Faculty is required to have the outline submitted to the Academic Affairs Office. The course outline is the form used for approval of new courses by the Academic Affairs and Standards Council.

DEPT. MECH COURSE NUMBER: 1105

NUMBER OF CREDITS: 1 – 3 credits, Variable and Repeatable in the same term.

COURSE TITLE: Hydraulic Lab

CATALOG DESCRIPTION: Examines basic equipment and fundamentals of hydraulic valves of fluid power. Focus will also cover various flow controls, pumps and motors. Students will tear down, plumb and operate the various components.

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:
None

LENGTH OF COURSE: Varies on registered credits. The course may be taken from 1 – 3 credits, Variable and Repeatable in the same term.

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. To achieve basic knowledge and skills needed to perform functional tests on hydraulic components.

2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
   a. Develop test taking skills
   b. Analyze problems and trouble-shoot solutions
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 lab presentations

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. Shop safety precautions, practice and emergency responses
2. Flow and pressure and pressure drop testing
3. Disassemble directional control valves and perform functional tests
4. Disassemble test pilot operated check valve
5. Disassemble /test direct acting and compound relief valves
6. Disassemble compound relief valve
7. Set up circuits using two sequence valves, unloading valves, counterbalance
8. Valve, brake valve, and pressure reducing valves
9. Disassemble/test pressure compensated flow controls
10. Test various flow divider circuits
11. Meter in flow, meter out and bleed-off control circuit
12. Hydraulic pump/electric motor efficiency test
13. Disassemble gear/vane/piston pump
14. Variable volume vane pump test
15. Pressure compensated vane pump test
16. Identify various fittings
17. Disassemble hydraulic cylinder
18. Hydraulic cylinder circuit
19. Regenerative circuit
20. Hydraulic reciprocating circuit
21. Calculate series cylinder circuit readings
22. Hydraulic cylinders in series and parallel
23. Disassemble and circuit hydraulic motor showing efficiency at various speeds

COURSE LEARNING OUTCOMES (GENERAL):
1. The student will be demonstrate the ability to test the basic functions of hydraulic components to determine proper operation and apply in real-work setting.
2. The student will solve deficiencies in flow and pumps and apply in employment setting.
3. The student will be able to identify and operate pumps, circuits, controls, valves needed to perform work.
STUDENT LEARNING OUTCOMES (SPECIFIC):
1. Identify shop safety precautions, practice and emergency responses
2. Complete flow, pressure, and pressure drop testing
3. Disassemble directional control valves and perform functional tests
4. Disassemble test pilot operated check valve
5. Disassemble /test direct acting and compound relief valves
6. Disassemble compound relief valve
7. Set up circuits using two sequence valves, unloading valves, counterbalance
8. Describe valve, brake valve, and pressure reducing valve function and operation
9. Disassemble/test pressure compensated flow controls
10. Test various flow divider circuits
11. Describe meter in flow, meter out and bleed-off control circuit
12. Perform hydraulic pump/electric motor efficiency test
13. Disassemble gear/vane/piston pump
14. Perform variable volume vane pump test
15. Perform pressure compensated vane pump test
16. Identify various fittings
17. Disassemble hydraulic cylinder
18. Connect and operate hydraulic cylinder circuit
19. Connect and operate regenerative circuit
20. Connect and operate hydraulic reciprocating circuit
21. Calculate series cylinder circuit parameters
22. Connect and operate hydraulic cylinders in series and parallel
23. Disassemble and circuit hydraulic motor showing efficiency at various speeds

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

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

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.

This document is available in alternative formats to individuals with disabilities by contacting the Student Services Advisor or by calling 800-658-2330 or via your preferred Telecommunications Relay Service.

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Revised 10/1/16