El Paso Community College
Syllabus
Part II
Official Course Description

SUBJECT AREA	**Heating, Ventilation and Air Conditioning**
COURSE RUBRIC AND NUMBER	**HART 2470**
COURSE TITLE	**Pneumatics and System Controllers**
COURSE CREDIT HOURS	**4 3 : 3** **Credits Lec Lab**

I. Catalog Description

Examines the theory and operation of pneumatic controls and system controllers in the class room and applies the theory in the laboratory activities. Troubleshooting and repairing of heating, ventilating and air conditioning pneumatic controls systems are included. **Prerequisites: HART 1403 and HART 1407. (3:3). Lab fee.**

II. Course Objectives

A. **Unit I. Basic Control Theory**

1. Explain the fundamentals of heating and cooling theory.
2. Convert Fahrenheit to Celsius and Celsius to Fahrenheit.
3. Define the terms specific heat, latent heat, and sensible heat.
4. Define pneumatic terms.
5. Give the meaning of pneumatic abbreviations.

B. **Unit II. Air Stations**

1. Describe the purpose and operation of an air station.
2. Identify the components required to make up an air station.
3. Perform the necessary pressure adjustments on an air stations .
4. Perform the required maintenance on an air station.

C. **Unit III. Pneumatic Thermostats**

1. Identify the different types of pneumatic thermostats.
2. Explain the operation of a one-pipe bleed thermostat.
3. Perform the required throttling range and set point adjustments for a one pipe bleed thermostat.
4. Explain the operation of a two-pipe, one- and two-temperature thermostat (day/night).
5. Explain the operation of a summer/winter thermostat.
6. Perform the required throttling range and set point adjustments for a two-pipe thermostat.

D. **Unit IV. Pneumatic Valves and Valve Actuators**

1. Identify and explain the operation of the different types of pneumatic valves.
2. Explain the operation of a valve actuator.
3. Determine the operation pressure of pneumatic valve actuators, perform mechanical adjustments on valve actuators, and check for spring range shift.

E. **Unit V. Pneumatic Dampers and Damper Actuator**
1. Identify and explain the operation of the different types of dampers used in pneumatic systems and how to install dampers to prevent temperature stratification in a duct system.
2. Identify and explain the operation of the three types of damper actuators and perform mechanical and stroke adjustments on them.
3. Verify operation of firewall dampers and fire alarmcontrols.
4. Explain the purpose of a positioner when used on an actuator and perform operating pressure adjustments on them.

F. **Unit VI. Pneumatic Relays**
1. Identify and explain the operation of the seven different types of pneumatic relays.
2. Perform the required adjustments on pneumatic relays.

G. **Unit VII. Pneumatic Transmitters**
1. Identify the different types of pneumatic transmitters and explain their operation.
2. Determine the transmitter range and sensitivity.
3. Perform the required adjustments on the transmitter.

H. **Unit VIII. Pneumatic Receiver-Controllers**
1. Identify the different types of pneumatic receiver-controllers and explain their operation.
2. Perform calibration adjustments on single- and dual-input receiver controllers.

I. **Unit IX. Restrictors**
1. Explain the purpose of a restriction and what will cause a restrictor to malfunction in a pneumatic system.

J. **Unit X. Troubleshooting and Repair**
1. Diagnose a malfunction in a pneumatic system and repair, replace, or adjust the component causing a malfunction.

K. **Unit XI. Pneumatic System Diagrams**
1. Read, identify and explain the symbols found on pneumatic diagrams.
2. Correctly draw a pneumatic diagram.

L. **Unit XII. Direct Digital Control**
1. Explain the advantages and disadvantages of six types of control systems.
2. Explain the fundamental operation of a microprocessor in an automated control system.
3. Explain the ladder diagram of a programmable controller and give advantages/disadvantages.
4. Explain the ladder diagram of a programmable controller and program one.
5. Give four examples of DDC applications and define the terms used with DDC.
6. Operate energy management systems (set parameters for temperatures and times)
7. Utilize laptop to service an energy management system.

III. THECB Learning Outcomes (WECM)

Learning outcomes/objectives are determined by local occupational need and business and industry trends.

IV. Evaluation

A. Challenge Exam

Students who wish to challenge the course should contact the Testing Center and the Division Dean. Challenges must be accomplished before the census cut-off date. Students who previously have received a W or a letter grade for the course are not eligible to challenge the course.

B. Home Work Assignments

Students are required to turn in review questions at the end of each unit, of the textbook, upon completion of that unit. These grades will constitute 40% of the final grade.

C. Final Exam and Lab Exam

These Exams will constitute 60% of the Final grade.

D. Grading Scale:
`

I = Incomplete
W = withdrew or withdrawn

90-100	A
80-89	B
70-79	C
60-69	D
0-59	F

V. Disability Statement (Americans with Disabilities Act [ADA])

EPCC offers a variety of services to persons with documented sensory, mental, physical, or temporary disabling conditions to promote success in classes. If you have a disability and believe you may need services, you are encouraged to contact the Center for Students with Disabilities to discuss your needs with a counselor. All discussions and documentation are kept confidential. Offices located: VV Rm C-112 (831-2426); TM Rm 1400 (831-5808); RG Rm B-201 (831-4198); NWC
Rm M-54 (831-8815); and MDP Rm A-125 (831-7024).

VI. 6 Drop Rule

Students who began attending Texas public institutions of higher education for the first time during the Fall 2007 semester or later are subject to a 6-Drop limit for all undergraduate classes. Developmental, ESL, Dual Credit and Early College High School classes are exempt from this rule. All students should consult with their instructor before dropping a class. Academic assistance is available. Students are encouraged to see Counselling Services if dropping because exemptions may apply. Refer to the EPCC catalog and website for additional information.