DEPT.  Wind Energy Technology  COURSE NUMBER:  FLPW 1104

NUMBER OF CREDITS:  1

COURSE TITLE:  Basic Hydraulics Lab

CATALOG DESCRIPTION:
Introduction to basic hydraulic concepts, formulas, and applications of hydraulic components used for directional, flow and pressure control of circuits as applies to the wind turbines. Also provides students with the knowledge and understanding of the operation, function, and application of hydraulic pumps, continuous rotation motors, and limited rotation motors.

AUDIENCE : Wind Energy Students

FULFILLS MN TRANSFER CURRICULUM AREA(S) (Leave blank if not applicable)
Area:  by meeting the following competencies:
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PREREQUISITES OR NECESSARY ENTRY SKILLS/KNOWLEDGE: Course should be taken concurrently with FLPW1103.

LENGTH OF COURSE : 1 lab credit

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:
The student will receive the knowledge to understand basic Fluid Power concepts and components found in modern wind turbines.

2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
The student will be able to design basic hydraulic circuits
3) COMMUNICATIONS SKILLS: This course will help students improve their oral and written communication skills through:

The student will begin to demonstrate appropriate communications both oral and written.

4) HUMAN DIVERSITY: This course will help students recognize, understand, and appreciate human diversity through:

The student will gain self awareness regarding their feelings towards people of different cultures, value systems and socioeconomic status.

TOPICS TO BE COVERED:

1. Define fluid power
2. List fluid power advantages/disadvantages
3. Describe other energy transmission systems
4. Describe fluid power terms
5. Describe Pascal's Law
6. Describe effects of pressure/pressure drop
7. Describe characteristics of fluid flow
8. Describe energy conservation theory
9. Draw symbols used in fluid power
10. Describe/design check valve operation & circuits
11. Describe shutoff valve operation/ characteristics
12. Describe pilot operated check valve operation
13. Describe 2-way, 3-way, four-way valve operation
14. Describe two stage valve operation
15. List valve selection factors
16. Describe relief, sequence, unloading, load control valve & pressure reducing valve characteristics / symbols
17. Describe non-compensated & compensated flow controls
18. Describe flow control types
19. Describe flow dividers
20. Identify non-positive/positive displacement pump types
21. Describe hydraulic pump efficiencies
22. Identify gear/vane/piston pump characteristics
23. Describe pressure compensated pump operation
24. Identify various hydraulic pump circuits
25. Identify various hydraulic motor types characteristics
26. Identify basic hydraulic motor circuits
27. Identify various hydraulic cylinder types characteristics
28. List hydraulic cylinder parts/options
29. List hydraulic cylinders selection factors
30. Identify basic cylinder circuits
31. Basic F=PA calculations
32. Basic cylinder calculations/sizing
33. Basic horsepower calculations
34. Basic line sizing
35. Basic cylinder speed calculation
LIST OF EXPECTED COURSE OUTCOMES: The student will understand basic fluid power concepts and components and be able to design circuits with these components.

LEARNING/TEACHING TECHNIQUES used in the course are:
- X Collaborative Learning
- X 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

EXPECTED STUDENT LEARNING OUTCOMES:
Students will develop a basic understanding and identification of Hydraulic components and how they are used in a fluid power system. Students will demonstrate their ability to identify and explain the purpose and functionality of system components.

The information in this course outline is subject to revision

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.

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 Minnesota Relay Service at 800-627-3529 or by using your preferred relay service.

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