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. Biofuels COURSE NUMBER: RNEW1155

NUMBER OF CREDITS: 2

COURSE TITLE: Process Optimization and Troubleshooting

CATALOG DESCRIPTION: This course is designed to pull together all of the concepts explored in the previous three semesters and apply them in real-life case studies. Participation in class is critical. The concept that decisions made by the process operator have immediate impacts on the bottom-line of a company will be an important theme running through this course. Emphasis will be placed on report generation and interpretation using real-life examples through the operation of the ethanol plant simulator. Prerequisite: RNEW 1185.

AUDIENCE: Students pursuing a Biofuels Technology AAS Degree and incumbent workers in the workforce.

FULFILLS MN TRANSFER CURRICULUM AREA(S) (Leave blank if not applicable)
Area: by meeting the following competencies:
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Area: by meeting the following competencies:

PREREQUISITES OR NECESSARY ENTRY SKILLS/KNOWLEDGE: RNEW1185

LENGTH OF COURSE: 1 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. Students will demonstrate the ability to start-up an ethanol plant through investigative simulation practices
   b. Students will demonstrate the ability to operate an ethanol plant through investigative simulation practices
   c. Students will demonstrate the ability to shut-down an ethanol plant through investigative simulation practices

2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
   a. Identifying process characteristics by varying temperature, flow rate, and pressure
b. Identifying the appropriate reaction parameters used to synthesize ethanol from the
dry-milling process
c. Troubleshooting process parameters

3) COMMUNICATIONS SKILLS: This course will help students improve their oral and written
communication skills through:
  a. Students will prepare formal and informal ethanol simulation progress reports
  b. Students will present results to the class

4) HUMAN DIVERSITY: This course will help students recognize, understand, and appreciate
human diversity through:
  a. Problem solving and trouble shooting process parameters on an individual and group
     basis
  b. Understand the knowledge that an ethanol process operator must possess in order to
     work in a control room

TOPICS TO BE COVERED:
  1.) Navigating the D3 DCS system.
  2.) Ethanol Plant Start-Up
  3.) Cook Operations
  4.) Fermentation
  5.) Distillation
  6.) Evaporation
  7.) Dehydration
  8.) Product Handling
  9.) Clean In Place (CIP) Processes
  10.) Partial Plant Shutdown
  11.) Plant Shutdown

LIST OF EXPECTED COURSE OUTCOMES:
  1.) Students will successfully navigate the D3 DCS system for a simulated ethanol plant.
  2.) Students will successfully start-up a simulated ethanol plant and gain knowledge in boiler,
     regenerative thermal oxidizer and dryer start-up.
  3.) Students will understand the equipment associated with cook processing technologies in
     ethanol production.
  4.) Students will gain knowledge about ethanol process parameters for fermentation,
     distillation, evaporation, and dehydration.
  5.) Students will establish working knowledge about CIP technologies via demonstration of
     each associated process.
  6.) Students will successfully demonstrate both the partial plant shutdown and the complete
     plant shutdown in an ethanol simulator.

LEARNING/TEACHING TECHNIQUES used in the course are:
☐ Collaborative Learning  ☑ Problem Solving
☐ Student Presentations  ☐ Interactive Lectures
☐ Creative Projects  ☐ Individual Coaching
☐ Lecture  ☐ Films/Videos/Slides
☒ Demonstrations  ☐ Other (describe below)
ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:

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

EXPECTED STUDENT LEARNING OUTCOMES:
Upon completion of this course, students will be able to complete the following:

1.) Understand Process Control as it relates to the control room in an ethanol plant
2.) Become familiar with the D3 operator system and the start-up and shut-down of an ethanol plant
3.) Record and interpret data regarding applications in analytical process controls
4.) Record and interpret data regarding applications in process flow and level
5.) Record and interpret data regarding applications related to thermal process control
6.) Describe the function of both manual and auto controls in process simulation
7.) Identify steady and transient control system states through ethanol process simulation

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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