

# ATPF-2813: SPECIAL TOPICS IN ADVANCED AUTOMATIC CONTROLS

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## Cuyahoga Community College

**Viewing: ATPF-2813 : Special Topics in Advanced Automatic Controls**

**Academic Term:**

Fall 2026

**Subject Code**

ATPF - Applied Ind Tech - Pipefitters

**Course Number:**

2813

**Title:**

Special Topics in Advanced Automatic Controls

**Catalog Description:**

Course covers the different types of temperature controls for the refrigeration industry and the equipment used to troubleshoot electronic failure. In addition, heat-cool electrical sequences, control circuits and loops will be covered.

**Credit Hour(s):**

2

**Lecture Hour(s):**

2

### Requisites

**Prerequisite and Corequisite**

Departmental approval: admission to Pipefitter's apprenticeship program.

### Outcomes

**Course Outcome(s):**

Explain the use of temperature, electrical, and pressure-sensitive controls that are used in the heating, cooling, and refrigeration industry.

**Objective(s):**

1. Identify the various controls used for space heating, cooling, and refrigeration.
2. Explain the function of space temperature controls.
3. Differentiate between low and high voltage controls.
4. List the different uses of pressure-sensitive controls.
5. Discuss the safety precautions required for handling automatic controls.

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**Course Outcome(s):**

Describe the operation of the electrical testing devices used for servicing electrical components in the heating, cooling, and refrigeration industry systems.

**Objective(s):**

1. Identify the functions of a voltmeter and list the different testing procedures.
  2. Identify different problems generally encountered in an electrical circuit.
  3. List the components of a heat-cool electrical circuit.
  4. Explain the flow chart of a heat-cool electrical circuit.
  5. Demonstrate the ability to troubleshoot problems in a heating and cooling system.
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**Course Outcome(s):**

Describe various control circuits and define respective terminology.

**Objective(s):**

1. List and define terms used with advanced controls.
  2. Describe the function of control circuits.
  3. Differentiate between pneumatic and electrical controls.
  4. Explain the various functions of a control loop.
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**Methods of Evaluation:**

1. Assignments
2. Attendance
3. Participation
4. Exams/quizzes

**Course Content Outline:**

1. Controls
  - a. Temperature control
    - i. Operation
      1. Closed contacts
      2. Random air current
    - ii. Applications
      1. Heating
      2. Cooling
    - iii. Heating thermostat
      1. Terminals
      2. Silver contacts
      3. Mercury bulb
  - b. Space temperature control
    - i. Electrical
    - ii. Heat anticipator
    - iii. Cold anticipator
    - iv. Thermostat
  - c. Space temperature/high line voltage
    - i. Uses
      1. Portable air conditioners
      2. Free standing units
    - ii. Thermostat
      1. Internal
      2. High voltage
  - d. Pressure sensitive controls
    - i. Pressure transducer
    - ii. Operation
      1. Pressure conversion
      2. Microprocessor
    - iii. Capacitor type
    - iv. Solid state
    - v. Uses
      1. Industrial refrigeration
      2. High pressure boiler
      3. Commercial applications
  - e. Safety precautions
    - i. Safety controls
    - ii. Equipment failure
      1. Low pressure
      2. High pressure
    - iii. Worker safety

- 1. Fire protection
- 2. Electrical hazards
- 3. Personal Protective Equipment
- 2. Electrical testing devices
  - a. Voltmeter
    - i. Functions

**Religious Accommodation**

Before reviewing the course schedule, students should carefully review the following religious accommodation policy and other required instructional policies:

**Religious Accommodation:**

Students seeking an accommodation for absences permitted under Ohio’s Testing Your Faith Act must provide the instructor with written notice of the specific dates for which the student requires an accommodation and must do so not later than fourteen (14) days after the first day of instruction. Please submit requests for accommodations at this link: [https://portal2.tri-c.edu/ReligiousAccommodation/ Religious Accommodation Form](https://portal2.tri-c.edu/ReligiousAccommodation/ReligiousAccommodationForm). Students with questions about their religious accommodations under Ohio’s Testing Your Faith Act may contact the College’s Office of General Counsel and Legal Services by phone at 216.987.4856 or via email at [legal@tri-c.edu](mailto:legal@tri-c.edu).

**Other Required Instructional Policies:**

<https://www.tri-c.edu/student-resources/curriculum/documents/syllabus-part-b.pdf>

**Weekly Schedule**

	Topics
Week 1	Automatic control components Space temperature controls Measuring temperatures of solids, liquids and air Shop
Week 2	Automatic control components Space temperature controls Measuring temperatures of solids, liquids, and air Shop
Week 3	Automatic Control Applications Pressure-sensing devices Pressure Transducers High and low-pressure controls Shop
Week 4	Automatic Control Applications Pressure-sensing devices Pressure Transducers High and low-pressure controls Shop
Week 5	Automatic control Applications (cont.) Oil pressure safety controls Air pressure controls Water and gas pressure regulators Shop
Week 6	Automatic control Applications (cont.) Oil pressure safety controls Air pressure controls Water and gas pressure regulators Shop
Week 7	Automatic control Applications (cont.) Mechanical controls Electromechanical controls Maintaining controls Shop

Week 8	Automatic control Applications (cont.) Mechanical controls Electromechanical controls Maintaining controls Shop
Week 9	Troubleshooting Basic Controls Simple circuits Complex circuits Thermostats Shop
Week 10	Troubleshooting Basic Controls Simple circuits Complex circuits Thermostats Shop
Week 11	Advanced Automatic controls Control applications Types of control systems Shop
Week 12	Advanced Automatic controls Control applications Types of control systems Shop
Week 13	Advanced Automatic controls (cont.) Pneumatic controls Direct Digital controls Residential electronic controls Shop
Week 14	Advanced Automatic controls (cont.) Pneumatic controls Direct Digital controls Residential electronic controls Shop
Week 15	Review
Week 16	Final evaluation

The Course Schedule is subject to change due to pedagogical needs, instructor discretion, parts of term, and unexpected events.

### Required/Recommended Readings

Instructor-provided materials

### Resources for the Instructor

Frankland, Thomas W. *Pipe Trades Manual*. McGraw-Hill, 1965.

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Althouse, Turnquist and Bracciano. *Modern Refrigeration and Air Conditioning*. 22nd. Goodheart-Wilcox, 2025.

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United Association Training Department. *HVAC/R Training Manual*. Annapolis, MD: United Association, [www.ua.org/training](http://www.ua.org/training)

### Additional Resources for the Instructor

[http://www.ehow.com/how\\_12205606\\_install-trane-hvac-thermostat.html?ref=Track2&utm\\_source=ask](http://www.ehow.com/how_12205606_install-trane-hvac-thermostat.html?ref=Track2&utm_source=ask) ([http://www.ehow.com/how\\_12205606\\_install-trane-hvac-thermostat.html?ref=Track2&utm\\_source=ask](http://www.ehow.com/how_12205606_install-trane-hvac-thermostat.html?ref=Track2&utm_source=ask))

<http://www.achrnews.com/articles/the-basic-refrigeration-cycle> (<http://www.achrnews.com/articles/the-basic-refrigeration-cycle/>)

<http://physics.about.com/od/glossary/g/heat.htm>

<http://www.refrigerationbasics.com/1024x768/definitions1.htm>

Top of page  
Key: 607