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. Biofuels Technology  COURSE NUMBER: RNEW 1160

NUMBER OF CREDITS: 3

COURSE TITLE: Instrumentation and Control

CATALOG DESCRIPTION:
Building on Mechanical Fundamentals and Process Dynamics, this course will cover the essential elements of a process control system. It will cover common types of electrical and pneumatic signals used for data collection while exploring devices used to measure flow rate, pressure, temperature, level and analytical control. This course will compare fundamental control concepts such as on\off and PID. It will explain how control concepts are used in the various control loops of feedback, cascade, ratio, and feedforward.

AUDIENCE:
This course is designed for any individual that would like to increase their knowledge about instrumentation and control in industrial operating plants.

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: None

LENGTH OF COURSE: One semester

THIS COURSE IS USUALLY OFFERED:
Every other year ☐ fall ☐ spring X 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. Introduce students to symbology and control loops
   b. Introduce students to essential elements of a process control system
   c. Introduce students to methods and means of data collection in a process control system
   d. Introduce students to measuring devices in process control systems
2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
   a. Demonstrating the learned knowledge through on-line assessments
   b. Understanding the information required to apply the components and concepts discussed in this course.

3) COMMUNICATIONS SKILLS: This course will help students improve their oral and written communication skills through:
   a. Interactive participation in on-line classroom discussion
   b. Written skills development will be reinforced through short-answer study guides, reports, and electronic communications

4) HUMAN DIVERSITY: This course will help students recognize, understand, and appreciate human diversity through:
   a. The student will gain self-awareness regarding the feelings towards people regardless of culture, values or socioeconomic status.

TOPICS TO BE COVERED:
Process Variables such as Pressure, Temperature, Level, and Flow; Analytical Sensing or Measuring Instruments, Control Loops, Symbology, Switches, Relays, and Annunciators, Signal Transmission and Conversion, Controllers, Distributed Controls Systems, PLCs, and Instrumentation Malfunctions

LIST OF EXPECTED COURSE OUTCOMES:
1. Students will be able to describe and evaluate sensors and signal processing and display elements commonly used with instrumentation in process plants.
2. Students will be able to explain what is meant by open and closed-loop control systems.
3. Students will be able to state the general function of an instrument system and identify the basic instruments/devices and the function of each.
4. Students will be able to describe the functions of the four basic elements of an automated process control system.
5. Students will be able to explain how resistance, capacitance, dead time and lag time can affect a process control system.

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:

X Reading  X Tests  □ Individual Projects
□ Oral Presentations  X Worksheets  □ Collaborative Projects
X Textbook Problems □ Papers  □ Portfolio
X Group Problems □ Term Paper  
□ Other (describe below)

EXPECTED STUDENT LEARNING OUTCOMES:

Upon successful completion of this course, students should:

1. Be able to explain the relationship between temperature, pressure, level and flow in process plant operations.
2. Be able to describe and evaluate sensors, signal processing, and display elements commonly found in instrumentation in process plants.
3. Be able to compare and contrast analog and digital control systems.
4. Be able to identify and describe the functions of the four basic elements of an automated process control system.
5. Be able to identify and explain the different signal transmissions with regard to simple control loops.
6. Become familiar with typical symbols used in process flow diagrams.

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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