Plymouth Public Schools' Science and Technology/Engineering Program High School Engineering Design Process Learning Standards

STE2063 Engineering Design Process College Prep 1

An Introduction to the Massachusetts Department of Elementary and Secondary Education Science and Technology/Engineering Curriculum Framework
Effective teaching and learning in science fosters engagement and has rigor, relevance, and coherence embedded within. It couples practice with content to give the context for performance. A program with these components encourages students to analyze and explain phenomena and experience; engages with practices to build, use, and apply knowledge; and builds a storyline over time and among disciplines. The state standards that form this program are outcomes that reflect what a student should know and be able to do as a result of instruction. Science and engineering practices, which are included in these standards, are not teaching strategies; they are important learning goals and skills to be learned, also as a result of instruction. The standards listed below are not intended to represent an exhaustive list of all that could be included in our district's science program, nor should this list prevent students from going beyond the standards where appropriate. (Excerpts from Curriculum Framework)

Disciplinary Core Ideas – ELECTIVE COURSES
By the end of high school, students should have gained a sufficient knowledge of the science and engineering practices and disciplinary core ideas of science and engineering to engage in public discussions on science-related issues, to be critical consumers of scientific information related to everyday lives, and to continue to learn about science throughout their lives. They do so by enrolling in and successfully completing introductory science courses, as well as application level elective courses. Within these elective courses, students come to appreciate that science and engineering are instrumental in addressing major challenges that confront society today and perhaps so excited and inspired to want to pursue science or engineering-based careers as a result. (Excerpts from National Research Council, A Framework for K-12 Science Education)

ETS1. Engineering Design

HS-ETS1-1. Analyze a major global challenge to specify a design problem that can be improved. Determine necessary qualitative and quantitative criteria and constraints for solutions, including any requirements set by society.

Clarification Statement:
Examples of societal requirements can include risk mitigation, aesthetics, ethical considerations, and long-term maintenance costs.

HS-ETS1-2. Break a complex real-world problem into smaller, more manageable problems that each can be solved using scientific and engineering principles.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, aesthetics, and maintenance, as well as social, cultural, and environmental impacts.

HS-ETS1-4. Use a computer simulation to model the impact of a proposed solution to a complex real-world problem that has numerous criteria and constraints on the interactions within and between systems relevant to the problem.

HS-ETS1-5(MA). Plan a prototype or design solution using orthographic projections and isometric drawings, using proper scales and proportions.

HS-ETS1-6(MA). Document and present solutions that include specifications, performance results, successes and remaining issues, and limitations.