DEPT. MECH                    COURSE NUMBER: 1103

NUMBER OF CREDITS:  3 credits

COURSE TITLE: Basic Hydraulics

CATALOG DESCRIPTION:
Introduces the students to basic concepts, formulas and applications of hydraulic system components. Studies the use of directional, flow and pressure control devices in circuits. Also provides students with the knowledge and understanding of the operation, function, and application of hydraulic pumps and motors.

AUDIENCE: Students enrolling in Mechatronics, Wind Energy or interested in applying basic hydraulics.

FULFILLS MN TRANSFER CURRICULUM AREA(S) (Leave blank if not applicable)
Area: by meeting the following competencies:
Area: by meeting the following competencies:
Area: by meeting the following competencies:

PREREQUISITES OR NECESSARY ENTRY SKILLS/KNOWLEDGE:

LENGTH OF COURSE: 3 credits (3 lect., 0 lab)

THIS COURSE IS USUALLY OFFERED:
Every other year ☐ fall ☒ spring ☐ summer ☐ undetermined ☐

Four goals are emphasized in course at Minnesota West Community & Technical College:

1) ACADEMIC CONTENT: The academic objectives of this course are:
   a. Address safety issues related to hydraulics systems
   b. Identify different components of a hydraulic system
   c. Describe how hydraulic principles work
   d. Explore Pascal’s Law, Bernoulli’s Principle and Bernoulli’s Theorem
   e. Apply calculations and equations to basic hydraulics
   f. Understand hydraulic symbols and schematic reading
2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
   a. Completing homework (reading, reports, and worksheets)
   b. Participating in classroom discussions
   c. Taking open and closed book quizzes and tests
   d. Performing internet research on basic hydraulics
   e. Complete assigned calculations
   f. Design a hydraulic system

3) COMMUNICATIONS SKILLS: This course will help students improve their oral and written communication skills through:
   a. Demonstrate both written and oral communication skills during presentations
   b. Interact and collaborate other students in assignments

4) HUMAN DIVERSITY: This course will help students recognize, understand, and appreciate human diversity through:
   a. Help students recognize, understand and appreciate working in groups to solve problems

TOPICS TO BE COVERED:
1) Pascal's Law
2) Energy transition through fluid
3) Torque = Force x Length of lever arm
4) Pressure (Pounds per square inch)
5) Velocity (feet per second)
6) Pressure in series/parallel circuits
7) Force = Pressure x Area
8) Work = Force x Distance
9) Power = Force x Distance/Time
10) Flow (Gallons per minute)
11) Pressure drop
12) Advantages/Disadvantages of hydraulics
13) Directional, flow and pressure control devices
14) Hydraulic pumps and motors
15) Hydraulic cylinders

COURSE LEARNING OUTCOMES (GENERAL):
1) Students will be able to identify hydraulic components and where they are located
2) Students will have a better understanding of how to read schematics and symbols
3) Students will have a better understanding of basic fluid dynamics and practical applications
STUDENT LEARNING OUTCOMES (SPECIFIC):
1) Define Pascal’s Law
2) Define energy transition through fluid
3) Determine Torque value using formula: Torque = Force x Length of lever arm
4) Define pressure (Pounds per square inch)
5) Define velocity (feet per second)
6) Describe pressure in series/parallel circuits
7) Explain: Force = Pressure x Area
8) Explain: Work = Force x Distance
9) Explain: Power = Force x Distance/Time
10) Define flow (Gallons per minute)
11) Define pressure drop
12) Describe advantages and disadvantages of hydraulics
13) Describe operation and function of directional, flow and pressure control devices
14) Describe operation and function of hydraulic pumps and motors
15) Identify styles, operation and function of hydraulic cylinders

LEARNING/TEACHING TECHNIQUES used in the course are:
- ✗ Collaborative Learning
- ✗ Student Presentations
- ✗ Creative Projects
- ✗ Lecture
- ✗ Demonstrations
- □ Lab
- ✗ Problem Solving
- ✗ Interactive Lectures
- ✗ Individual Coaching
- ✗ Films/Videos/Slides
- □ Other (describe below)

ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:
- ✗ Reading
- □ Oral Presentations
- ✗ Textbook Problems
- ✗ Group Problems
- □ Other (describe below)
- ✗ Tests
- □ Worksheets
- □ Papers
- □ Term Paper
- ✗ Individual Projects
- □ Collaborative Projects
- □ Portfolio

Veteran Services: Minnesota West is dedicated to assisting veterans and eligible family members in achieving their educational goals efficiently. Active duty and reserve/guard military members should advise their instructor of all regularly scheduled military appointments and duties that conflict with scheduled course requirements. Instructors will make every effort to work with the student to identify adjusted timelines. If you are a veteran, please contact the Minnesota West Veterans Service Office.

The information in this course outline is subject to revision

To receive reasonable accommodations for a documented disability, please contact the campus Student Services Advisor or campus Disability Coordinator as arrangements must be made in advance. In addition, students are encouraged to notify their instructor.