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: 2126

NUMBER OF CREDITS: 4 lect.

COURSE TITLE: Systems Analysis

CATALOG DESCRIPTION: Provides students with the knowledge of how components interact with each other in systems and what may cause them to malfunction.

AUDIENCE: Mechatronics students

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:
Completion year one of the Mechatronics diploma or A.A.S. degree program or equivalent work experience.

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 knowledge and skills to analyze hydraulic and pneumatic systems.

THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
Performing tests with an examination (discussion) on information required to analyze hydraulic, pneumatic and electrical components in circuits and how they affect one another.
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
   c. Working with students from other cultures

TOPICS TO BE COVERED:
1. Pump unloading systems
2. Vented relief valve systems
3. Filtration circuits
4. Filter beta ratios
5. ISO filter ratings
6. Internal/external drain dcv
7. Internal/external pilot dcv
8. Load locking circuits
9. Sequencing systems
10. Counterbalance circuits
11. Braking systems
12. Pump failure
13. Cylinder failure
14. Motor failure
15. Flow control failure
16. Pressure control failure
17. Directional valve failure
18. Air valve failure
19. Pneumatic speed control circuits
20. Compressor controls
21. PSID in air distribution systems
22. Analyze electro-pneumatic systems
23. Air logic symbols/circuits
24. Automated pneumatic system
25. Manifold valves
26. Programmable Logic Control interfaced circuits
27. Closed center circuits
28. Open center circuits
29. Circuits incorporating open loop pumps
30. Circuits incorporating hydraulic safety
31. Circuits incorporating electrical safety
32. Circuits incorporating linear actuators
33. Circuits incorporating accumulators
34. Circuits incorporating load-locking devices
35. Circuits for mobile vehicles
36. Circuits incorporating rotary actuators
37. Circuits incorporating closed loop pumps
38. Circuits incorporating gear reducers

COURSE LEARNING OUTCOMES (GENERAL):
1. Determine information required to analyze hydraulic and pneumatic systems.
2. Identify how circuit components affect one another.
3. Knowledge of pressure, flow, and directional control
4. Troubleshoot fluid power components and systems
5. Determine uses for various types of control
6. Implement fluid power safety techniques
7. Identify component failure

STUDENT LEARNING OUTCOMES (SPECIFIC):
1. Demonstrate pump unloading techniques
2. Calculate filtration requirements
3. Identify internal/external drain and pilots
4. Design circuits with pressure control valves
5. Implement various flow control methods
6. Determine correct directional control applications
7. Diagnose component failures
8. Test circuits and analyze failure
9. Describe compressor controls
10. Troubleshoot pneumatic components and systems
11. Analyze electro-pneumatic systems
12. Interface electronic controls
13. Demonstrate safe testing and work practices
14. Apply circuits for mobile and industrial applications

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.

A Member of the Minnesota State Colleges and Universities System
An Affirmative Action Equal Opportunity Educator/Employer

Revised 10/1/16