Center for Research on Interface Structure and Phenomena (CRISP)
CRISP CLASSROOM KITS & DEMONSTRATIONS STANDARD ALIGNMENT

**KIT TITLE:** Designing Prosthetic Devices **GRADE LEVEL:** Middle and High school

**OBJECTIVES:**

Students will be able to:

- Execute and explain the Engineering Design Process
- Design and build a model prosthesis that can perform similar functions to the human hand Recognize design constraints and critically assess design solutions

***NEXT GENERATION SCIENCE STANDARDS***

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| NGSS Performance Tasks | **MS-ETS1-2**<br>• Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.<br>**HS-ETS1-3**<br>• 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, and aesthetics as well as possible social, cultural, and environmental impacts. |
| NGSS Disciplinary Core Ideas (DSI) | **MS-PS1-3**<br>• Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.<br>**MS-ETS1-1**<br>• Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.<br>**MS-ETS1-3**<br>• Analyze data from tests to determine similarities and differences among several design solution to identify the best characteristics of each that can be combined into a new solution to better meet criteria for success.<br>**MS-EST1-4**<br>• Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. |

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| | **HS-ETS1-1**<br>• Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.<br>**HS-ETS1-2**<br>• Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.<br>**HS-ETS1-4**<br>• Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. |
| NGSS Cross Cutting Concepts (CCC) | **CC-4: Systems and System Models**<br>• Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows— within and between systems at different scales. (HS-ETS1-4)<br>**CC-2: Cause and Effect**<br>• New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology. (HS-ETS1-1) (HS-ETS1-3) |
| NGSS Science and Engineering Practices (SEP) | **SEP 2- Developing and Using Models**<br>• Asking questions (for science) and defining problems (for engineering) Constructing explanations (for science) and designing solutions (for engineering) |

***COMMON CORE STANDARDS***

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| CC - ELA/Literacy Standards | **RST.11-12.7**<br>• Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-ETS1-1),(HS-ETS1-3)<br>**RST.11-12.8**<br>• Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-ETS1-1),(HS-ETS1-3)<br>**RST.11-12.9**<br>• Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. (HS-ETS1-1),(HS-ETS1-3) |
| CC-Math Standards | **MP.2**<br>• Reason abstractly and quantitatively. (5-PS1-1)<br>**MP.4**<br>• Model with mathematics. (5-PS1-1) |