KPBSD Computer Aided Drafting/Computer Aided Manufacturing II & III Curriculum – 2017

Industry Standards	

Skills USA Automated Manufacturing Technology Standards

1. Perform mathematical and measurement calculations used in automated manufacturing situations. MFG 1.1, 1.2, 1.4
2. Design, sketch, and plan machine work to U.S. National CAD Standards. MFG 2.1, 2.2, 2.5, 2.6
3. Create a toolpath (CAM file) and the CNC code to related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills, Level I. MFG 3.1, 3.2, 3.3, 3.4, 3.5
4. Perform CNC machining functions given a scenario to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills, Level I. MFG 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11
5. Perform and inspect part(s) using a Total Quality Management process. MFG 5.1, 5.2, 5.3
6. Demonstrate safety practices in a working situation to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills-Level I. MFG 6.1, 6.2, 6.3

ALASKA STANDARDS ALIGNMENT:
CAD/CAM II-III

Transfer Goals

Students will be able to independently use their learning to…
- Design media using computer software and output to a CNC machine.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Level II: Identify and discuss careers that use CAD/CAM applications.
- Level III: Identify, discuss, and participate in career opportunities the use CAD/CAM applications.

Meaning

ENDURING UNDERSTANDINGS

Students will understand…
- How to utilize basic drafting and design tools to measure and draw within a standard tolerance.
- And draw items to an appropriate scale.
- How to determine the length and shape of an object.
- How to use lines that meet drafting standards.
- How to make parts from scaled drawings with a machine.
- How to determine the shape of an object from a print.
- How to reverse engineer objects - digitize into a part file.
- That CNC machines are used to create specialized parts.
- And know the spatial relation between views (Cartesian coordinates system/Pan Views) and objects.
- Appropriate dimension techniques.
- The process of toolpath sequencing.

ESSENTIAL QUESTIONS

Students will keep considering…
- How can I use drafting and design tools to create a product?
- How can I edit projects to ensure quality?
- How do I safely operate CNC machines?
- Why they use CNC machines?
- How do appropriate dimension and scaling techniques effect the quality of a product?
- What career opportunities are available using CNC machines?

- What an orthographic view of an object looks like. - That there are appropriate speed and feed rates while operating a CNC machine. - How to analyze various file extension associated with machine parts. - That there are various types of file formats and select the most appropriate format for each CNC machine to use for machining the part. - That clamping and positioning techniques are for holding down parts to be processed. - That quality control is a planned process to ensure that a product, service, or system meets established criteria. - And realize the design process includes many stages, factors, and inherently designs have a set of constraints and criteria. - How to evaluate a solution based on the needs of customers, society, or environment. - And explore various careers related to graphic design and machining.	

Acquisition	
Students will know… - Appropriate safety requirements in a workshop. - Proper measurements are necessary to create an accurate part. - Speed and feed rates affect the finished product. - Various jobs require CAD/CAM knowledge.	Students will be skilled at… - Following appropriate safety requirements. - Using editing, measuring, annotating, and drawing tools in CAD/CAM software for 2.5D & 3D objects. - Securing and/or positioning media on machining surface.

	• Recognizing and using file formats specific to CNC machining being used.

Evidence	
Evaluative Criteria	**Assessment Evidence**
Design and Quality Rubrics CTE Content Rubrics SkillsUSA Standards	• Create a 2D, 2.5D, & 3D scale drawing. • Create an isometric drawing from an orthographic drawing. • Reproduce a real-world object in a CAD/CAM program to be produced on a CNC machine. • Use a CNC machine to create a predefined part that the student has designed. (Same at all three levels). • Identify, discuss, and participate in career opportunities available in construction, engineering, and manufacturing fields related to CAD/CAM industry.
Resources	
skillsusa.org NCCER, 2009 Core Curriculum NCCER Basic Safety module 09 NCCER Introduction to Power Tools 09 SkillsUSA Technical Drafting 2011 Equipment: PlasmaCAM cutting machine Drafting Software: AutoCAD (from AutoDesk) Drafting Program 2010 Additional Drafting Software: Chief Architect 2010	