

# MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE

## COURSE OUTLINE

DEPT. RNEW

COURSE NUMBER: 2120

NUMBER OF CREDITS: 2

Lecture: 2 Lab: 0 OJT: 0

### Course Title:

Ethanol Separation Technology

### Catalog Description:

Ethanol Separation Technology covers the basic principles of ethanol distillation, evaporation and dehydration. Included will be an understanding of the operating components in a distillation system; demonstrable familiarity with startup, cleaning, operating, and shutdown procedures; and the ability to interpret both normal and abnormal operating conditions. The evaporative process and its role in processing plants will also be covered as well as the theory of molecular sieve dehydration and how it is used in the ethanol process.

### Prerequisites or Necessary Entry Skills/Knowledge:

RNEW 1101

### 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

Chemical and physical characteristics of ethanol

Ethanol and water mixtures

Alcohol/Water vapor diagrams

True percent proof tables

Batch distillation

Continuous distillation

Beer column

Side stripper
Rectifier column
Fusel oils
Reflux condenser
Reflux ratio
Azeotropic distillation
Molecular sieve dehydration
Three-bed molecular sieve operation and troubleshooting
Evaporation principles
Falling film evaporators
Multiple effect evaporation
Centrifuge basics and operation

### Student Learning Outcomes

Use terminology as it relates to ethanol separation technologies.
Identify proper parameters for the distillation, dehydration and evaporation of ethanol.
Explain trouble shooting options for each step relating to ethanol separation.
Differentiate batch and continuous distillation principles.
Explain the process flow of an ethanol separation system.

**Is this course part of a transfer pathway:** Yes  No

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

Revised Date: 3/29/2022