

**Florida Department of Education
Curriculum Framework**

Program Title: CNC Production Specialist
Program Type: Career Preparatory
Career Cluster: Manufacturing

Career Certificate Program

Program Number	J200300	
CIP Number	0648050307	
Grade Level	30, 31	
Program Length	600 hours	
Teacher Certification	Refer to the Program Structure section	
CTSO	SkillsUSA	
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.	
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml	
Basic Skills Level	Computation (Mathematics): 10	Communications (Reading and Language Arts): 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the manufacturing career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the manufacturing career cluster.

The content includes but is not limited to broad, transferable skills, stresses the understanding of all aspects of the computer numeric control as it relates to the machining industry, and demonstrates such elements of the industry as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3) (b), F.S.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length
A	PMT0026	CNC Production Technician I	ENG 7G MACH SHOP @7 7G METAL WORK 7G	300 hours
B	PMT0027	CNC Production Technician II		300 hours

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline, or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social, and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership, and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate an understanding of workplace safety and workplace organization.
- 02.0 Demonstrate an understanding of manufacturing methodology principles.
- 03.0 Solve basic job-related math problems.
- 04.0 Interpret basic blueprint information.
- 05.0 Perform basic metrology.
- 06.0 Demonstrate basic knowledge of manufacturing history and primary as well as secondary manufacturing processes.
- 07.0 Demonstrate basic understanding of geometric dimension and tolerance (GD&T)
- 08.0 Set up and operate drill presses.
- 09.0 Demonstrate the use of a CNC control panel.
- 10.0 Demonstrate an understanding of CNC machine systems.
- 11.0 Set up and operate a computerized-numerical-control (CNC) machine for lathe operations.
- 12.0 Set up and operate a computerized-numerical-control (CNC) machine for milling operations.
- 13.0 Demonstrate appropriate computerized-numerical-control (CNC) maintenance and troubleshooting.
- 14.0 Explain the importance of employability and entrepreneurship skills.
- 15.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 16.0 Solve problems using critical thinking skills, creativity, and innovation.
- 17.0 Demonstrate first article inspection methods.
- 18.0 Demonstrate the technique of CNC milling.
- 19.0 Perform advanced set up and operation of a computerized-numeric-control (CNC) mill machine.
- 20.0 Demonstrate the technique of CNC turning.
- 21.0 Perform advanced set up and operation of a computerized-numeric-control (CNC) lathe machine.
- 22.0 Demonstrate basic computer-aided design/computer-aided manufacturing (CAD/CAM) processes.

**Florida Department of Education
Student Performance Standards**

Program Title: CNC Production Specialist
Career Certificate Program Number: J200300

Course Description: CNC Production Technician 1 prepares students for entry into the CNC machining industry. Students explore career opportunities and requirements of a CNC production specialist. Content emphasizes beginning skills key to the success of working in the CNC machining industry. Students study workplace safety and organization, job-related mathematics, basic blueprint information, metrology, the history of manufacturing and primary and secondary manufacturing processes, geometric dimension and tolerance, set up and operation of drill presses, CNC control panels, CNC machine systems, CNC lathe and mill operations, and maintenance and troubleshooting.

Course Number: PMT0026 Occupational Completion Point: A CNC Production Technician I – 300 Hours	
01.0	Demonstrate an understanding of workplace safety and workplace organization. The student will be able to:
01.01	Identify safety requirements for manual, electrical-powered, and pneumatic tools.
01.02	Demonstrate, apply, and provide evidence of safely using manual, electrical-powered, and pneumatic tools
01.03	Identify safety requirements for operation of automated machines and equipment.
01.04	Demonstrate, apply, and provide evidence of safely operating automated machines and equipment.
01.05	Demonstrate, apply, and provide evidence of properly storing equipment and tools.
01.06	Demonstrate, apply, and provide evidence of properly storing precision measuring tools.
01.07	Identify, demonstrate, apply, and provide evidence of understanding of shop safety rules on an ongoing basis.
01.08	Research and characterize class A, B, and C type fires.
01.09	Demonstrate and apply the proper procedures for extinguishing class A, B, and C type fires.
01.10	Identify various workplace injuries related to the manufacturing industry.
01.11	Identify and apply safety procedures in case of smoke or chemical inhalation.
01.12	Demonstrate and apply material handling and lifting techniques to safely move materials.
01.13	Research Occupational Safety Health Administration (OSHA) safety standards as it pertains to the manufacturing industry.
01.14	Locate Safety Data Sheets (SDS).
01.15	Understand the Globally Harmonized System of Classification and Labeling of Chemicals.
01.16	Proactively respond to a safety concern and then document occurrences.

01.17	Demonstrate knowledge of emergency exits and signage.
01.18	Identify and report unsafe conditions.
01.19	Demonstrate knowledge of various emergency alarms and procedures.
01.20	Perform emergency drills and participate in emergency teams.
01.21	Demonstrate knowledge and apply clean-up procedures for spills.
01.22	Explain Lock Out/Tag Out requirements and procedures.
01.23	Demonstrate knowledge of machinery and equipment safety functions to determine if all safeguards are operational.
01.24	Identify and apply procedures for handling hazardous material.
01.25	Perform safety and environmental inspections.
01.26	Demonstrate knowledge of proper and safe installation techniques as described in manuals, checklists, and regulations.
01.27	Demonstrate and apply proper equipment shutdown procedures.
01.28	Identify safety related maintenance procedures.
01.29	Select lubricants for machining operations.
01.30	Lubricate equipment parts.
01.31	Inspect and maintain machine cutting fluids.
01.32	Properly dispose of scrap-metal chips, shavings, trash, and waste.
01.33	Identify, select, and use personal protective equipment (PPE).
01.34	Identify, demonstrate, and apply ergonomic work techniques.
01.35	Identify, demonstrate, and apply pinch points.
02.0	Demonstrate an understanding of the manufacturing methodology principles. The student will be able to:
02.01	Identify and understand an ISO process environment.
02.02	Identify and understanding documentation requirements in an ISO environment.
02.03	Understand their role in an ISO audit.
02.04	Identify and understand 5S terminology.
02.05	Apply 5S principles in workplace.
02.06	Identify and understand lean manufacturing principles and terminology.
02.07	Identify waste in the workplace.

02.08	Identify “management by eye: (visual cues).
02.09	Identify and understand six sigma principles and terminology.
02.10	Identify the DMAIC process.
02.11	Explain the purpose of statistical process control (SPC).
03.0	Solve basic job- related math problems. The student will be able to:
03.01	Solve job-related math problems by adding, subtracting, multiplying, and dividing whole numbers, decimals, and common fractions.
03.02	Understand and apply the order of operations and rounding.
03.03	Solve job-related math problems using positive and negative numbers.
03.04	Solve job-related math problems using different measurement systems (American and metric).
03.05	Measure a workpiece and compare measurements with blueprint specifications and tolerances.
03.06	Solve job-related problems using mathematical charts, tables, and calculators.
03.07	Calculate machine speed and feed by suing appropriate formulas.
04.0	Interpret basic blueprint information. The student will be able to:
04.01	Interpret view concepts (drawing views and projections)
04.02	Read and interpret dimensioning.
04.03	Read and interpret tolerances.
04.04	Interpret lines.
04.05	Read and interpret tile blocks.
04.06	Read and interpret 1st and 3rd angles.
04.07	Read and interpret change orders on working and assembly prints.
04.08	Read and interpret abbreviations, symbols, and terminology.
04.09	Read and interpret thread callouts.
05.0	Perform basic metrology. The student will be able to:
05.01	Identify and understands the proper use of functional measuring tools.
05.02	Read and measure with scales and calipers.
05.03	Read and measure with micrometers (American and Metric).
05.04	Read, calculate, and measure with sine tool.

05.05	Demonstrate proper use of gage blocks.
06.0	Demonstrate basic knowledge of manufacturing history and primary as well as secondary manufacturing processes. The student will be able to:
06.01	Demonstrate knowledge of how manufacturing processes have evolved throughout history.
06.02	Identify different types of raw materials used in manufacturing.
06.03	Explain the difference between primary and secondary manufacturing processes.
06.04	Demonstrate knowledge of primary processes (milling, turning, assembly).
06.05	Demonstrate knowledge of secondary processes including painting, plating, coating, and heat treating)
06.06	Demonstrate knowledge of the use of current manufacturing processes.
06.07	Demonstrate knowledge of quality assurance.
07.0	Demonstrate a basic understanding of geometric dimension and tolerance (GD&T). The student will be able to:
07.01	Identify the datum reference frame.
07.02	Identify datum's and datum symbols.
07.03	Identify geometric characteristic symbols.
07.04	Understand material condition modifiers.
07.05	Identify feature control frame.
08.0	Set up and operate drill presses. The student will be able to:
08.01	Identify the parts of a drill press and explain their uses.
08.02	Identify and set the machine controls.
08.03	Comply with safe and efficient work practices.
08.04	Select the proper tooling.
08.05	Identify the parts of a drill press and explain their uses.
08.06	Set up and operate drill press for secondary operations.
08.07	Set drill presses for proper feed and speed for specified operations.
09.0	Demonstrate the use of a CNC control panel. The student will be able to:
09.01	Apply power off and power on procedures.
09.02	Identify and apply modes of operation and overrides.
09.03	Identify and use emergency stops.

09.04	Identify and use movement controls.
09.05	Identify and use switching functions.
10.0	Demonstrate the understanding of CNC machine systems. The student will be able to:
10.01	Identify and use construction of machine tools.
10.02	Identify controllable feed and rotation axis.
10.03	Identify feed and main drives and their characteristics.
10.04	Identify workpiece clamping device types.
10.05	Identify and use switching functions.
11.0	Set up and operate a computerized numerical-control (CNC) machine for lathe operations. The student will be able to:
11.01	Comply with safe and efficient work practices.
11.02	Set up work holding devices.
11.03	Select proper cutting tools.
11.04	Select appropriate raw materials.
11.05	Write and transfer basic program from computer to machine.
11.06	Adjust appropriate cutting tools and tool offsets.
11.07	Machine and create parts to blueprint tolerances.
11.08	Perform first piece inspection.
12.0	Set up and operate a computerized numerical-control (CNC) machine for milling operations. The student will be able to:
12.01	Comply with safe and efficient work practices.
12.02	Set up work holding devices.
12.03	Select proper cutting tools.
12.04	Select appropriate raw materials.
12.05	Write and transfer basic program from computer to machine.
12.06	Adjust appropriate cutting tools and tool offsets.
12.07	Machine and create parts to blueprint tolerances.
12.08	Perform first piece inspection.
13.0	Demonstrate appropriate CNC maintenance and troubleshooting. The student will be able to:

13.01	Maintain lubrication levels.
13.02	Maintain coolant levels.
13.03	Perform basic housekeeping tasks.

Course Description: CNC Production Technician 2 is designed to build on the skills and knowledge students learned in the CNC Production Technician 1 for entry into the machining industry. Students explore the importance of employability and entrepreneurship skills, leadership and teamwork skills; solve problems using critical thinking, creativity and innovation; demonstrate inspection methods, the techniques of CNC milling, perform advanced set up and operation of a CNC mill and lathe machine, and demonstrate basic computer-aided design/computer-aided manufacturing processes.

Course Number: PMT0027
Occupational Completion Point: B
CNC Production Technician II – 300 Hours

14.0	Explain the importance of employability and entrepreneurship skills. The student will be able to:
14.01	Identify and demonstrate positive work behaviors needed to be employable.
14.02	Develop personal career plan that includes goals, objectives, and strategies.
14.03	Examine licensing, certification, and industry credentialing requirements.
14.04	Maintain a career portfolio to document knowledge, skills, and experience.
14.05	Evaluate and compare employment opportunities that match career goals.
14.06	Identify and exhibit traits for retaining employment.
14.07	Identify opportunities and research requirements for career advancement.
14.08	Research the benefits of ongoing professional development.
14.09	Examine and describe entrepreneurship opportunities as a career planning option.
15.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. The students will be able to:
15.01	Employ leadership skills to accomplish organizational goals and objectives.
15.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
15.03	Conduct and participate in meetings to accomplish work tasks.
15.04	Employ mentoring skills to inspire and teach others.
16.0	Solve problems using critical thinking skills, creativity, and innovation. The students will be able to:
16.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.

16.02	Employ critical thinking and interpersonal skills to resolve conflicts.
16.03	Identify and document workplace performance goals and monitor progress toward those goal.
16.04	Conduct technical research to gather information necessary for decision-making.
17.0	Demonstrate first article inspection methods. The student will be able to:
17.01	Comply with safe and efficient work practices.
17.02	Inspect equipment for safety.
18.0	Demonstrate the technique of CNC milling. The student will be able to:
18.01	Use and apply program structure – address letters
18.02	Use and apply geometric & technological basics
18.03	Use and apply linear interpolation
18.04	Use and apply circular interpolation
18.05	Use and apply point machining cycle calls
18.06	Use and apply programming milling cycles (3 Digit)
19.0	Perform advanced set up and operation of a computerized-numerical-control (CNC) mill machine. The student will be able to:
19.01	Identify parts of a CNC machine and explain their uses.
19.02	Follow safe and efficient work practices, including procedure sheets.
19.03	Identify unusual machine noises.
19.04	Inspect parts for correct dimensions.
20.0	Demonstrate the technique of CNC turning. The student will be able to:
20.01	Use and apply program structure – address letters
20.02	Use and apply geometric & technological basics
20.03	Use and apply linear interpolation
20.04	Use and apply circular interpolation
20.05	Use and apply Turning Canned Cycles
21.0	Perform advanced set up and operation of a computerized-numerical-control (CNC) lathe machine. The student will be able to:
21.01	Comply with safe and efficient work practices.
21.02	Set up work holding devices.

21.03	Select proper cutting tools.
21.04	Select appropriate advanced program and make necessary edits.
21.05	Adjust appropriate cutting tools and tool offsets.
21.06	Machine and create parts to blueprint tolerances.
21.07	Inspect parts for correct dimensions.
22.0	Demonstrate basic computer-aided design/computer-aided manufacturing (CAD/CAM) processes. The student will be able to:
22.01	Identify and use computer-aided design (CAD) software
22.02	Use computer-aided design (CAD) software to create sketches
22.03	Use computer-aided design (CAD) software to create extrudes and cuts
22.04	Use computer-aided design (CAD) software to create a model for sample part machining
22.05	Use computer-aided manufacturing (CAM) to generate features of a sample part
22.06	Use computer-aided manufacturing (CAM) generate operations of a sample part
22.07	Use computer-aided manufacturing (CAM) verify operations of a sample part
22.08	Use computer-aided manufacturing (CAM) to execute post process operation of a sample part

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools, and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate, and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

SkillsUSA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In Career Certificate Programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Computation (Mathematics) and Communications (Reading and Language Arts). These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02, Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01, F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College System Institution must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91, F.S.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.