

Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course Resumes also detail student experience with tools, software, lab work, and engineering design. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

### **Computational and Analytical Skills**

- Sketch a free body diagram with more than one pair of forces
- Justify the validity of entries in a given decision matrix
- Solve for unknown variables in a combination circuit given other components
- Calculate the location of a shape's centroid
- Solve for the magnitude of a vector
- Solve for external and internal forces in a given truss
- Determine the modulus of elasticity and elastic limit from tensile test data
- Determine the yield, tensile, and ultimate strengths from tensile test data
- Analyze graphical data from beam deflection
- Use Kirchoff's Law to calculate current, resistance, and voltage in a circuit
- Write programming code for a project involving a sequence or system of tasks
- Use a variety of methods for identifying and correcting bugs in a program code
- Calculate the unknown variable for a system that has been subject to a change of state using the gas laws
- Use Bayes' theorem to calculate the probability of an event based on past events
- Calculate the initial velocity of a projectile and the angle it is launched
- Determine an unknown quantity in a formula when most of the other variable values are provided and one value requires an additional calculation such as addition, unit conversion, or rearrangement of the formula

### **Engineering Design Experience**

- Exhibit professional skills needed to successfully contribute to work in a team
- Determine how to proceed through possible alternate routes of a design process
- Improve a system design that converts electrical energy to mechanical energy
- Modify the design of a fuel cell project to increase the efficiency of the system
- Defend an insulation design considering the three modes of heat transfer
- Interpret data to make conclusions about insulation design effectiveness
- Justify material choice in the design of a solution
- Improve the efficiency of a solution by modifying hardware and software
- Justify the use of either a hydraulic or pneumatic system in a problem

### **Tools and Software**

- VEX Robotics platform
- Logger Pro- Data collection and analysis software
- ROBOTC- Robot programming language

### **Professional Skills**

- Team collaboration
- Project management
- Problem-solving
- Communication skills

- Presentation skills
- Technical writing

### **Course Knowledge**

- Careers
  - Engineering disciplines
  - STEM careers related to engineering
  - Professional ethics
- Energy and Power
  - Mechanisms and simple machines
  - Mechanical advantage
  - Energy sources and applications
- Materials and Structures
  - Vectors, forces, and statics
  - Trusses
  - Material properties
  - Centroids
  - Tensile testing
- Control Systems
  - Machine control
  - Programming
  - Sensors and motors
  - Fluid Power – hydraulics and pneumatics
- Statistics and Kinematics
  - Statistics
  - Kinematics