



**COWLEY COLLEGE  
& Area Vocational Technical School**

**COURSE PROCEDURE FOR**

**HYDRAULIC & PNEUMATIC POWER  
MLL3603 3 Credit Hours**

**Student Level:**

This course is open to high school and post-secondary level students.

**Catalog Description:**

**MLL3603 – HYDRAULIC & PNEUMATIC POWER (3)**

This course is an introduction to pressurized hydraulic components in power delivery and positioning systems. Students will use pneumatic compressors and motors and make air connections, measurements, and calculations to determine appropriate system components.

**Prerequisites:**

None

**Controlling Purpose:**

This course is designed to help the student increase their knowledge regarding fundamentals of industrial pneumatics systems.

**Learner Outcomes:**

Upon completion of the course, the student will be able to demonstrate proficiency specifically in pneumatics systems and operations and how they are related to mechanical systems and Mechatronics.

**Units Outcomes and Criterion Based Evaluation Key for Core Content:**

The following defines the minimum core content, not including the final examination period. Instructors may add other content as time allows.

**Evaluation Key:**

- A = All major and minor goals have been achieved, and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.
- C = All major goals have been achieved, but many of the minor goals have not been

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achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.

- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

<b>UNIT 1: Pneumatic System Operating Concepts</b>						
Outcomes: Upon completion of this unit, the student will be able to successfully utilize pneumatic schematic elements.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Identify and describe the various parts of a pneumatic circuit.
						Recognize and use pneumatic fluid power symbols.
						Explain the basic scientific principles critical to the operation of pneumatic systems.
						Apply appropriate basic formulas related to the gas laws and component operation.

**UNIT 2: Production of Compressed Air**

Outcomes: Upon completion of this unit, the student will be able to successfully understand reservoir and pump functionality.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Explain the operation of basic displacement and dynamic compressor designs, and describe the common compressor designs used in today's pneumatic systems.
						Explain the various methods used to maintain adequate system air pressure to assure effective operation of system circuits.
						Correctly size a compressor for specific applications using published manufacturer specifications.

**UNIT 3: Treatment of Compressed Air**

Outcomes: Upon completion of this unit, the student will be able to successfully apply air treatment techniques for specific systems.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Describe the various methods used to filter air to assure it is clean as it passes through the compressor and system circuits.
						Explain the concepts involved in removing excess moisture from pneumatic system compressed air.
						Explain the purpose of the receiver and estimate receiver size for specific application.
						Describe typical methods used to treat air at individual workstations in pneumatic circuits.

**UNIT 4: Compressed Air Distribution**

Outcomes: Upon completion of this unit, the student will be able to successfully identify and create layouts for generic applications.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Select the distribution method most desirable for a pneumatic system installation.
						Lay out a distribution network that will effectively deliver compressed air to equipment in the pneumatic system.
						Calculate the size of distribution lines based on equipment operated by the pneumatic system.
						Position distribution lines to provide maximum entrapment and removal of water that may condense in an operating pneumatic system.

**UNIT 5: Pneumatic System Control Valves, Actuators, and Support Components**

Outcomes: Upon completion of this unit, the student will be able to successfully identify and apply system components.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Describe the construction and operation of pneumatic valves that control system and circuit pressure.
						Describe the construction and operation of pneumatic valves that control actuator direction and speed.
						Describe the construction and operation of various pneumatic linear and rotary actuators.
						Describe the construction and operation of special purpose pneumatic equipment.

**UNIT 6: Typical Pneumatic Circuits and Circuit Design**

Outcomes: Upon completion of this unit, the student will be able to successfully identify specialized layouts for specific applications.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Understand the operation of a variety of speed- and force-control circuits as well as circuits controlling specific motion.
						Develop circuit designs and specifications based on speed, force, and motion outlined in hypothetical problems.
						Use schematic diagrams of pneumatically controlled equipment to determine speed, force, and motion capability and identify operational problems that may exist in system circuits.

**UNIT 7: Laboratory**

Outcomes: Upon completion of this unit, the student will be able to successfully apply understanding of pneumatics in hands-on settings.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Use computer simulation software to design, test and troubleshoot pneumatics and pressurized systems.
						Perform pneumatic connections, measurements and calculations to increase efficiency of pneumatic and pressurized systems.
						Demonstrate understanding of diagnosis and troubleshooting techniques of pneumatic systems.
						Integrate pneumatic fluid power into other mechanical systems.

## UNIT 8: Analysis of a Pneumatic Application

Outcomes: Upon completion of this unit, the student will be able to successfully apply understanding of pneumatics in real-world applications.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Prepare a report on a piece of equipment that uses a substantial amount of pneumatic power in its operation.
						Demonstrate ability to utilize references from technical and popular sources to address real-world applications.
						Describe the equipment, its function, and where pneumatics is used in its operation.
						Explain how circuit diagrams of the pneumatic applications, photographs and drawings of the equipment can be helpful in analyzing the report.
						Analyze and defend the use of pneumatic power in an application instead of another power-transmission method.

**Projects Required:**

As assigned.

**Textbook:**

Contact Bookstore for current textbook.

**Materials/Equipment Required:**

None

**Attendance Policy:**

Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

**Grading Policy:**

The grading policy will be outlined by the instructor in the course syllabus.

**Maximum class size:**

Based on classroom occupancy

**Course Timeframe:**

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents, define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

**Refer to the following policies:**

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

**Disability Services Program:**

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.