

**Florida Department of Education
Curriculum Framework**

Program Title: Major Appliance and Refrigeration Technician
Program Type: Career Preparatory
Career Cluster: Manufacturing

Career Certificate Program

Program Number	J620300
CIP Number	0647010604
Grade Level	30, 31
Program Length	1200 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): 9 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. This program offers a broad foundation of knowledge and skills to prepare students for employment in machining positions.

The content includes but is not limited to broad, transferable skills, stresses the understanding of all aspects of 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 four 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	EER0391	Appliance Installation Helper	APPLI REPR @7 7G GAS FITTER 7G	200 hours
B	EER0315	Laundry Technician		300 hours
C	EER0392	Cooking Appliance Technician		350 hours
D	ACR0084	Cooling Appliance Technician		350 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 Apply proper laboratory practices.
- 02.0 Apply electrical fundamentals.
- 03.0 Apply gas fundamentals.
- 04.0 Install, troubleshoot and repair electric and gas clothes dryers.
- 05.0 Install, troubleshoot, and repair clothes washers.
- 06.0 Install, troubleshoot, and repair electric and gas ranges.
- 07.0 Install, troubleshoot, and repair microwave ovens.
- 08.0 Install, troubleshoot, and repair dishwashers.
- 09.0 Utilize fundamentals of refrigeration.
- 10.0 Work with tubing and fittings.
- 11.0 Install, troubleshoot, and repair refrigerators, icemakers, and freezers.
- 12.0 Install, troubleshoot, and repair window air conditioners.

**Florida Department of Education
Student Performance Standards**

Program Title: Major Appliance and Refrigeration Technician
Career Certificate Program Number: J620300

Course Description: The Appliance Installation Helper course is designed to provide instruction for entry into the major appliance and refrigeration repair industry. Students explore career opportunities and requirements of a professional appliance repairman. Students study laboratory practices, electrical fundamentals, and gas fundamentals.

Course Number: EER0391 Occupational Completion Point: A Appliance Installation Helper – 200 Hours	
01.0	Apply proper laboratory practices. The student will be able to:
01.01	Use industry accepted safety practices.
01.02	Explain appropriate first aid for electrical shock and potential shop accidents.
01.03	Perform appropriate record keeping functions.
01.04	Explain and demonstrate the proper use and care of hand tools.
01.05	Explain and demonstrate the proper use and care of meters and test equipment.
01.06	Explain and demonstrate the proper use and care of power tools.
02.0	Apply electrical fundamentals. The student will be able to:
02.01	Explain electron theory.
02.02	Identify circuits from schematics and diagrams using commonly accepted symbols.
02.03	Explain Ohm's Law.
02.04	Measure resistance.
02.05	Measure voltage.
02.06	Measure amperage.
02.07	Measure wattage.
02.08	Explain and construct series circuits.
02.09	Explain and construct parallel circuits.
02.10	Explain and construct combination circuits.

02.11	Explain inductance and magnetism and their relationship to electric motors.
02.12	Describe how electric motors function.
02.13	Explain the function of capacitors and how to troubleshoot them.
02.14	Explain the function of relay and switches and how to troubleshoot them.
02.15	Explain the function of capacitors and transformers in major appliances.
02.16	Explain the concept and rationale of motor protection.
02.17	Describe how a compressor functions.
02.18	Perform electronic diagnostic tests.
02.19	Identify and understand error codes and troubleshooting procedures.

Course Description: The Laundry Technician course is designed to provide instruction for entry into the major appliance and refrigeration repair industry. Students explore career opportunities and requirements of a professional appliance repairman. Students study installing, troubleshooting and repairing electric and gas clothes dryers, and clothes washers.

Course Number: EER0315
Occupational Completion Point: B
Laundry Technician – 300 Hours

03.0	Apply gas fundamentals. The student will be able to:
03.01	Explain common use terms.
03.02	Explain different types of gas.
03.03	Explain specific gravity.
03.04	Diagram and explain basic components of a gas burner.
03.05	Explain requirements for burning.
03.06	Perform pressure tests on gas systems.
03.07	Identify gas fitting and connections
03.08	Identify and test procedures for leak testing
03.09	Identify procedures for converting appliances between different gases.
04.0	Install, troubleshoot, and repair electric and gas clothes dryer. The student will be able to:
04.01	Install an electric dryer.
04.02	Install a gas dryer.

04.03	Read and interpret schematics and diagrams.
04.04	Describe the operation and application of components and their function.
04.05	Troubleshoot timers, electronic controls, and components.
04.06	Remove and replace timers, electronic controls, or components.
04.07	Troubleshoot drive motors and components.
04.08	Remove and replace drive motors or components.
04.09	Troubleshoot heating elements and components. (electric)
04.10	Remove and replace the element or component. (electric)
04.11	Troubleshoot gas burner. (gas)
04.12	Remove and replace the gas burner. (gas)
04.13	Troubleshoot thermostats.
04.14	Remove and replace the thermostats.
04.15	Troubleshoot gas valves. (gas)
04.16	Remove and replace gas valves. (gas)
04.17	Troubleshoot thermocouples. (gas)
04.18	Remove and replace thermocouples. (gas)
04.19	Troubleshoot flame switch. (gas)
04.20	Remove and replace the flame switch. (gas)
04.21	Troubleshoot bearings and components.
04.22	Remove and replace bearings or components.
04.23	Troubleshoot belts and pulleys.
04.24	Remove and replace belts or pulleys.
04.25	Troubleshoot rollers and glides.
04.26	Remove and replace rollers or glides.
04.27	Troubleshoot filters.
04.28	Remove and replace filters.
04.29	Troubleshoot seals.

04.30	Remove and replace seals.
04.31	Troubleshoot push-to-start switch. (electric)
04.32	Remove and replace push-to-start switch. (electric)
04.33	Troubleshoot electric ignition components. (gas)
04.34	Remove and replace electric ignition components. (gas)
04.35	Troubleshoot door switches.
04.36	Remove and replace door switches.
04.37	Troubleshoot selector switches.
04.38	Remove and replace selector switches.
04.39	Troubleshoot motor switches. (gas)
04.40	Remove and replace motor switches. (gas)
04.41	Troubleshoot sensor and electronic control. (electric)
04.42	Remove and replace sensor and electronic control. (electric)
04.43	Perform operational check.
04.44	Instruct consumer on use and care.
04.45	Perform electronic diagnostic tests.
04.46	Identify and understand error codes and troubleshooting procedures.
05.0	Install, troubleshoot, and repair clothes washers. The student will be able to:
05.01	Install a clothes washer.
05.02	Identify components and their function.
05.03	Read and interpret schematics and diagrams.
05.04	Troubleshoot timers, electronic controls and components.
05.05	Remove and replace timers, electronic controls or components.
05.06	Troubleshoot selector switches.
05.07	Remove and replace selector switches.
05.08	Troubleshoot water level switches and components.
05.09	Remove and replace water level switches or components.

05.10	Troubleshoot water inlet valves and components.
05.11	Remove and replace water inlet valves or components.
05.12	Troubleshoot hoses.
05.13	Remove and replace hoses.
05.14	Troubleshoot water pumps and components.
05.15	Remove and replace water pumps or components.
05.16	Troubleshoot filters to include front load washers.
05.17	Remove and replace filters to include front load washers
05.18	Troubleshoot drive motors and components.
05.19	Remove and replace drive motors or components.
05.20	Troubleshoot belts and pulleys.
05.21	Remove and replace belts or pulleys.
05.22	Troubleshoot transmissions and components.
05.23	Remove and replace transmissions or components.
05.24	Troubleshoot bearings.
05.25	Remove and replace bearings.
05.26	Troubleshoot water and oil seals.
05.27	Remove and replace water and oil seals.
05.28	Troubleshoot clutches.
05.29	Remove and replace clutches.
05.30	Troubleshoot brakes.
05.31	Remove and replace brakes.
05.32	Troubleshoot lid switches and components.
05.33	Remove and replace lid switches or components.
05.34	Perform operational check.
05.35	Instruct consumer on use and care.
05.36	Perform electronic diagnostic tests.

05.37 Identify and understand error codes and troubleshooting procedures.

Course Description: The Cooking Appliance Technician course is designed to provide instruction for entry into the major appliance and refrigeration repair industry. Students explore career opportunities and requirements of a professional appliance repairman. Students study installing, troubleshooting and repairing electric ranges, gas ranges, microwave ovens, and dishwashers.

Course Number: EER0392
Occupational Completion Point: C
Cooking Appliance Technician – 350 Hours

06.0 Install, troubleshoot, and repair electric and gas ranges. The student will be able to:

06.01 Install an electric range.

06.02 Describe the operation and application of components and their function.

06.03 Read and interpret schematics and diagrams.

06.04 Troubleshoot clocks, timers, and electronic controls.

06.05 Remove and replace clocks, timers, or electronic controls.

06.06 Troubleshoot surface unit switches and components. (electric)

06.07 Remove and replace surface switches or components. (electric)

06.08 Troubleshoot oven thermostats and components.

06.09 Remove and replace oven thermostats or components.

06.10 Troubleshoot self-clean relays. (gas)

06.11 Remove and replace self-clean relays. (gas)

06.12 Troubleshoot surface units and components including induction cook-tops and ranges. (electric)

06.13 Remove and replace surface units or components including induction cook-tops and ranges. (electric)

06.14 Troubleshoot bake and broil elements. (electric)

06.15 Remove and replace bake and broil elements. (electric)

06.16 Troubleshoot gas valves for surface burners. (gas)

06.17 Remove and replace gas valves for surface burners. (gas)

06.18 Troubleshoot gas valve for oven. (gas)

06.19 Remove and replace gas valve for oven. (gas)

06.20 Troubleshoot electric igniters. (gas)

06.21	Remove and replace electric igniters. (gas)
06.22	Troubleshoot safety valves. (gas)
06.23	Remove and replace safety valves. (gas)
06.24	Troubleshoot pressure regulators. (gas)
06.25	Remove and replace pressure regulators. (gas)
06.26	Troubleshoot oven sensors and components.
06.27	Remove and replace oven sensors or components.
06.28	Troubleshoot door locks and components.
06.29	Remove and replace door locks or components.
06.30	Troubleshoot fans.
06.31	Remove and replace fan.
06.32	Troubleshoot gaskets and seals.
06.33	Remove and replace gaskets or seals.
06.34	Perform temperature test and calibration on electric and gas ranges.
06.35	Perform operational check.
06.36	Instruct consumer on use and care.
06.37	Perform electronic diagnostic tests.
06.38	Identify and understand error codes and troubleshooting procedures.
07.0	Install, troubleshoot, and repair microwave ovens. The student will be able to:
07.01	Install a microwave oven.
07.02	Describe the operation and application of components and their function.
07.03	Read and interpret schematics and diagrams.
07.04	Troubleshoot clocks, timers, and electronic controls.
07.05	Remove and replace clocks, timers, or electronic controls.
07.06	Troubleshoot door switches.
07.07	Remove and replace door switches.
07.08	Troubleshoot relays.

07.09	Remove and replace relays.
07.10	Troubleshoot thermal protectors.
07.11	Remove and replace thermal protectors.
07.12	Troubleshoot power transformer.
07.13	Remove and replace power transformer.
07.14	Troubleshoot high voltage diode.
07.15	Remove and replace high voltage diode.
07.16	Troubleshoot capacitor.
07.17	Remove and replace capacitor.
07.18	Troubleshoot magnetron.
07.19	Remove and replace magnetron.
07.20	Troubleshoot fans.
07.21	Remove and replace fans.
07.22	Troubleshoot stirrer blade and motor.
07.23	Remove and replace stirrer blade and motor.
07.24	Troubleshoot turntable motor.
07.25	Remove and replace turntable motor.
07.26	Troubleshoot inverter board.
07.27	Remove and replace inverter board.
07.28	Perform operational check.
07.29	Instruct consumer on use and care.
07.30	Perform electronic diagnostic tests.
07.31	Identify and understand error codes and troubleshooting procedures.
08.0	Install, troubleshoot, and repair dishwashers. The student will be able to:
08.01	Install a dishwasher.
08.02	Describe the operation and application of components and their function.
08.03	Read and interpret schematics and diagrams.

08.04	Troubleshoot timers, electronic controls, and components.
08.05	Remove and replace timers, electronic controls, or component.
08.06	Troubleshoot selector switches.
08.07	Remove and replace selector switches.
08.08	Troubleshoot float switches.
08.09	Remove and replace float switches.
08.10	Troubleshoot door switches.
08.11	Remove and replace door switches.
08.12	Troubleshoot motors and components.
08.13	Remove and replace motor and components.
08.14	Troubleshoot heating elements.
08.15	Remove and replace heating elements.
08.16	Troubleshoot relays.
08.17	Remove and replace relays.
08.18	Troubleshoot water valves and components.
08.19	Remove and replace water valves or components.
08.20	Troubleshoot hoses.
08.21	Remove and replace hoses.
08.22	Troubleshoot pumps and components.
08.23	Remove and replace pumps or components.
08.24	Troubleshoot seals.
08.25	Remove and replace seals.
08.26	Troubleshoot dispensers and components.
08.27	Remove and replace dispensers or components.
08.28	Troubleshoot spray arms.
08.29	Remove and replace spray arms.
08.30	Troubleshoot blower motors.
08.31	Remove and replace blower motors.
08.32	Troubleshoot thermostats.

08.33	Remove and replace thermostats.
08.34	Perform operational check.
08.35	Instruct consumer on use and care.
08.36	Perform electronic diagnostic tests.
08.37	Identify and understand error codes and troubleshooting procedures.

Course Description: The Cooling Appliance Technician course is designed to provide instruction for entry into the major appliance and refrigeration repair industry. Students explore career opportunities and requirements of a professional appliance repairman. Students study installing, troubleshooting and repairing basic refrigeration, icemakers and freezers, and window air conditioners.

Course Number: ACR0084
Occupational Completion Point: D
Cooling Appliance Technician – 350 Hours

09.0	Utilize the fundamentals of refrigeration. The student will be able to:
09.01	Explain commonly used terms.
09.02	Perform heat transfer, measuring and temperature conversions.
09.03	Perform pressure measuring and conversion calculations.
09.04	Explain the concept of state of matter.
09.05	Explain the differences in refrigerants and their uses.
09.06	Diagram and explain the functions of the components of basic refrigeration systems.
09.07	Identify purpose and importance of CFC recover/recycling.
09.08	Identify operation of recovery system components.
09.09	Recover and recycle refrigerants.
10.0	Work with tubing and fittings. The student will be able to:
10.01	Identify types and uses of solders and brazing alloys.
10.02	Identify types and sizes of tubing and fittings.
10.03	Measure, cut, flare, swage, and bend tubing.
10.04	Soft solder with acetylene.
10.05	Braze with acetylene and oxyacetylene.
10.06	Fabricate replacement sections of tubing for appliances.

11.0	Install, troubleshoot, and repair refrigeration icemakers and freezers. The student will be able to:
11.01	Install a refrigerator and a freezer.
11.02	Identify components, electronic controls, variable speed compressors and their functions.
11.03	Read and interpret schematics and diagrams.
11.04	Troubleshoot gaskets and seals.
11.05	Remove and replace gaskets and seals.
11.06	Troubleshoot light and fan switches.
11.07	Remove and replace light and fan switches.
11.08	Troubleshoot fans.
11.09	Remove and replace fans.
11.10	Troubleshoot manual and electronic adaptive controls defrost timers.
11.11	Remove and replace manual and electronic adaptive control defrost timers.
11.12	Troubleshoot defrost thermostats and thermistors.
11.13	Remove and replace defrost thermostats and thermistors.
11.14	Troubleshoot defrost heater.
11.15	Remove and replace defrost heater.
11.16	Troubleshoot cold control.
11.17	Remove and replace cold control.
11.18	Troubleshoot icemakers.
11.19	Remove and repair icemakers.
11.20	Use test equipment to determine operating conditions of a refrigeration system.
11.21	Troubleshoot refrigeration system.
11.22	Remove and replace compressors.
11.23	Remove and replace condensers, evaporators, metering devices and dryers.
11.24	Perform operational check.
11.25	Instruct consumers on use and care.
12.0	Install, troubleshoot, and repair window air conditioners. The student will be able to:

12.01	Install a window air conditioner.
12.02	Identify components and their functions to include multi-split systems and electronic controls.
12.03	Read and interpret schematics and diagrams.
12.04	Troubleshoot selector switches.
12.05	Remove and replace selector switches.
12.06	Troubleshoot thermostats.
12.07	Remove and replace thermostats.
12.08	Troubleshoot capacitors.
12.09	Remove and replace capacitors.
12.10	Troubleshoot fan motor.
12.11	Remove and replace fan motor.
12.12	Troubleshoot heater.
12.13	Remove and replace heater.
12.14	Troubleshoot deicer.
12.15	Remove and replace deicer.
12.16	Troubleshoot reversing valve.
12.17	Remove and replace reversing valve.
12.18	Troubleshoot compressor.
12.19	Remove and replace compressor.
12.20	Use test equipment to determine operating conditions of refrigeration systems.
12.21	Perform operational check.
12.22	Instruct consumer on use and care.

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.