COURSE OUTLINE

DEPT: WIND ENERGY TECHNOLOGY

COURSE NUMBER: FPLW 1103

NUMBER OF CREDITS: 3 Credits (Lecture)

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 of circuits as it applies to the wind turbine. 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 SKILL/KNOWLEDGE: NONE

LENGTH OF COURSE: 1 SEMESTER

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. Identify the past and future applications of hydraulics in wind energy
   d. Describe how hydraulic principles work
   e. Explore Pascal’s Law, Bernoulli’s Principle and Bernoulli’s Theorem
   f. Apply calculations and equations to basic hydraulics
   g. Understand symbology 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. Participating in class discussions and reports
   b. Participating in assignments, worksheets, and reports

4) HUMAN DIVERSITY: This course will help students recognize, understand, and appreciate human diversity through:
   a. Participating in classroom discussions
   b. Working with other students on internet research
   c. Working with students from other cultures

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

LIST OF EXPECTED OUTCOMES:
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 understand symbology
3) Students will have a better understanding of basic fluid dynamics and practical applications

LEARNING/TEACHING TECHNIQUES USED IN THIS COURSE:
X Collaborative Learning
X Interactive Lectures
X Lecture
Other (describe below)

ASSIGNMENTS & ASSESSMENTS USED IN THIS COURSE MAY INCLUDE:
X Reading
X Tests
X Collaborative Projects
X Group Problems
Other (as determined by the instructor)

EXPECTED STUDENT LEARNING OUTCOMES:
Students will learn the basic concepts, formulas and applications of hydraulic system components. Students will understand the use of directional, flow and pressure control of circuits as it applies to the wind turbine. Students will also understand the practical operation, function, and application of hydraulic pumps, continuous rotation motors and limited rotation motors as used in the wind energy field.

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.