

MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE

COURSE OUTLINE

DEPT. MECH

COURSE NUMBER: 2100

NUMBER OF CREDITS: 3

Lecture: 2 Lab: 1 OJT: 0

Course Title:

Advanced Systems Calculations

Catalog Description:

Advanced Systems Calculations provides students with knowledge and skills of calculating and sizing systems in both mobile and industrial fluid power applications.

Prerequisites or Necessary Entry Skills/Knowledge:

Successful completion of year one in the Mechatronics diploma or A.A.S. degree program or equivalent work experience.

FULFILLS MN TRANSFER CURRICULUM AREA(S) (*Leave blank if not applicable*)

- Goal 1: Communication: By meeting the following competencies:
- Goal 2: Critical Thinking: By meeting the following competencies:
- Goal 3: Natural Sciences: By meeting the following competencies:
- Goal 4: Mathematics/Logical Reasoning: By meeting the following competencies:
- Goal 5: History and the Social and Behavioral Sciences: By meeting the following competencies:
- Goal 6: The Humanities and Fine Arts: By meeting the following competencies:
- Goal 7: Human Diversity: By meeting the following competencies:
- Goal 8: Global Perspective: By meeting the following competencies:
- Goal 9: Ethical and Civic Responsibility: By meeting the following competencies:
- Goal 10: People and the Environment: By meeting the following competencies:

Topics to be Covered

Hydraulic motor displacement and selection factors.

Applications for motor/gear reducer combinations.

Hydraulic pump selection and displacement factors and efficiencies.

Pneumatic systems components calculations.

SCFM, CV, pressure, efficiency, velocity, and torque calculations.

Tractive effort/drawbar pull, vehicle torque, RPM, resistance calculations.

Accumulator sizing, selection, and applications.

Open, closed, center, tandem and horse power limiting systems.

Cylinder selection, force, and pressure calculations.

Student Learning Outcomes

Demonstrate the ability to size and select hydraulic and pneumatic components to meet different system requirements.

Calculate hydraulic motor efficiencies, pressures, torque, displacement.

Examine gear reducer application requirements and ratios.

Identify hydraulic pump selection factors and efficiencies.

Calculate cylinder force/pressure.

Calculate resistances, vehicle tractive effort/drawbar, pull/torque, and wheel RPM.

Identify accumulator applications, sizing and selection factors.

Calculate SCFM, CV, pressure, efficiency, velocity, and torque for pneumatic system components.

Design and implement systems using various directional, pressure and flow control components.

Identify and control potential safety hazards and implement safe working practices.

Is this course part of a transfer pathway: Yes No

***If yes, please list the competencies below**

Revised Date: 1/26/2022