MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE
COURSE OUTLINE

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:  ____ 2110 ______

NUMBER OF CREDITS:  3 credits (3 lect., 0 lab)

COURSE TITLE:  Circuit Design and Control Theory

CATALOG DESCRIPTION:  Provides student instruction in design and function of hydrostatic drives, mobile valves, pump controls, and power steering.

AUDIENCE:  Mechatronics 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:
MECH1110, MECH1103 and MECH1105

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:

ACADEMIC CONTENT:  The academic objectives of this course are:
Demonstrating the knowledge of mobile hydraulic components and systems.

THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
Performing tests with an examination (or discussion) of the rationale for each test.

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

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 research activities
c. Working with students from other cultures

TOPICS TO BE COVERED:

1. Power transmission types and purpose
2. Open loop and closed loop circuit advantages and disadvantages
3. Components in a closed loop circuit
4. Operation of pressure compensated pump controls
5. Operation of load sensing controls
6. Operation of horsepower limiter controls
7. Miscellaneous pump controls
8. Operation of manual servo controls
9. Operation of electronic servo control
10. Purpose of hydraulic motor controls
11. Operation of pressure compensated motors
12. Design considerations of hydrostatic reservoirs/filters/heat exchangers
13. Design considerations of hydrostatic pumps/motors/relief valves
14. Selection of hydrostatic pump/motor displacements
15. Initial start-up procedures and every-day start-up procedures
16. Hydrostatic maintenance procedures
17. Differences between mobile and industrial valves
18. Mobile valve symbols
19. Mobile stack valve circuits
20. Mobile spool options
21. Inlet/outlet body options
22. Power beyond valving
23. Mobile valve applications
24. Circuits with mobile valves
25. Modify existing mobile valve circuits
26. Power steering types
27. Liability considerations when selecting power steering system
28. Components in power steering systems
29. Open center non-load/load reaction circuits
30. Closed center non-load/load reaction circuits
31. Closed center load reaction circuits

COURSE LEARNING OUTCOMES (GENERAL):

1. Identify components and operation of hydrostatic drives.
2. Determine proper function of mobile hydraulic valves.
3. Determine proper function of pump controls.
4. Identify components and operation of power steering systems.

STUDENT LEARNING OUTCOMES (SPECIFIC):
1. Identify power transmission types and purpose
2. Describe advantages/disadvantages of open or closed loop control
3. Operate pressure compensated, load sensing, and horsepower limiting controls
4. Describe manual and electronic servo systems
5. Identify hydrostatic components
6. Design hydrostatic systems
7. Select correct displacement for hydrostatic pumps/motors
8. Initialize start-ups for hydrostatic systems
9. Troubleshoot hydrostatic systems
10. Differentiate between mobile and industrial components
11. Draw mobile valve symbols
12. Identify mobile valve components and applications
13. Perform mobile valve modifications
14. Examine power steering applications
15. Apply open/closed center non-load/load reactions

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.

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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