a larger complex system. Students also explore models as a tool used to represent systems and their interactions.** | |
| **Massachusetts Standards:**<br>7.MSETS34(MA). Show how the components of a structural system work together to serve a structural function. Provide examples of physical structures and relate their design to their intended use.<br>Clarification Statements:<br>●Examples of components of a structural system could include foundation, decking, wall, and roofing.<br>●Explanations of function should include identification of live vs. dead loads and forces of tension, torsion, compression, and shear.<br>●Examples of uses include carrying loads and forces across a span (such as a bridge), providing livable space (such as a house or office building), and providing specific environmental conditions (such as a greenhouse or cold storage).<br><br>7.MSETS35(MA). Use the concept of systems engineering to model inputs, processes, outputs, and feedback among components of a transportation, structural, or communication system.<br><br>● | |
| **Enduring Understandings: Students will understand that:**<br>● Systems may interact with other systems; they may have sub-systems and be part of a larger complex system | |

- Models can be used to represent systems and their interactions- such as inputs, processes, and outputs- and energy, matter and information flows within systems.
- Models are limited in that they only represent certain aspects of the system under study.

**Essential Questions:**

- What is a system?
- How does change happen in a system?
- How can we model the components of a system?
- (How is one community impacted by changes in another community?)
- Why are models or simulations useful?

| **Students will demonstrate KNOWLEDGE of:** | **Students will be SKILLED at**: |
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| ● inputs and outputs are part of systems.<br>● Systems can interact with other systems or contain subsystems.<br>● Systems can be represented by models<br>● There are limitations to models | ● Defining a system and explaining how energy, matter and information flow<br>● Identifying inputs and outputs<br>● Defining a model and explaining why it is important<br>● Identifying limitations of a model<br>● Identifying components of a system (i.e. a school as a system)<br>● comparing a school system to a different system<br>● using systems mapping as a tool to visualize the interactions between a human–nature-coupled system within their communities. |

**Estimated Duration: 3 weeks**