

**APED 368 Course Outline as of Spring 2020****CATALOG INFORMATION**

Dept and Nbr: APED 368      Title: APP PLUMBERS, HVAC, 9TH  
 Full Title: Apprentice Plumbers, HVAC/Refrigeration, Ninth 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:****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:

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. Explain, demonstrate, and analyze physical properties of water and steam in industrial applications.
2. Explain, demonstrate, and analyze properties of hydraulic and pneumatic systems in industrial applications.
3. Explain, demonstrate, analyze and utilize theories and characteristics of metals, alloys, and synthetics in industrial applications.
4. Define, demonstrate, analyze, and apply thermodynamic terms, definitions, and formulas to industry-related practices and processes.
5. Define, demonstrate, analyze, and apply psychrometric terms, definitions, and formulas to industry-related practices and processes.

### **Topics and Scope:**

#### **I. Water and Steam**

- A. Physical properties of water in industrial applications
- B. Physical properties of steam in industrial applications
- C. Flows and characteristics of water in machinery
- D. Flows and characteristics of steam in machinery

#### **II. Hydraulic and pneumatic systems**

- A. Hydraulic systems
- B. Pneumatic systems
- C. Testing of hydraulic systems
- D. Testing of pneumatic systems

#### **III. Metals, alloys, and synthetics**

- A. Industrial materials: metals, alloys, and synthetics
- B. Corrosion by water and steam on industrial materials
- IV. Thermodynamics in industrial applications
  - A. Thermodynamic terms and symbols
  - B. Thermodynamic formulas and equations
  - C. Thermodynamic terms, symbols, and formulas in industrial applications
- V. Psychrometrics in industrial applications
  - A. Psychrometric terms and symbols
  - B. Psychrometric formulas, equations, and tables
  - C. Psychrometric terms, symbols, and formulas in industrial applications

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:

5. 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
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Other Category 5 - 10%
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**Representative Textbooks and Materials:**

Related Science. International Pipe Trades Joint Training Committee. 2010 (classic)

Hydraulic Heating & Cooling. International Pipe Trades Joint Training Committee. 2009 (classic)