

## Crosscutting Concepts

*A Framework for K-12 Science Education: Practices, Crosscutting Concepts and Core Ideas (NRC, 2011)*

<p>“Students’ understanding of the crosscutting concepts should be reinforced by repeated use of them in the context of instruction in the disciplinary core ideas. In turn, the crosscutting concepts can provide a connective structure that supports students’ understanding of sciences as disciplines and that facilitates their comprehension of the systems under study in particular disciplines.” (NRC, 2011)</p>	
<b>Patterns</b>	Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.
<b>Cause and effect: Mechanism and explanation</b>	Events have causes, sometimes, simple, sometimes multifaceted. A major activity of science is investigating and explaining causal-relationships and the mechanisms by which they are mediated. Such mechanisms can be tested across give contexts and used to predict and explain events in new contexts.
<b>Scale, proportion, and quantity</b>	In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system’s structure of performance.
<b>Systems and system models</b>	Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.
<b>Energy and matter: Flows, cycles, and conservation</b>	Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems’ possibilities and limitations.
<b>Structure and function</b>	The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.
<b>Stability and change</b>	For natural and built systems alike, conditions of stability and determinants of rates of change or evolution for the system are critical elements of study.