

**APED 369 Course Outline as of Spring 2020****CATALOG INFORMATION**

Dept and Nbr: APED 369      Title: APP PLUMBERS, HVAC, 10TH  
 Full Title: Apprentice Plumbers, HVAC/Refrigeration, Tenth Semester  
 Last Reviewed: 5/14/2018

| Units   |      | Course Hours per Week |      | Nbr of Weeks | Course Hours Total |        |
|---------|------|-----------------------|------|--------------|--------------------|--------|
| Maximum | 4.00 | Lecture Scheduled     | 3.00 | 18           | Lecture Scheduled  | 54.00  |
| Minimum | 4.00 | Lab Scheduled         | 3.00 | 8            | Lab Scheduled      | 54.00  |
|         |      | Contact DHR           | 0    |              | Contact DHR        | 0      |
|         |      | Contact Total         | 6.00 |              | Contact Total      | 108.00 |
|         |      | Non-contact DHR       | 0    |              | Non-contact DHR    | 0      |

Total Out of Class Hours: 108.00

Total Student Learning Hours: 216.00

Title 5 Category: AA Degree Non-Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

Related supplemental instruction of heating, ventilation, air conditioning, and refrigeration for apprentice plumbers and pipefitters.

**Prerequisites/Corequisites:****Recommended Preparation:****Limits on Enrollment:**

Indentured apprentice.

**Schedule of Classes Information:**

Description: Related supplemental instruction of heating, ventilation, air conditioning, and refrigeration for apprentice plumbers and pipefitters. (Grade Only)

Prerequisites/Corequisites:

Recommended:

Limits on Enrollment: Indentured apprentice.

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

|                   |                      |                   |                  |
|-------------------|----------------------|-------------------|------------------|
| <b>AS Degree:</b> | <b>Area</b>          | <b>Effective:</b> | <b>Inactive:</b> |
| <b>CSU GE:</b>    | <b>Transfer Area</b> | <b>Effective:</b> | <b>Inactive:</b> |

|               |                      |                   |                  |
|---------------|----------------------|-------------------|------------------|
| <b>IGETC:</b> | <b>Transfer Area</b> | <b>Effective:</b> | <b>Inactive:</b> |
|---------------|----------------------|-------------------|------------------|

|                      |                   |                  |
|----------------------|-------------------|------------------|
| <b>CSU Transfer:</b> | <b>Effective:</b> | <b>Inactive:</b> |
|----------------------|-------------------|------------------|

|                     |                   |                  |
|---------------------|-------------------|------------------|
| <b>UC Transfer:</b> | <b>Effective:</b> | <b>Inactive:</b> |
|---------------------|-------------------|------------------|

**CID:**

**Certificate/Major Applicable:**

Certificate Applicable Course

## **COURSE CONTENT**

### **Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Describe and demonstrate electrical/ plumbing principles and regulations related to heating, ventilation, air conditioning, and refrigeration trade.
2. Apply best practices in practical environment related to heating, ventilation, air conditioning, and refrigeration trade.

### **Objectives:**

At the conclusion of this course, the student should be able to:

1. Define, analyze and demonstrate advanced control systems, concepts, and electrical troubleshooting.
2. Analyze, explain, discuss, and demonstrate advanced electrical systems.

### **Topics and Scope:**

#### **I. Advanced Control Systems**

- A. Electronic and direct digital control (DDC) systems
- B. Theory of operation and function in individual control devices
- C. Construction of simple electronic and DDC systems
- D. Application of electronic and DDC controls to heating/cooling systems

#### **II. Advanced Electrical Systems**

- A. Introduction to advanced electrical control devices
- B. Terms and definitions
- C. Theory and function:
  1. Variable frequency drives
  2. Power inverters
  3. Power converters
  4. Rectifiers
  5. Capacitance systems
  6. Power transmission
  7. Safety devices

All topics are covered in the lecture and lab portions of the course.

## Assignment:

### Lecture-Related Assignments:

1. Written homework assignments (1 to 2 sets per week)
2. Project homework assignments (1 to 2 sets per week)
3. Weekly reading 10-15 pages
4. Quizzes and examinations (4 to 6 per semester)

### Lab-Related Assignment:

1. Class performances and field work (on-the-job demonstrations) of skill development, safety practices, equipment, and material handling

## Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework assignments; field work

Problem solving  
10 - 25%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Class performances; field work

Skill Demonstrations  
50 - 65%

**Exams:** All forms of formal testing, other than skill performance exams.

Quizzes and examinations to include multiple choice, true/false, matching items, and completion

Exams  
10 - 20%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

Attendance and participation

Other Category  
5 - 10%

## Representative Textbooks and Materials:

Electric Controls for Mechanical Equipment Service. International Pipe Trades Joint Training Committee. 2009 (classic)