



**COWLEY COLLEGE  
& Area Vocational Technical School**

**COURSE PROCEDURE FOR**

**FLUID POWER  
MEC3483 3 Credit Hours**

**Student Level:**

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

**Catalog Description:**

**MEC 3483 - FLUID POWER (3 hrs)**

This course is an introduction to pressurized hydraulic components in power delivery and positioning systems. Students will use hydraulic pumps and motors and make hydraulic 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 fluid power systems.

**Learner Outcomes:**

Upon completion of the course, the student will be able to demonstrate proficiency specifically in hydraulic fluid power and in general all basic fluid power.

The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

**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

Rev: 6/01/2016

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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 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.

### UNIT 1: Hydraulic System Operating Concepts

Outcomes: Upon completion of this course students will be able to successfully utilize hydraulic schematic elements.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Name and describe the various parts of a hydraulic circuit.
						Recognize and use hydraulic fluid power symbols.
						Understand the fluid mechanics principles critical to the operation of hydraulic systems.
						Apply basic formulas for the calculation of hydraulic horsepower and actuator speeds.

**UNIT 2: Power Units**

Outcomes: Upon completion of this course students will be able to successfully understand reservoir and pump functionality.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Describe the function of each of the major parts of the power unit.
						Explain the operation of each of the common designs of fixed and variable displacement pumps.
						Correctly select a pump from a manufacturer's catalog given information on system load and expected performance.
						Correctly size the reservoir for the power unit of a hydraulic system.

**UNIT 3: Control Valves**

Outcomes: Upon completion of this course students will be able to successfully apply valve controls for hydraulic systems.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Describe the design and operation of each of the pressure, flow, and directional control valves used in a hydraulic system.
						Explain the function of pilot and drain connections incorporated into hydraulic valves.
						Explain the operation of pressure compensation used to accurately control flow control valves.
						Correctly select control valves for use in a system given information on system load and expected operation.

**UNIT 4: Actuators**

Outcomes: Upon completion of this course students will be able to successfully understand actuator applications.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Describe the design and operation of the three general types of actuators.

						Calculate the force and speed output of an actuator given component specifications and system flow rate and pressure.
						Explain the design and operation of actuator cushions.
						Correctly select actuators for use in a system, given information on system load and expected operation.

### UNIT 5: Support Components and Materials

Outcomes: Upon completion of this course students will be able to successfully identify auxiliary components and their functions.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Select conductors that are appropriate for the operating conditions of a given system.
						Describe the importance of a hydraulic system fluid and identify a fluid suitable for use in a given system.
						Describe the function of heat exchangers in a hydraulic system.
						Describe the function of boosters and accumulators in a hydraulic system.

### UNIT 6: Typical Hydraulic Circuits and Circuit Design

Outcomes: Upon completion of this course students 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 hydraulically 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 course students will be able to successfully apply understanding of hydraulics 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 hydraulics and pressurized systems.
						Perform hydraulic connections, measurements and calculations to increase efficiency of hydraulic and pressurized systems.
						Demonstrate understanding of diagnosis and troubleshooting techniques of hydraulic systems.
						Integrate fluid power into other mechanical systems.

### UNIT 8: Analysis of a Hydraulic Application

Outcomes: Upon completion of this course students will be able to successfully apply understanding of hydraulics in a real-world application.

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 hydraulic power in its operation.
						Include a minimum of four references from technical and popular sources.
						Describe the equipment, its function, and where hydraulics is used in its operation.
						Show how circuit diagrams of the hydraulic applications, photographs and drawings of the equipment can be helpful in analyzing the report.
						Analyze and report why hydraulic power was used in the 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.