



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.

Industry 4.0

- Integrate real-time data
- Automate systems with artificial intelligence (AI)
- Connect devices through the Internet of Things (IoT)
- Monitor processes continuously
- Build and analyze prediction models
- Explore collaborative robotics
- Strengthen systems with cybersecurity

Robotics

- Program 6-axis robots
- Use absolute and relative motion
- Troubleshoot robot behavior
- Integrate conveyors and pneumatics
- Palletize, transport, and sort
- Coordinate multi-robot systems

Manufacturing Processes and Tools

- Map manufacturing process flow
- Define sequence of operations
- Apply lean manufacturing principles
- Improve processes continuously
- Analyze cycle time
- Optimize workflows
- Evaluate product quality

Digital Twins

- Analyze 3D models and import them into different software
- Run kinematic simulations
- Optimize cycle time
- Perform collision avoidance
- Program robots offline
- Develop simulation programs

Product Lifecycle and Supply Chain Management

- Evaluate economic incentives
- Build and validate forecasts
- Compare suppliers and procurement plans
- Validate production schedules
- Optimize distribution and warehousing
- Design effective packaging
- Calculate product financials
- Determine system efficiency

Programming and Computation

- Write Python® and VEXcode programs for the 6-axis arm, motors, sensors, and pneumatic system
- Use variables, loops, conditionals, and other logic to create flexible and efficient programs
- Break complex automation problems into programmable steps
- Debug programs to resolve logic errors, movement issues, and sensor problems
- Translate programming solutions between environments with AI assistance



Automation and Control Systems

- Build control logic for automated systems
- Program system-level behaviors
- Manage input and output signals
- Coordinate timing of automated steps
- Maintain stable system behavior through feedback

Data Analytics

- Analyze and optimize production performance data
- Create clear data visualizations
- Build predictive maintenance models
- Design experiments
- Draw conclusions based on evidence in data

Cybersecurity

- Detect data and configuration issues
- Practice secure coding
- Analyze logs and sensor outputs
- Apply principles of confidentiality, integrity, and availability
- Mitigate common cyber threats

Artificial Intelligence

- Engineer effective AI prompts
- Troubleshoot and optimize code
- Apply safe programming constructs
- Detect objects with an AI vision sensor
- Translate code into plain English
- Analyze large data sets
- Convert Python into VEXcode
- Evaluate demand forecasts and outliers

Engineering Design and Problem-Solving Skills

- Design and build optimized robotic systems
- Iterate to improve automation
- Integrate multi-workcell solutions
- Follow the engineering design process
- Implement corrective actions

Tools and Software

- 3D solid modeling software (Autodesk Fusion® or other 3D solid modeling applications)
- RoboDK™ (robot simulator)
- Artificial intelligence (such as Microsoft® Copilot and ChatGPT)
- VEX® Robotics VEXcode
- Microsoft Office (Excel®, Word, PowerPoint®) or similar
- 6-axis robotic arm
- Conveyor belts
- Digital and analog sensors
- Pneumatics

Transportable Skills

- Collaborate effectively with a team
- Review and provide feedback
- Manage projects
- Solve problems creatively
- Write technical documentation
- Apply ethical reasoning
- Work in defined roles
- Communicate technical ideas and decisions clearly
- Document processes and instructions
- Collaborate to analyze and present information