

Florida Department of Education
Curriculum Framework

Course Title: Fundamentals of Manufacturing
Course Type: Orientation/Exploratory
Career Cluster: Manufacturing

Secondary – Middle School

Course Number	9260400
CIP Number	149260400M
Grade Level	6 – 8
Standard Length	Semester
Teacher Certification	Refer to the Course Structure section
CTSO	FL-TSA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the manufacturing career cluster. This course provides students with opportunities to become familiar with related careers and develop fundamental technological literacy as they learn about the history, systems, and processes of manufacturing. In addition, the course will provide an overview of the safe use of tools and equipment used in the industry. Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

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

Course Structure

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

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 course structure:

Course Number	Course Title	Teacher Certification	Length
9260400	Fundamentals of Manufacturing	AUTO PROD 7G ELECTRONIC @7 7G ENG 7G IND ENGR 7G TEC ED 1 @ 2	Semester

Standards

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

- 01.0 Demonstrate an understanding of the societal impact of manufacturing.
- 02.0 Demonstrate an understanding of the history of manufacturing.
- 03.0 Demonstrate an understanding of the universal systems model as it relates to manufacturing.
- 04.0 Demonstrate an understanding of safe work practices while performing tasks.
- 05.0 Identify materials and resources used in manufacturing.
- 06.0 Describe the essential systems and processes involved in manufacturing.
- 07.0 Perform a pre-planned introductory manufacturing activity applying correct safety procedures, appropriate use of materials, and processing operations.
- 08.0 Use visual and verbal communication to present employment and career opportunities in manufacturing.
- 09.0 Students will select and demonstrate techniques, skills, tools, and understanding related to manufacturing.
- 10.0 Students will develop leadership and interpersonal problem-solving skills through participation in co-curricular activities.

**Florida Department of Education
Student Performance Standards**

Course Title: Fundamentals of Manufacturing
Course Number: 9260400
Course Length: Semester

Course Description:

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CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the societal impact of manufacturing.--The student will be able to:
01.01	Track the evolution of manufacturing and its impact on society.
01.02	Explain the educational requirements and professional expectations associated with a career in manufacturing.
01.03	Describe the impact of governmental and political systems on manufacturing.
01.04	Explain the interaction between manufacturing industries and social change
01.05	Explain how manufacturing made the United States a world leader.
01.06	Describe the relationship between manufacturing and the environment
01.07	Explain the importance of a technologically literate workforce to the manufacturing industry.
02.0	Demonstrate an understanding of the history of manufacturing.--The student will be able to:
02.01	Identify key historical events and their impact on manufacturing.
02.02	List key persons who have contributed to change in manufacturing.
02.03	Describe the Industrial Revolution and its impact on manufacturing.
02.04	Identify pioneers of the manufacturing industry.
02.05	Describe/debate the affect that automation has had on manufacturing.
03.0	Demonstrate an understanding of the universal systems model as it relates to manufacturing.--The student will be able to:

CTE Standards and Benchmarks

03.01	Describe the processes of input, processing, output, and feedback that comprise the universal systems model.
03.02	Demonstrate applications of the universal systems model in manufacturing.
03.03	Describe the role of time, capital, people, tools and machines, energy, materials, and information within the universal systems model as it applies to manufacturing industries.
04.0	Demonstrate an understanding of safe work practices while performing tasks.--The student will be able to:
04.01	Identify safety equipment.
04.02	Recognize immediate, potential, and hidden hazards.
04.03	Perform housekeeping tasks related to maintaining a safe work environment.
04.04	Pass a safety test with a perfect score prior to operating equipment.
04.05	Demonstrate the proper safe use of tools and equipment
04.06	Identify safety color codes
05.0	Identify materials and resources used in manufacturing.--The student will be able to:
05.01	Describe the seven basic technological resources.
05.02	Describe the properties of manufacturing materials.
05.03	Explain how materials are classified.
05.04	List, measure, and compare common mechanical properties of select materials.
05.05	List sources and costs where materials may be obtained
05.06	Create a bill of materials
05.07	Calculate production cost analysis
06.0	Describe the essential systems and processes involved in manufacturing.--The student will be able to:
06.01	Compare and contrast custom, intermittent, and continuous manufacturing systems.
06.02	Demonstrate fundamentals of producing technical sketches.
06.03	Create simple two and three dimensional drawings using CAD software.
06.04	List common hand tools used in the maintenance, installation, and repair of equipment.

CTE Standards and Benchmarks

06.05	Identify commonly used power tools.
06.06	Describe primary manufacturing processes.
06.07	List secondary manufacturing processes.
06.08	Define the terms separating and forming as it relates to manufacturing.
06.09	Identify separating processes – traditional and non-traditional.
06.10	Identify forming processes including casting, molding, compression, stretching, and conditioning.
06.11	Differentiate between combining processes such as mixing, bonding, coating, and mechanical filtering.
06.12	Produce a simple part applying computer assisted production equipment.
06.13	Program a robot to perform a repetitive task.
06.14	Create a device that will perform a task using a computer controlled program.
06.15	Describe the advantages/disadvantages of the separation processing of materials using manual versus computer controlled machinery.
06.16	Describe assembling processes.
06.17	Explain the importance of finishing processes.
06.18	Describe the role of quality control in the manufacturing process.
06.19	Explain the importance of quality control within a manufacturing system.
07.0	Perform a pre-planned introductory manufacturing activity applying correct safety procedures, appropriate use of materials, and processing operations.--The student will be able to:
07.01	Use hand and power tools safely.
07.02	Demonstrate fundamentals of reading technical sketches.
07.03	Use English and/or metric measurement effectively in order to properly lay out a part for manufacturing.
07.04	Follow a production flow chart to produce a teacher-selected product.
07.05	Apply appropriate problem solving to improve an existing manufacturing system.
08.0	Use visual and verbal communication to present employment and career opportunities in manufacturing.--The student will be able to:
08.01	Present a technical report to an audience regarding a researched manufacturing related career using multimedia.

CTE Standards and Benchmarks

08.02 Prepare and produce a portfolio representing experiences throughout the course of study.

09.0 Students will select and demonstrate techniques, skills, tools, and understanding related to manufacturing.--The student will be able to:

09.01 Use common tools correctly and safely.

09.02 Describe strategies for selecting materials and processes necessary for developing a technological system or artifact.

09.03 Demonstrate fundamental materials processing and assembly techniques.

09.04 Evaluate the interdependence of components in a technological system and identify those elements that are critical to correct functioning.

09.05 Apply analytical tools to the development of optimal solutions for technological problems.

10.0 Students will develop leadership and interpersonal problem-solving skills through participation in co-curricular activities.--The student will be able to:

10.01 Demonstrate effective communication skills.

10.02 Participate in teamwork to accomplish specified organizational goals.

10.03 Demonstrate cooperation and understanding with persons who are ethnically and culturally diverse.

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.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: <http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf>. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Special Notes

Career Planning

Effective July 1, 2019, per Section 1003.4156, Florida Statutes (F.S.), for students to meet middle grades promotion requirements, a Career and Education Planning course must be completed in either sixth, seventh, or eighth grade. These courses should be taught integrating the eight career and education planning course standards.

Career and Technical Student Organization (CTSO)

The Florida Technology Student Association (FL-TSA) is the intercurricular career and technical student organization for 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.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan 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.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>