## Course Outline

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| **Prepare the Surface** | Students explore the particle motion of different phases (solids, liquids and gases) and use that to set the air and ice temperature for the arena. | - Explain that matter is made up of particles that are too small to see (i.e., Molecules).  
- Describe how changes in temperature affect molecular motion and kinetic energy.  
- Describe and compare the phases of matter (solid, liquid, and gas) based on temperature and molecular motion. | Molecules, atoms, H₂O, O₂, phases, solid, liquid, gas, volume, kinetic energy, Celsius, Fahrenheit, freezing, melting |
| **The Face-Off**       | Students explore the relationship between potential and kinetic energy during a puck drop. | - Explain the difference between kinetic energy (ke) and potential energy (pe).  
- Identify the relative amount of ke and pe in a system, based on an object’s speed and position relative to the ground.  
- Explain the relationship between ke and pe in a closed system (i.e., Energy is conserved). | Kinetic energy, potential energy, energy transformation, conservation of energy |
| **Strength**           | Students explore the effect of mass and speed on a player’s kinetic energy by adding removing their equipment and adjusting their skating speed. | - Identify and define independent and dependent variables.  
- Recognize patterns and correlations in data sets.  
- Explain the positive relationships between mass, speed (velocity), and kinetic energy.  
- Identify that changes in speed (velocity) have a greater impact on kinetic energy than changes in mass. | Independent variable, dependent variable, kinetic energy, mass, speed |
| **Endurance**          | Students train players in their target heart rate zone during an on-ice shift to see the effect of exercise on heart rate and breathing rate. | - Describe the components and function of the respiratory and circulatory system.  
- Collect data to analyze the relationship between physical exercise and heart rate and breathing rate.  
- Describe the relationship between cells, tissues, organs and organ systems. | Specialized cells, tissue, rate, organ, organ system, circulatory system, respiratory system, red blood cell, capillaries, heart rate, breathing rate |
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| The Stick  | Students make observations about player’s stick design preferences based on their skating, shooting, and passing styles and use this observational data to design the best stick for a new player. | - Define and identify variables and criteria in an engineering design task.  
- Analyze data tables to discover patterns and correlations.  
- Select an optimal design solution to meet given criteria. | Observation, criteria, variable, qualitative data, quantitative data |
| The Goalie Pads | Students isolate and control variables to see how different pad materials affect protection & maneuverability. | - To define and identify controls (or controlled variables) in an engineering design task.  
- Perform controlled experiments by adjusting experimental variables.  
- Analyze data tables to find patterns and correlations.  
- Select an optimal design solution based on given requirements. | Criteria, independent/dependent/controlled variables, optimization |

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