Nature of science and nature of engineering ideas (adapted from Clough and Kruse 2017; Wilcox, Cruse, and Decker 2021, Lederman and Lederman 2004; NGSS Lead States 2013).

Nature of science ideas	Nature of engineering ideas
● Science seeks to understand the natural world. ● Scientists use a variety of methods to understand the natural world. ○ Science is empirical. ○ Some of these methods are more observational and some are experimental. ○ Regardless, scientists don't follow a step-by-step scientific method. ● Doing science well requires imagination and creativity. ● Generation and acceptance of scientific ideas take time. ● Science has a subjective aspect. ● Science ideas are durable but open to revision. ● Well-established ideas are not easily abandoned. ● Science provides natural explanations for phenomena. ● Hypotheses, Laws, and Theories are different types of knowledge. ● Doing science is a social and collaborative process. ● Science is a human endeavor. ○ People from different backgrounds, cultures, and identities can contribute to science.	● Engineering is not the same as science. ○ Engineering often focuses on designing solutions to solve problems for humanity whereas science is attempting to understand the natural world. ○ Engineering often uses science (as well as math and other disciplines) to inform their practices. ● Doing engineering well requires imagination and creativity. ● Engineering has a subjective aspect. ● Engineers attempt to optimize their designs through iterations. ● Engineers face constraints (e.g., money, time, materials, society). ● Society impacts engineering (e.g., consumer-driven), and engineering impacts society (e.g., social media, smartphones). ● Doing engineering is a social and collaborative process. ● Engineers have to consider trade-offs. Everything engineered has trade-offs. ● Engineering is a human endeavor. ○ People from different backgrounds, cultures, and identities can contribute to engineering.

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