Indiana Department of Education
Academic Standards Course Framework

CONSTRUCTION TRADES: HVAC II

Construction Technology: HVAC II builds on concepts introduced in HVAC I. This course will emphasize reading blueprints and other technical documents, as well as troubleshooting common mechanical and electrical problems encountered when servicing HVAC systems. Additional topics include: combustion testing, venting and air requirements, electrical control systems, and electrical motor basics. Students will hone their science and math skills in HVAC system installation, maintenance, or repair projects.

- DOE Code: 5498
- Recommended Grade Level: Grade 12
- Recommended Prerequisites: Construction Technology: HVAC I
- Credits: 2-3 credits per semester, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- This course is aligned with postsecondary courses for Dual Credit:
    - Ivy Tech
        - HVAC 107 – Duct Fabrication/Installation
        - HVAC 208 – Heating Service
        - HVAC 211 – Refrigeration

Dual Credit
This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

Application of Content and Multiple Hour Offerings
Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

Career and Technical Student Organizations (CTSOs)
Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in SkillsUSA, the CTSO for this area.

Content Standards

Domain – Duct Fabrication and Installation

Core Standard 1 Students fabricate duct systems and fittings to install, maintain, and repair systems.

Standards

HVACII-1.1 Develop layout drawings to scale

HVACII-1.2 Interpret schedules, drawings and specifications shown on construction drawings to formulate a material list

HVACII-1.3 Layout and calculate measurements for ductwork used in HVAC mechanical drawings

HVACII-1.4 Demonstrate the use of hand tools and shop equipment used to fabricate sheet metal duct and fittings

HVACII-1.5 Layout and fabricate sheet metal and fiberglass duct fittings such as plenums, transitions, and elbows

HVACII-1.6 Demonstrate proper installation techniques of sheet metal, fiberglass, and flexible duct systems

Domain – HVAC System Design

Core Standard 2 Students apply and adapt HVAC installation processes to design projects.

Standards

HVACII-2.1 Develop project plans to install properly sized HVAC equipment based on Manual J heat loss/gain load estimates

HVACII-2.2 Develop project plans to install properly sized sheet metal, fiberglass, and flexible duct systems

HVACII-2.3 Develop materials list and costs estimates for HVAC sales bid

HVACII-2.4 Measure airflow through main and branch ducts using pressure and velocity instruments

HVACII-2.5 Develop familiarity with manufacturer's literature pertaining to product data

Domain – Heating Service

Core Standard 3 Students analyze heating systems to evaluate and maintain natural gas, propane, fuel oil, and electric heating appliances.

Standards

HVACII-3.1 Develop familiarity with manufacturer's literature pertaining to service data

HVACII-3.2 Verify manufacturer's specifications pertaining to temperature, electrical, and pressure data

HVACII-3.3 Analyze the electrical schematic of heating appliances and demonstrate logic of operation

HVACII-3.4 Discuss operational parameters of hot water and steam boiler systems

HVACII-3.5 List basic code requirements pertaining to furnace installations

HVACII-3.6 Describe different venting requirements from atmospheric to induced draft heating appliances

HVACII-3.7 Formulate a "clean and check" preventative maintenance procedure for all heating appliances

Domain – Advanced Refrigeration

Core Standard 4 Students analyze refrigeration principles to accurately evaluate, assess, and troubleshoot maintenance problems.

Standards

HVACII-4.1 Locate air conditioning, heat pump, and refrigeration system components normally found in residential and light commercial systems

HVACII-4.2 Analyze common types of component failure and the effects each has on the performance of the system

HVACII-4.3 Apply fundamentals of the refrigeration cycle to interpret and troubleshoot air conditioning, heat pump, and light commercial refrigeration systems

HVACII-4.4 Outline the basics of residential and light commercial electrical systems including

controls used in temperature, humidity, and zoning

HVACII-4.5 Describe motor starting components, their applications, functions, and troubleshooting

HVACII-4.6 Analyze compressor failures and preventative measures to avoid compressor failures

HVACII-4.7 Describe and analyze the effects of evaporator and condense loads and how they affect system performance

HVACII-4.8 Develop familiarity with manufacturer's literature pertaining to service data

HVACII-4.9 Verify manufacturer's specifications pertaining to temperature, electrical, and pressure data

HVACII-4.10 Analyze the electrical schematic of cooling appliances and demonstrate logic of operation

HVACII-4.11 List basic code requirements pertaining to air conditioning, heat pump, and refrigeration installations

HVACII-4.12 Formulate a "clean and check" preventative maintenance procedure for all cooling appliances

Domain – Alternative Heating and Cooling

Core Standard 5 Students evaluate alternative and green energy methods to perform maintenance, repair, and troubleshooting procedures on heating and cooling systems.

Standards

HVACII-5.1 Describe alternatives to residential heat sources including geothermal, solar, and outdoor fuel furnaces such as corn pellets and wood burners

HVACII-5.2 Describe applications of geothermal ground loops including horizontal, vertical, and pond loops

HVACII-5.3 Discuss applications of commercial and industrial cooling systems including process cooling systems and their applications

HVACII-5.4 Describe alternative cooling methods such as ice storage and cryogenics