



Minnesota
STATE COLLEGES
& UNIVERSITIES

Associate in Applied Science (A.S.) Energy Technical Specialist Biodiesel Certificate

PROGRAM DESCRIPTION

This degree program was developed to train students in the field of energy technology. The Energy Technical Specialist Associate in Applied Science degree will convey the skills and knowledge necessary to be successful in both the tradition and renewable energy fields.

Students enrolled in the Energy Technical Specialist program will study a 35-credit core curriculum providing a strong base in electrical, electronic, and mechanical systems. Students will select an area of specialization to complete their program of study from the following: wind Energy, Ethanol, Biodiesel, Fossil Fuels, or Power Generation.

The Energy Technical Specialist degree is offered through ten colleges in the Minnesota State Colleges and Universities system. Through this partnership, students have the opportunity to complete all of their courses online through partner institutions.

FILE CONTENTS:

In this file, course outlines and a sample syllabus is provided for the 10-credit Biodiesel Certificate which includes the following:

An overview of the entire degree can be found on pages 2-9

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NOTE: Course Outlines and Syllabi are formatted based on the institution's guidelines

Energy Technical Specialist, A.A.S. Information Sheet

The Energy Technical Specialist, A.A.S. is a new degree that has been developed using funding from a Department of Labor High Growth Energy Grant. The goal of the degree is to train students in the field of energy technology. Due to the increasing age of the current energy workforce, it is estimated that there will be a great demand for skilled workers in the energy industry. The Energy Technical Specialists, A.A.S. degree will convey the skills and knowledge necessary to be successful in the traditional and renewable energy fields. The degree will prepare students for work as technicians in the following industries: coal-fired electric power generation, natural gas distribution, ethanol production, biodiesel production, wind turbine maintenance, and solar energy. Many of the courses for this degree will be offered online making them easily accessible to all students. Students may enroll in the degree program at any one of the partner colleges.

Partner Colleges:

1. Alexandria Technical College
2. Century College
3. Dakota County Technical College
4. Hibbing Community College
5. Itasca Community College
6. Mesabi Range Community College
7. Minnesota West Community and Technical College
8. South Central College
9. St. Cloud Technical College
10. Vermilion Community College

Degree Description:

- 60 Credits to be completed in 4 semesters
- **15 General Education Credits** (including English, Math, and Science)
- **35 Credits of Core Energy Curriculum** (including: Introduction to Renewable and Traditional Energy, Industrial Safety, AC/DC Fundamentals, Digital Electronics, Mechanical Fundamentals, PLC Fundamentals, Pneumatics, Hydraulics, Process Control, and Print Reading and Design)
- **10 Credits of Technical Electives** (Students may take courses in wind, ethanol, biodiesel, solar, and/or fossil fuels. Students are not required to take all 10 credits in one area.)

Courses

Core Curriculum	Credits	Offering course on-line to other colleges (FALL)	Offering course on-line to other colleges (SPRING)
Industrial Safety	2	Hibbing (SHA 1600)	
Intro. To Trad/Renewable Energy	3	MN West (RNEW 1300)	MN West (RNEW 1300)
AC/DC 1	3	MN West (ELCO 1110)	MN West (ELCO 1110)
AC/DC 2	3	MN West (ELCO 1120)	MN West (ELCO 1120)
Digital Electronics	3		South Central (MECA 1210)
Mechanical Fundamentals	3		South Central (MECA 1220)
Mech. Fund for Process Controls	3	MN West (RNEW 1115)	MN West (RNEW 1115)
PLC Fundamentals	3	Alexandria (ENTS 2550)	
Pneumatics	3	Alexandria (ENTS 2555)	
Hydraulics	3	MN West (FLPW 1103)	MN West (FLPW 1103)
Process Controls/Instrumentation	3		MN West (RNEW 1160)
Print Reading	3	Century (ECAD 1023)	Century (ECAD 1023)
Technical Electives (choose 10 credits)			
Wind Power ¹ (see below)		MN West	
Solar Power ² (see below)		Century	
Ethanol Fuel ¹ (see below)		MN West	
Biodiesel Fuel ¹ (see below)		MN West	
Fossil Fuel ³ (see below)		St. Cloud	
Power Generation ³ (see below)		Alexandria	

¹ Majority of the courses offered online.

² Some courses offered online others offered only face-to-face.

³ Courses offered face-to-face.

NOTE: Some courses are offered face-to-face only, whenever possible these courses will be offered in a concentrated format to allow all students to access these courses. Please check with the offering college about specific options for taking these courses.

Wind Courses

All courses with the exception of ELWT 1170 are offered in an online format. Whenever possible, ELWT 1170 will be offered in a concentrated minimizing student travel time. These courses are offered through Minnesota West Community and Technical College.

Windsmith Certificate (MN West)			
Course Name		Fall	Spring
Wind Energy Fundamentals	3	MN West (ELWT1100)	MN West (ELWT1100)
AC /DC 1 Circuits <i>(Part of the core curriculum)</i>	3	MN West (ELCO 1110)	MN West (ELCO 1110)
AC/ DC 2 Circuits <i>(Part of the core curriculum)</i>	3	MN West (ELCO 1120)	MN West (ELCO 1120)
Hydraulics <i>(Part of the core curriculum)</i>	3	MN West (FLPW 1103)	MN West (FLPW 1103)
Environmental Health and Safety	1	MN West (ELWT1160)	MN West (ELWT1160)
Wind Energy OSHA Standards & Climbing Lab	2	MN West (ELWT1170) This course is not available on-line. Available as a concentrated lab.	
Introduction to OSHA <i>(Part of the core curriculum)</i>	1	MN West (RNEW1105)	MN West (RNEW1105)

Ethanol Courses

All courses for the Ethanol and Biodiesel Certificates are available in an online format. These courses are offered through Minnesota West Community and Technical College.

Ethanol Certificate (MN West)			
Course Name		Fall	Spring
Process Dynamics	3	MN West (RNEW1100)	
Ethanol Process Fundamentals	2	MN West (RNEW1101)	
Introduction to OSHA <i>(Part of the core curriculum: Industrial Safety)</i>	1	MN West (RNEW 1105)	MN West (RNEW 1105)
Mechanical Fundamentals <i>(Part of the core curriculum: Mechanical Fundamentals for Process Control)</i>	3	MN West (RNEW 1115)	
P&ID and PFD Reading <i>(Part of the core curriculum: Print Reading)</i>	1	MN West (RNEW 1125)	
Instrumentation & Control <i>(Part of the core curriculum: Process Controls / Instrumentation)</i>	3		MN West (RNEW1160)
Industrial Water Treatment	2		MN West (RENW1175)
Ethanol Separation Technology	2		MN West (RENW2120)

Biodiesel Courses

All courses for the Ethanol and Biodiesel Certificates are available in an online format. These courses are offered through Minnesota West Community and Technical College.

Biodiesel Certificate (MN West)			
Course Name		Fall	Spring
Process Dynamics	3	MN West (RNEW 1100)	
Biodiesel Fundamentals	2	MN West (RNEW1102)	
Introduction to OSHA <i>(Part of the core curriculum: Industrial Safety)</i>	1	MN West (RNEW 1105)	MN West (RNEW 1105)
Mechanical Fundamentals <i>(Part of the core curriculum: Mechanical Fundamentals for Process Control)</i>	3	MN West (RNEW 1115)	
P&ID and PFD Reading <i>(Part of the core curriculum: Print Reading)</i>	1	MN West (RNEW 1125)	
Instrumentation & Control <i>(Part of the core curriculum: Process Controls / Instrumentation)</i>	3		MN West (RNEW1160)
Industrial Water Treatment	2		MN West (RENW1175)
Biodiesel Feedstock, Technologies & Regulatory Issues	2		MN West (RENW1195)

Solar Courses

These courses are offered through Century College. Only SOLR 1020 and SOLR 2030 are offered in an online format. Degrees are not available completely online. However, some courses may be offered in a concentrated format to minimize student travel.

Solar Assessor Certificate 16 credits (Century)			
Course Name		Fall	Spring
Construction Technology	4	Century (FST1000)	Century (FST1000)
Facility Workplace Safety (Part of the core curriculum: Industrial Safety)	2	Century (FST 1001)	Century (FST 1001)
Introduction to Solar Site Assessment	3	Century (SOLR1020)	Century (SOLR1020)
Construction for Solar Energy	2	Century (SOLR1030)	Century (SOLR1030)
Advanced Solar Thermal Concepts	3	Century (SOLR 2030)	Century (SOLR 2030)
Solar Thermal Lab	2	Century (SOLR 2035)	Century (SOLR 2035)

Advanced Solar Thermal Energy Systems Certificate 30 Credits (Century)			
Course Name		Fall	Spring
Facility Workplace Safety (Part of the core curriculum: Industrial Safety)	2	Century (FST 1001)	Century (FST 1001)
Blueprint Reading for Renewable Energy (Part of the core curriculum: Print Reading)	2	Century (ECAD 1023)	Century (ECAD 1023)
Hydronic and Low Pressure Boilers	3	Century (HVAC 1073)	Century (HVAC 1073)
Residential Energy Auditing and Conservation	3	Century (HVAC 1080)	Century (HVAC 1080)
Introduction to Solar Site Assessment	3	Century (SOLR1020)	Century (SOLR1020)
Advanced Solar Thermal Concepts	3	Century (SOLR 2030)	Century (SOLR 2030)
Solar Thermal Lab	2	Century (SOLR 2035)	Century (SOLR 2035)
Solar Thermal Installation Internship	1-3	Century (SOLR 1781)	Century (SOLR 1781)
Energy Concepts With Lab	4	Century (ESCI 1040 & 1045)	Century (ESCI 1040 & 1045)
Minimum 4 credits in a related field such as Electrical, HVAC, or FST	4		

Advanced Photovoltaic Energy Systems Certificate 30 Credits (Century)			
Course Name		Fall	Spring
Facility Workplace Safety (<i>Part of the core curriculum: Industrial Safety</i>)	2	Century (FST 1001)	Century (FST 1001)
Blueprint Reading for Renewable Energy (<i>Part of the core curriculum: Print Reading</i>)	2	Century (ECAD 1023)	Century (ECAD 1023)
Basic Electricity (<i>Part of the core curriculum: AC/DC 1</i>)	2	Century (FST 1030)	Century (FST 1030)
Introduction to Solar Site Assessment	3	Century (SOLR1020)	Century (SOLR1020)
Construction for Solar Energy	2	Century (SOLR1030)	Century (SOLR1030)
Advanced Photovoltaic Systems	3	Century (SOLR 2020)	Century (SOLR 2020)
Photovoltaic Systems Lab	2	Century (SOLR 2025)	Century (SOLR 2025)
Photovoltaic Systems Integration Internship	1-3	Century (SOLR 1780)	Century (SOLR 1780)
Applied Mathematics	5	Century (Math 1015)	Century (Math 1015)
Energy Concepts With Lab	4	Century (ESCI 1040 & 1045)	Century (ESCI 1040 & 1045)
Sufficient credits to Total 30			

Fossil Fuel Courses

These courses are offered through St. Cloud Technical and Community College. The courses are offered in a face-to-face format or as a hybrid course meaning part of the content is delivered online with labs being done in person. Whenever possible, concentrated offerings of these courses will be available to minimize student time and travel to take these courses.

Fossil Fuel Concentration (St. Cloud TCC)			
Course Name		Fall	Spring
Mechanical System II	4	St. Cloud TCC (ETEC 2516)	
Basic Metal Joining and Fabrication	2	St. Cloud TCC (TECH 1552)	St. Cloud TCC (TECH 1552)
Power Plant Technology	4		St. Cloud TCC (ETEC 2546)

Power Generation Courses

These courses are offered through Alexandria Technical and Community College.

Power Generation Concentration (Alex TCC)			
Course Name			
Combustion Engine			
Combustion Fuel Systems			
Generator Principles			
Grid Tie-Paralleling			

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 Technology

COURSE NUMBER: RNEW 1100

NUMBER OF CREDITS: 3

COURSE TITLE: Process Dynamic

CATALOG DESCRIPTION : This course introduces concepts which deal with physical forces and their relationship to energy through temperature and pressure and are frequently encountered in an operation plant environment. An explanation and understanding of a plant system is crucial to this course. The scientific principles of flow, temperature, pressure heat, gasses, liquids, solids, fluid systems, process dynamics and heat transfer are covered in detail. The curriculum of this course encompasses basic physics and science.

AUDIENCE : This course is designed for any individual that would like to increase their knowledge about process dynamics 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 X spring ☐ 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 concepts which deal with physical forces and their relationship to energy through temperature and pressure.
 - b. Introduce students to basic physics and chemistry principles and their relationship to fluid systems and process flow.
 - c. Introduce students to industrial requirements for mathematical applications.
- 2) **THINKING SKILLS:** This course will help students improve the effectiveness of their thinking skills through:
 - a. Written explanation of chapter topics
 - b. Applying the learned course materials in an academic and industrial setting

- 3) **COMMUNICATIONS SKILLS:** This course will help students improve their oral and written communication skills through:
- Interactive participation in on-line classroom discussion
 - 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:
- Respectable participation in on-line classroom discussions

TOPICS TO BE COVERED:

Mathematics, Chemistry, Physics, Machines, Fluid Systems, Process Variables and Measurement, Heat, Elements of Control Systems, Statistical Process Control, Process Sampling

LIST OF EXPECTED COURSE OUTCOMES:

- Students will gain knowledge about the principles of temperature, pressure and flow, and the relationships that exist between them.
- Students will gain knowledge about fluid systems and environmental factors that affect them.
- Students will become familiar with heat and heat transfer
- Students will be familiar with process variables and process variable measurement

LEARNING/TEACHING TECHNIQUES used in the course are:

- | | |
|---|---|
| ☐ Collaborative Learning | ☒ Problem Solving |
| ☐ Student Presentations | ☒ Interactive Videos |
| ☐ Creative Projects | ☐ Individual Coaching |
| ☐ Lecture | ☒ Films/Videos/Slides |
| ☐ Demonstrations | ☐ Other (describe below) |
| ☐ Lab | |

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 the course, students should understand the scientific principles of flow, temperature, pressure, heat, gases, liquids, solids, fluid systems, process dynamics and heat transfer. In addition, the students will become familiar with the operators' responsibilities in processing plants.

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

This document can be made available in alternative format by contacting Student Services, the Campus CEOs or calling Minnesota Relay Service at 1-800-627-3529. Reasonable accommodations will be provided upon request for documented disabilities. An Affirmative Action Equal Opportunity Educator/Employer. ADA Accessible.

MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE SYLLABUS FORM

Faculty is required to distribute to student within one week of the first class meeting. The faculty is requested to submit their syllabus to the Academic Affairs office within two weeks of the first class meeting. Refer to Policy 3.22 which defines information required on the syllabus.

COURSE TITLE: Process Dynamics

COURSE NUMBER: RNEW 1100

NUMBER OF CREDITS: 3

ACADEMIC YEAR: 2011

INSTRUCTOR NAME: Rosemary Patzer

OFFICE HOURS Tuesdays, 10 AM – 12:00 PM

OFFICE TELEPHONE 320-564-5044

OFFICE NUMBER: 103A

E-MAIL rose.patzer@mnwest.edu

TEXTBOOKS TO BE USED:

Job Training Systems; Fundamentals of Process Instrumentation Part 1

Required On-Line Videos:

Critical Information Network (CiNet) series videos as assigned. These videos will serve as one of our texts for the course. Consequently, there is a fee that each student will be charged for the subscription and use of these videos during the semester. You can learn how to log into CiNet's website and access the videos through the instruction sheet found in the Admin File folder. You can watch the videos as many times as you would like to throughout the semester.

SYLLABUS INFORMATION:

Course Web Site Access:

You'll find course information and assignments in the "Desire 2 Learn" (D2L) course management software. D2L can be accessed through the at the MNWest home page. This course uses interactive CIN learning modules. The log-in information to these modules will be provided in the D2L "Content" section.

When you have logged into D2L, a page listing of the courses in which you are currently enrolled will appear. Click on the name of this course – "Process Dynamics". You will then be at our course home page. I will be posting class materials to this web page frequently under the "Contents" tab, and you should check the site a few times each week during the semester. You will find your scores for the homework assignments, quizzes, and exams under the "Grades" tab.

Help:

You have the right to expect help if you are struggling in the class. Talk to me **before** the situation becomes critical. Also be aware that you have access to the Student Resource Center and tutors.

Objectives:

This course will examine various process industries and what they do. Course material will provide an introduction to concepts which deal with physical forces and their relationship to energy through temperature and pressure. These concepts are frequently encountered in an operating plant environment. The curriculum of this course encompasses basic physics and chemistry and industrial requirements for mathematical applications. Upon completion of the course, students should understand the scientific principles of flow, temperature, pressure, heat, gases, liquids, solids, fluid systems, process dynamics and heat transfer. In addition, the students will become familiar with the operators' responsibilities in processing plants.

Course Schedule:

You will find weekly scheduled assignments under the "Content" tab. Note that our weeks will run Wednesday to Wednesday and assignment closing times are 11:59 PM.

Class work – Assignments, Quizzes, and Tests:

You should plan to work up to 6 hours per week on class assignments. Homework assignments will be posted at least one week in advance.

Please pay attention to submission directions. Most assignments will be submitted via the dropbox, but some of them will need to be submitted via e-mail. When you are directed to use the dropbox, you will want to first save the document on your hard drive using a title that is close to the assignment name. Then upload it via the dropbox.

Student Contributions / Attendance:

Participation is critical in this class. Your attendance is noted by your log-in/log-out times as well as the submission of your assignments on time.

Academic Conduct and Honesty:

You are expected to uphold the Minnesota West "Student Code of Conduct" including academic integrity at all times. Please review this section in the *Student Handbook*, which can be easily accessed at the following website:

<http://www.mnwest.edu/student-handbook/code-of-conduct/>

Topics to be Covered:

1) Mathematics

For many students, this section of the curriculum is review material. Students are encouraged to set aside the calculator or computer and work some of the problems by hand.

2) Chemistry

In this segment, we will take a look at basic chemistry principles. You'll see relationships to this in other courses in the Biofuels Technology program

3) Physics

In this segment, we will study different forms of energy. Force and motion are key areas that fall under physics principles. We'll also look at the laws of thermodynamics.

4) Machines

Our main focus here is to understand simple machines. We'll also do some fundamental calculations that relate to work, power, and efficiency.

5) Fluid Systems

As we are introduced to states of matter, we will see how they relate back to process dynamics. This section also includes calculations for flow and flow rates.

6) Process Variables

We will study the process variable listed above and see how they are interrelated and how one can affect the other. Some of the topics require calculations as well as unit conversions between both U.S. and metric scales.

7) Process Variable Measurement

In this segment, we will review a variety of ways and instruments used to measure process variables. We will also learn appropriate ways to take measurements using thermometers, levers, levels, and gauges.

8) Heat

Convection, conduction, and radiation are areas of study in the heat segment. We also look at different modes of transferring heat in heat exchangers as well as become familiar with their components.

9) Elements of Control Systems

The fundamental elements of control systems are studied in this section. We study closed loop and open loop systems, digital and analog signals, and various means of transmission.

10) Statistical Process Control and Process Sampling series videos

In this segment, we will review Statistical Process Control and Product Sampling. We'll study typical graphs used in the industry, control room charts and logs. We'll also take a look at the appropriate ways to obtain samples.

STANDARDS USED FOR ASSESSMENT: Industrial standards are non-existent. Formative and summative assessments will be used throughout the course.

GRADING:

Grades will be earned as follows as a percentage of the total possible points:

A 94–100 %	B+ 88–89.99 %	C+ 78–79.99%	D+ 68–69.99 %
A- 90-93.99%	B 82-87.99%	C 72-77.99%	D 62-67.99%
	B- 80-81.99%	C- 70-71.99%	D- 60-61.99%

F =< 60%

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

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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. Renewable Energy Technology

COURSE NUMBER: RNEW 1102

NUMBER OF CREDITS: 2

COURSE TITLE: Biodiesel Process Fundamentals

CATALOG DESCRIPTION : Covers in detail the overall fundamental process of biodiesel production. The course will include a review of biodiesel chemistry, process engineering, post reaction processing, fuel specification and properties, feedstock preparation, treatment and recovery of side streams, fuel transportation, storage, and general plant operations.

AUDIENCE : Trainees for biodiesel process operations and plant personnel

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:

LENGTH OF COURSE : 2 credits, on-line

THIS COURSE IS USUALLY OFFERED:

Every other year ☐ fall X spring ☐ 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. Provide students with information as it relates to biodiesel processing
 - b. Recognize the chemical reactions associated with the process
 - c. Recognize the process parameters necessary for successful biodiesel production
 - d. Recognize the fuel quality standards
 - e. Globalization of Biodiesel
- 2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
 - a. Students will gain a basic working knowledge about biodiesel production and process parameters.
 - b. Students will disseminate the impact of out-of-specification fuel

- 3) **COMMUNICATIONS SKILLS:** This course will help students improve their oral and written communication skills through:
 - a. Interactive participation in class discussion
 - b. Oral and written skills development will be reinforced through short reports on both individual and team platforms.
- 4) **HUMAN DIVERSITY:** This course will help students recognize, understand, and appreciate human diversity through:
 - a. Acknowledging the globalization of the production of biodiesel, and realizing the driving forces for production vary between countries or regions of the world

TOPICS TO BE COVERED:

- a. History of Biodiesel
- b. Define the Common Terminology
- c. Define the Chemistry relating to Biodiesel Production
 - i. Reactants: Triglycerides, Fatty Acids, Alcohol, Catalyst
 - ii. Products: Biodiesel, Water, Crude Glycerin, Soap
- d. Reaction Trouble Shooting
- e. Describe the process engineering
- f. Fuel Properties
 - a. Comparison to petroleum diesel
- g. Fuel Specifications according to ASTM and European Standards
- h. Introduction to BQ-9000
- i. Social, Economic, and Environmental Benefits and Concerns of Biodiesel Production
- j. Globalization

LIST OF EXPECTED COURSE OUTCOMES:

1. Students will have a basic understanding about biodiesel processing and the chemistry that supports the production technology.
2. Students will become familiar with process parameters.
3. Students will become familiar with fuel properties.
4. Students will recognize the differences between biodiesel and petroleum diesel properties.
5. Students will become familiar with fuel specifications.
6. Students will recognize the social, economic, and environmental benefits and concerns associated with biodiesel production.

LEARNING/TEACHING TECHNIQUES used in the course are:

- | | |
|--|--|
| X Collaborative Learning | X Problem Solving |
| X Student Presentations | X Interactive Lectures |
| ☐ Creative Projects | ☐ Individual Coaching |
| X Lecture | X Films/Videos/Slides |
| Demonstrations | Other (describe below) |
| Lab | |

ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:

- | | | |
|---------------------|-------------------------------------|---|
| X Reading | X Tests | ☐ Individual Projects |
| Oral Presentations | X Worksheets | ☐ Collaborative Projects |
| X Textbook Problems | X Papers | ☐ Portfolio |
| X Group Problems | ☐ Term Paper | |

☐ Other (describe below)

EXPECTED STUDENT LEARNING OUTCOMES:

Students will gain an understanding of the chemical reactions that support successful biodiesel processing. They will be equipped to identify feedstock, production, and storage issues that can relate to production quality. They will also recognize the social, economic, and environmental benefits and concerns that relate to biodiesel production.

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

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MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE

SYLLABUS FORM

Faculty is required to distribute to student within one week of the first class meeting. The faculty is requested to submit their syllabus to the Academic Affairs office within two weeks of the first class meeting. Refer to Policy 3.22 which defines information required on the syllabus.

COURSE TITLE: Biodiesel Process Fundamentals

COURSE NUMBER: RNEW 1102

NUMBER OF CREDITS: 2

ACADEMIC YEAR: 2011

INSTRUCTOR NAME: Rosemary Patzer

OFFICE HOURS Tuesdays, 10 AM – 12:00 PM

OFFICE TELEPHONE 320-564-5044

OFFICE NUMBER: 103A

E-MAIL rose.patzer@mnwest.edu

TEXTBOOKS TO BE USED: Building a Successful Biodiesel Business, 2nd edition, J. Van Gerpen, et. al.

ISBN#: 0-9786349-0-X

Additional Resources:

National Biodiesel Board www.biodiesel.org

Renewable Fuels Association www.rfa.org

Internet sites to support Web-based research

SYLLABUS INFORMATION:

Weekly Schedule:

Assignments for this course will be posted and due on Tuesdays throughout the semester.

Course Description:

This course is designed to provide detailed information regarding the overall fundamental process of biodiesel production. The course will include a review of biodiesel chemistry, process engineering, post reaction processing, fuel specification and properties, feedstock preparation, treatment and recovery of side streams, fuel transportation storage and general plant operations.

Course Web Site Access:

Any announcements will be posted at the home page and you should check this on a regular basis. The white menu bar near the top holds the links – or tabs – that we will be using. In this class, we will use the following tabs (found in the white menu bar near the top of the course page):

Assignments under the **Content** tab.

On occasion, you may be asked to post something to the **Discussion** tab.

The **Classlist** will list the students in the class. When there's a green dot by a name, it means that he or she is in D2L.

The **Dropbox** is where you will submit each of your assignments.

The **Quizzes** tab is where you'll find quizzes and exams.

And of course, the **Grades** tab is where you'll find your posted grades.

Student Learning Outcomes/Course Objectives

Upon successful completion of this course, students will:

1. Understand the chemical and physical properties associated with the raw materials in biodiesel production
2. Understand the chemical reaction that takes place during biodiesel production
3. Identify traditional biodiesel production processes
4. Consider emerging technology/alternative production methods for biodiesel production
5. Recognize in-specification fuel properties for biodiesel
6. Identify and describe the social, economic, and environmental benefits and concerns of biodiesel production

Teaching and Learning Activities

All students will:

1. Study and demonstrate their knowledge about the chemical and physical properties associated with the raw materials in biodiesel production
2. Study and demonstrate their knowledge about the chemical reaction that takes place during biodiesel production
3. Construct a biodiesel production flow chart and identify what occurs at each stage of production
4. Research and present information regarding emerging technology and alternative production methods for biodiesel production
5. Identify properties associated with in-specification biodiesel fuels
6. Identify and describe the social, economic, and environmental benefits and concerns of biodiesel production

Student Contributions / Attendance:

Participation is critical in this class. Failure to turn in personal and group assessments will result in zero points for the assignment.

Academic Conduct and Honesty:

You are expected to uphold the Minnesota West "Student Code of Conduct" including academic integrity at all times. Please review this section in the

Help:

You have the right to expect help if you are struggling in the class. Talk to me **before** the situation becomes critical. Also be aware that you have access to the Student Resource Center and tutors.

Plagiarism:

Plagiarism will not be tolerated. All work that you submit must be your own. This includes downloading a file from the Internet and trying to turn it in as your original work. You risk failing the course and your standing at the college if you choose to plagiarize someone else's work.

STANDARDS USED FOR ASSESSMENT: Industry standards are non-existent; formative and summative assessments will be used throughout the course.

GRADING:

Grades will be earned as follows as a percentage of the total possible points:

A 94–100 %	B+ 88–89.99 %	C+ 78–79.99%	D+ 68–69.99 %
A- 90-93.99%	B 82-87.99%	C 72-77.99%	D 62-67.99%
B- 80-81.99%	C- 70-71.99%	D- 60-61.99%	
F =< 60%			

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

This document can be made available in alternative format by contacting Student Services, the Campus CEOs or calling Minnesota Relay Service at 1-800-627-3529. Reasonable accommodations will be provided upon request for documented disabilities. An Affirmative Action Equal Opportunity Educator/Employer. ADA Accessible.

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 Technology

COURSE NUMBER: RNEW 1105

NUMBER OF CREDITS: 1

COURSE TITLE: Introduction to OSHA

CATALOG DESCRIPTION : This course will introduce students to many of the Occupational Safety and Health Administration (OSHA) Standards that help establish safety in the workplace. Topics such as HAZWOPER, Hazard Communications, Personal Protection, Fire Safety, and Blood Born Pathogens are covered along with many of the Standards that support Safety Orientation

AUDIENCE : Any individual seeking a basic understanding about some of the OSHA standards.

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 : 1 semester

THIS COURSE IS USUALLY OFFERED:

Every other year ☐ fall X 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. To increase student knowledge regarding the common safety issues that are associated with workplace safety
 - b. To provide supporting information for OSHA Certification courses
- 2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
 - a. Reviewing on-line safety-related videos
 - b. Demonstrating the learned knowledge through on-line assessments
 - c. Identifying safety hazards through on-line assessments

- 3) **COMMUNICATIONS SKILLS:** This course will help students improve their oral and written communication skills through:
- Interactive participation in on-line classroom discussion
 - Oral and written communications with faculty and fellow students
 - Written skills development will be reinforced through formal reports on both individual and team platforms.
- 4) **HUMAN DIVERSITY:** This course will help students recognize, understand, and appreciate human diversity through:
- Participation in the on-line discussions
 - Recognizing safety constraints for some individuals and for some environments.

TOPICS TO BE COVERED: Safety Orientation, Ergonomics, Fall Protection, Confined Space Entry, Electrical Safety, Hearing Conservation, HAZWOPER Introduction, HAZWOPER First Responder, Hazard Communications, Warning Signs and Labels, MSDS's. Lockout/Tag-out, Transporting Hazardous Materials, Personal Protection Equipment, Respiratory Protection, Respirator Fit Testing, Blood Borne Pathogens, Fire Safety, Classes of Fires and Extinguishers, Understanding Forklifts, Forklift Safety Checks, and Safe Forklift Operation.

LIST OF EXPECTED COURSE OUTCOMES:

Upon completion of this course, you should be able to complete the following:

- Identify the common safety issues that are associated with workplace safety
- Realize the importance of practicing safe work habits
- Identify good housekeeping practices that promote workplace safety
- Look at safety concerns associated with proper use of tools, ladders, and energy sources
- Understand how to safely lift heavy objects
- Describe the basic types of personal protective equipment that are commonly required to protect workers on the job and those that may be required for special hazards
- Identify types of information that can be obtained from material safety data sheets
- Identify common types of labels or warnings that can be used to communicate information about chemicals or other hazards in a workplace.
- Examine basic concerns associated with responding to a fire in the workplace
- Identify the appropriate types of fire extinguishers for fighting different classes of fires
- Understand ergonomic risk factors and work activities associated with musculoskeletal disorder (MSD) hazards
- Describe some common MSDs, including their signs and symptoms, and the importance of reporting them early
- Understand when fall protection is required, how fall protection can be achieved, how to identify the basic parts of a typical fall system, and how to select and use a personal fall arrest system.
- Provide a basic understanding of confined space hazards and the general requirements of the OSHA Confined Space Standard.
- Know the difference between a confined space and a "permit-required" confined space.

- Identify basic principles of electricity and electrical safety as well as working safely around electrical equipment.
- Understand the conditions when noise levels are hazardous, the basic requirements of the OSHA regulation on hearing conservation, and devices that are used to provide hearing protection.
- Provide a general understanding of what "HAZWOPER" means, the purpose of the OSHA HAZWOPER Standard, and the requirements associated with safety and health training and medical surveillance, and the basic requirements of emergency response training.

LEARNING/TEACHING TECHNIQUES used in the course are:

- | | |
|---|---|
| ☐ Collaborative Learning | X Problem Solving |
| ☐ Student Presentations | X Interactive Lectures |
| ☐ Creative Projects | ☐ Individual Coaching |
| ☐ Lecture | X Films/Videos/Slides |
| ☐ Demonstrations | ☐ Other (describe below) |
| ☐ Lab | |

ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:

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

EXPECTED STUDENT LEARNING OUTCOMES:

Students will gain a basic understanding of some of the OSHA Standards that many industries are required to follow and enforce. They will be able to recognize the social, economic, and environmental benefits and concerns that relate to safe practices in the workplace.

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

This document can be made available in alternative format by contacting Student Services, the Campus CEOs or calling Minnesota Relay Service at 1-800-627-3529. Reasonable accommodations will be provided upon request for documented disabilities. An Affirmative Action Equal Opportunity Educator/Employer. ADA Accessible.

MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE SYLLABUS FORM

Faculty is required to distribute to student within one week of the first class meeting. The faculty is requested to submit their syllabus to the Academic Affairs office within two weeks of the first class meeting. Refer to Policy 3.22 which defines information required on the syllabus.

COURSE TITLE: Introduction to OSHA

COURSE NUMBER: RNEW 1105

NUMBER OF CREDITS: 1

ACADEMIC YEAR: 2011

INSTRUCTOR NAME: Rosemary Patzer

OFFICE HOURS Tuesdays, 10 AM – 12:00 PM

OFFICE TELEPHONE 320-564-5044

OFFICE NUMBER: 103A

E-MAIL rose.patzer@mnwest.edu

TEXTBOOKS TO BE USED: on-line videos, CiNET

SYLLABUS INFORMATION:

Course Description: This course will introduce students to many of the Occupational Safety and Health Administration (OSHA) Standards that help establish safety in the workplace. Topics such as HAZWOPER, Hazard Communications, Personal Protection, Fire Safety, and Blood Born Pathogens are covered along with many of the Standards that support Safety Orientation

Required On-Line Modules: CiNet Knowledge Group, OSHA series. Critical Information Network (CiNet) OSHA series videos will serve as our text for the course. Consequently, there is a fee that each student will be charged for the subscription and use of these videos during the semester. Log-In directions can be found in a separate sheet in the Admin Folder under the Content Tab.

You will receive an e-mail from CiNet once your account is established. The e-mail will contain your log-in identification and your password. Unfortunately, you cannot access the CiNet videos from within D2L. Please contact me if you can't access the CiNet video database.

For additional CiNet Log-In Information see the CiNet Log-In page under the Admin Files.

Prerequisites: None

Course Web Site Access: This is an on-line course. Course information and instructions will be posted under the following tabs: Contents, Quizzes, Grades, and we might occasionally use the Drop Box. This course also utilizes interactive CiNet learning modules (on-line videos) that are available through a different website. The log-in directions to these modules will be provided in the D2L "Content" section in the Admin Files folder. CiNet learning modules should load in 5-10 seconds. If you have dial-up, you may encounter difficulty while watching the videos. *Please note: these videos are not compatible with Macintosh computers.*

Objectives: You will find that a lot of the material is reinforced throughout all of the on-line units. In other words, there will be some repetition.

Upon completion of this course, you should be able to complete the following:

- Identify the common safety issues that are associated with workplace safety
- Realize the importance of practicing safe work habits
- Identify good housekeeping practices that promote workplace safety
- Look at safety concerns associated with proper use of tools, ladders, and energy sources
- Understand how to safely lift heavy objects
- Describe the basic types of personal protective equipment that are commonly required to protect workers on the job and those that may be required for special hazards
- Identify types of information that can be obtained from material safety data sheets
- Identify common types of labels or warnings that can be used to communicate information about chemicals or other hazards in a workplace.
- Examine basic concerns associated with responding to a fire in the workplace
- Identify the appropriate types of fire extinguishers for fighting different classes of fires
- Understand ergonomic risk factors and work activities associated with musculoskeletal disorder (MSD) hazards
- Describe some common MSDs, including their signs and symptoms, and the importance of reporting them early
- Understand when fall protection is required, how fall protection can be achieved, how to identify the basic parts of a typical fall system, and how to select and use a personal fall arrest system.
- Provide a basic understanding of confined space hazards and the general requirements of the OSHA Confined Space Standard.
- Know the difference between a confined space and a "permit-required" confined space.
- Identify basic principles of electricity and electrical safety as well as working safely around electrical equipment.
- Understand the conditions when noise levels are hazardous, the basic requirements of the OSHA regulation on hearing conservation, and devices that are used to provide hearing protection.
- Provide a general understanding of what "HAZWOPER" means, the purpose of the OSHA HAZWOPER Standard, and the requirements associated with safety and health training and medical surveillance, and the basic requirements of emergency response training.

Help: You have the right to expect help if you are struggling in the class. Talk to me **before** the situation becomes critical. Also be aware that you have access to the Student Resource Center and tutors.

Academic Conduct and Honesty: You are expected to uphold the Minnesota West "Student Code of Conduct" including academic integrity at all times. Please review this section in the *Student Handbook*, which can be easily accessed at the following website:

<http://www.mnwest.edu/student-handbook/code-of-conduct/>

Plagiarism: Plagiarism will not be tolerated. All work that you submit must be your own. This includes downloading a file from the Internet and trying to turn it in as your original work. You risk failing the course and your standing at the college if you choose to plagiarize someone else's work.

Assignments: There are 22 videos to watch throughout the semester, and most of them are less than 30 minutes in length. The videos are grouped per topic and you can find out more information in the “**Introduction and Schedule**” document found in the *Admin* folder under the Content tab in D2L. A True/False or Multiple Choice quiz will accompany each video. You will need to complete the quizzes for a group before you take the section exam. *Remember, you can watch the videos as many times as you want to throughout the semester.*

Quizzes / Exams: If you miss a posted deadline for a quiz or an exam, **it is up to you to contact me to make them up.** For late work, you will automatically lose possible points according to this schedule:

1 – 2 weeks late	less 25%
2 – 3 weeks late	less 50%
3 – 4 weeks late	less 75%
>4 weeks late	results in an automatic zero (0).

Since open notes are allowed, all quizzes and exams will be timed. You will have one minute per question, and quizzes will contain primarily True/False and/or multiple choice questions taken directly from information in the videos. Exams may include additional types of questions. Matching could be included in either quizzes or exams.

STANDARDS USED FOR ASSESSMENT: This course does not meet eligibility for OSHA Certification. However, course materials support industrial certification information.

GRADING:

A 94–100 %	B+ 88–89.99 %	C+ 78–79.99%	D+ 68–69.99 %
A- 90-93.99%	B 82-87.99%	C 72-77.99%	D 62-67.99%
	B- 80-81.99%	C- 70-71.99%	D- 60-61.99%
F =< 60%			

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COURSE OUTLINE

DEPARTMENT: **RNEW**

COURSE NO. **1115**

NUMBER OF CREDITS: **3**

COURSE TITLE: **Mechanical Fundamentals**

CATALOG DESCRIPTION:

This course covers the basic functions of equipment such as drive components, pumps, compressors, valves and basic electrical equipment. It explores various methods and the importance of equipment lubrication. Additional topics covered in this course include material handling equipment and procedures. Mechanical Fundamentals explains how equipment is used in systems such as piping systems, heat exchangers, cooling towers, refrigeration, furnace and boiler systems. Startup, shutdown, operation and troubleshooting procedures of various mechanical systems will be explained.

AUDIENCE: Trainees for process operation and production plant personnel.

LENGTH OF COURSE: **_3_** credits (**_3_** lect/pres, **_** lab, **_** other)

THIS COURSE IS USUALLY OFFERED:

Every other year ☐ fall ☐ **spring X** summer ☐ undetermined ☐

Four goals are emphasized in this course:

- 1) **ACADEMIC CONTENT:** This course will provide a basic knowledge of equipment and mechanical systems commonly found in a process facility.
- 2) **THINKING SKILLS:** The learner will use critical thinking skills to demonstrate their understanding of the information required to identify components and apply the concepts discussed in this course.
- 3) **COMMUNICATIONS SKILLS:** The learner will demonstrate written communication skills using appropriate technology that supports or facilitates communication.
- 4) **HUMAN DIVERSITY:** The student will gain self-awareness regarding the feelings towards people regardless of culture, values or socioeconomic status.

TOPICS TO BE COVERED:

1. Boilers
 - 1.1. Basic Principles and Types
 - 1.2. Combustion Water and Steam
 - 1.3. Startup and Shutdown
2. Electrical
 - 2.1. Circuit Breakers
 - 2.2. AC and DC Motors
 - 2.3. Test Equipment
 - 2.4. Transformers
 - 2.5. Breakers
 - 2.6. Switches
 - 2.7. Production and Distribution
 - 2.8. Motor Controllers
3. Equipment
 - 3.1. Lubricants and Bearings
 - 3.2. Using Lubricants
 - 3.3. Drive Components, couplings, gears, belts and drive chains
4. Compressors
 - 4.1. Introduction
 - 4.2. Positive Displacement
5. Furnaces
 - 5.1. Introduction
 - 5.2. Operating Conditions
 - 5.3. Startup and Shutdown
6. Heat Exchangers
 - 6.1. Introduction
 - 6.2. Condensers and Reboilers
 - 6.3. Cooling Towers
 - 6.4. Operation of Shell and Tube
7. Material Handling
 - 7.1. Tank Cars
 - 7.2. Trucks
8. Piping and Auxiliaries
 - 8.1. Basic Components and Functions
 - 8.2. System Components and Operation
9. Pumps
 - 9.1. Basic Types and Operation
 - 9.2. Performance and Inspection
 - 9.3. Rotary Positive Displacement
 - 9.4. Fundamentals of Centrifugal
 - 9.5. Operation of Centrifugal
10. Refrigeration
 - 10.1. Basic Concepts
 - 10.2. System Operation

- 11. Troubleshooting
 - 11.1. Basic Concepts
 - 11.2. Process Examples
- 12. Valves
 - 12.1. Basic Types and Operation I and II
 - 12.2. Introduction to Actuators
 - 12.3. Electric and Hydraulic Actuators

EXPECTED LEARNING OUTCOMES:

1. State the purpose of piping & pipe fittings
2. Identify and describe common pipe fittings
3. Explain why and how pipe movement needs to be controlled
4. Describe the function and uses of both relief and safety valves.
5. Describe the purposes and uses of valves in a process system
6. Identify valve types used for on off flow control
7. Identify valve types used for throttling flow control
8. Describe the function of pneumatic actuators
9. Explain the use and rational of valve positioners
10. Explain how pumps can be identified.
11. Identify the basic components of a pump system.
12. Describe the functions of pump auxiliary equipment and systems.
13. Identify the various types of centrifugal pumps.
14. Identify various types of rotary positive displacement pumps.
15. Describe the procedure for shutting down a typical rotary pump.
16. Describe the procedure for starting up a typical rotary pump.
17. Describe the general operating procedures of centrifugal pumps.
18. Describe various types of impellers used in centrifugal pumps.
19. Identify the general types of compressors.
20. Describe the procedure for starting up a compressor.
21. Describe the procedure for shutting down a compressor.
22. Describe the functions of compressor auxiliary equipment.
23. Identify the components of a typical compressed air system.
24. Describe the general operation of a reciprocating compressor.
25. Identify the main components of reciprocating compressors.
26. Identify the main components of a rotary compressor.
27. Explain the theory behind the concept of heat exchangers
28. Explain the basic operation of a plate and frame heat exchanger
29. Explain the basic concept of a shell in tube heat exchanger
30. Summarize the various factors that can affect heat transfer
31. Describe startup and shutdown procedures for a heat exchanger
32. Exhibit a basic understanding of the operation of a cooling tower
33. Exhibit a basic understanding of the operation of condensers
34. Exhibit a basic understanding of the operation of reboilers

- 35. Demonstrate understanding of basic refrigeration principals
- 36. State the basic requirements of steam production
- 37. State the basic requirements of combustion
- 38. Explain in general terms how a boiler produces steam
- 39. Exhibit a basic understanding of thermal oxidation

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) |
| ☐ Lab | Various online instructional tools |

ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:

- | | | |
|---|--|---|
| ☒ Reading | ☒ Tests | ☒ Individual Projects |
| ☐ Oral Presentations | ☒ Worksheets | ☐ Collaborative Projects |
| ☒ Textbook Problems | ☐ Papers | ☐ Portfolio |
| ☐ Group Problems | ☐ Term Paper | |

EXPECTED STUDENT LEARNING OUTCOMES:

Learners will be able to identify equipment used in a process facility and develop a basic understanding of how each component works and interacts within a processing system. Startup, shutdown, operation and troubleshooting of mechanical systems will be introduced and learners will demonstrate their ability to identify and explain the purpose and functionality of each system and its components.

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

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The information in this course outline is subject to revision.

Syllabus

COURSE TITLE: **Mechanical Fundamentals**

COURSE NUMBER: **RNEW1115**

NUMBER OF CREDITS: **3**

ACADEMIC YEAR: **2010-2011**

INSTRUCTOR NAME: **Duane Carrow**

TELEPHONE: **320-564-4511**

E-MAIL: **duane.carrow@mnwest.edu**

SYLLABUS INFORMATION:

Course Description:

This course covers the basic functions of equipment such as drive components, pumps, compressors, valves and basic electrical equipment. It explores various methods and the importance of equipment lubrication. Additional topics covered in this course include material handling equipment and procedures. Mechanical Fundamentals explains how equipment is used in systems such as piping systems, heat exchangers, cooling towers, refrigeration, furnace and boiler systems. Startup, shutdown, operation and troubleshooting of each of these mechanical systems will be explained.

Text and References

This course utilizes the online version of CiNet interactive textbook. Your tuition covers the cost of this interactive textbook and no additional textbook is required for this course, all content will be delivered online via CiNet interactive learning modules. You will receive login instructions and a password from your instructor. The online modules do not support Apple computers. You will need access to a Windows based system.

Topics to be Covered:

1. Boilers
 - 1.1. Basic Principles and Types
 - 1.2. Combustion Water and Steam
 - 1.3. Startup and Shutdown
2. Electrical
 - 2.1. Circuit Breakers
 - 2.2. AC and DC Motors
 - 2.3. Test Equipment
 - 2.4. Transformers
 - 2.5. Breakers
 - 2.6. Switches
 - 2.7. Production and Distribution
 - 2.8. Motor Controllers

3. Equipment
 - 3.1. Lubricants and Bearings
 - 3.2. Using Lubricants
 - 3.3. Drive Components, couplings, gears, belts and drive chains
4. Compressors
 - 4.1. Introduction
 - 4.2. Positive Displacement
5. Furnaces
 - 5.1. Introduction
 - 5.2. Operating Conditions
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6. Heat Exchangers
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 - 9.3. Rotary Positive Displacement
 - 9.4. Fundamentals of Centrifugal
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 - 10.2. System Operation
11. Troubleshooting
 - 11.1. Basic Concepts
 - 11.2. Process Examples
12. Valves
 - 12.1. Basic Types and Operation I and II
 - 12.2. Introduction to Actuators
 - 12.3. Electric and Hydraulic Actuators

Expected Student Learning Outcomes:

Learners will be able to identify equipment used in a process facility and develop a basic understanding of how each component works and interacts within a processing system. Startup, shutdown, operation and troubleshooting of mechanical systems will be introduced and learners will demonstrate their ability to identify and explain the purpose and functionality of each system and its components.

Course Evaluation

Performance will be evaluated through quizzes, chapter tests, discussion topics and Dropbox assignments. Grading of student performance will be done through assignment of point values to successfully completed student outcomes. Point values will be converted into a percentage to compute the letter grade earned:

Letter grades will be calculated as follows:

	B+ 88–89 %	C+ 78–79%	D+ 68–69 %	
A 95-100%	B 82-87%	C 72-77%	D 62-67%	
A- 90-94%	B- 80-81%	C- 70-71%	D- 60-61%	F = 0-59%

Course Schedule

This online course requires an estimated time commitment of 6-8 hours per week. You will work on your own schedule with weekly assignment deadlines.

Academic Honesty

Academic honesty is important to the learning organization's purpose of helping learners to develop critical, independent thinking skills and habits. Cheating and other forms of academic dishonesty run counter to this purpose and violate ethical and intellectual principles; they are therefore subject to penalties. For purposes of this course we will define academic dishonesty as:

Plagiarism:

Presentation of work that originates from another unacknowledged source as one's own. Presenting someone else's ideas, argument, or information verbatim (or close to verbatim) without acknowledgement of the source in assessments, papers, or discussions, constitutes plagiarism.

Cheating:

Giving, receiving, or using, or attempting to give, obtain, or use, unauthorized information or assistance during an assessment or an examination
Obtaining or conveying, or attempting to obtain or convey, unauthorized information about an assessment or examination questions
Giving or receiving assistance on an essay or assignment that goes beyond that specifically allowed by the instructor (this includes buying and selling, or attempt to buy or sell essays and/or research assistance relating to course assignments)
Impersonating someone else or causing or allowing oneself to be impersonated in an examination, or knowingly availing oneself of the results of impersonation
Presenting a single piece of work in more than one course without the permission of the instructors involved

ADA Statement

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the

instructor. This document can be made available in alternative format by contacting Student Services, the Campus CEOs or calling Minnesota Relay Service at 1-800-627-3529. Reasonable accommodations will be provided upon request for documented disabilities. An Affirmative Action Equal Opportunity Educator/Employer. ADA Accessible.

Attendance

As in any course, whether a traditional course or an online course, attendance in this course is critical to your success. The Humanities Division has adopted the following policy regarding attendance:

"Instructors may administratively withdraw any student who misses 20 percent of scheduled classes. A student who misses a class to participate in a scheduled College activity may receive credit for the class only if he or she notifies the instructor in advance."

For an online class, 20 percent attendance is equivalent to missing two weeks worth of discussion, assignments, etc. Note that instructors have access to progress reports. Instructors can review information about when you log in to the online course system, what content you read, what discussions you read, and how often you post in the discussion boards. If you do not participate in the online class for two weeks (either consecutively or separately in two 1 week instances), you may be dropped from the class. Participation is defined as reading content, participating in discussion, taking assigned quizzes, and uploading assignments as listed in the course content area.

College Policies

Learners with questions regarding affirmative action, equal opportunity, harassment, or information about any other college policies may refer to the current college catalog or student handbook available on the college web site.

Guidelines for Mutual Respect

This course is designed for collaboration rather than competition. That means that each member of the class supports the others in their efforts to succeed. Be sure to come to each class prepared to:

1. Listen with respect.
2. Speak with respect.
3. Contribute actively to the work of your team.

Students' Right to Know

Students have a right to know about the college policies on "Harassment and Discrimination", "Crime Awareness and Campus Security," "Drug and Alcohol Abuse," "Employee and Student Conduct," "Academic Honesty," "Student Grievance/Complaint Process," and "Student Data Privacy." This information is available on the college web site or by calling the campus CEO.

MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE COURSE OUTLINE

DEPT. **Renewable Energy Technology**

COURSE NO. **RNEW 1125**

NUMBER OF CREDITS: **1**

COURSE TITLE: **P&ID and PFD Reading**

CATALOG DESCRIPTION:

This course will cover the symbols and diagrams commonly used on piping and instrumentation diagrams (P&ID) and Process Flow Diagrams (PFD). Focus will be on identifying the types of diagrams, identifying instrument symbols and line symbols used on P & ID's, understanding the types of information typically found on a legend, using a P & ID to locate the components of a system, and reading a PFD to trace the flow paths of a system.

AUDIENCE: Trainees for Process Operation and Plant Personnel

PREREQUISITES OR NECESSARY ENTRY SKILLS/KNOWLEDGE:

Minimum score or higher on entrance exam.

LENGTH OF COURSE: One semester

THIS COURSE IS USUALLY OFFERED:

Every other year ☐ **fall X** spring ☐ summer ☐ undetermined ☐

Four goals are emphasized in course at Minnesota West Community & Technical College:

- 1) **ACADEMIC CONTENT:** The student will achieve the basic skills required to read and understand a technical diagram.
- 2) **THINKING SKILLS:** The student will understand the information required to apply the components and concepts discussed in this course.
- 3) **COMMUNICATIONS SKILLS:** The student will demonstrate both written and oral communication skills.
- 4) **HUMAN DIVERSITY:** The student will gain self-awareness regarding the feelings towards people regardless of culture, values or socioeconomic status.

TOPICS TO BE COVERED:

1. Identify instrument and major equipment symbols.
2. Describe the process flow of a Dry Mill ethanol plant.
3. Identify and distinguish between various diagrams including PFD and P & ID diagrams.
4. Describe in general terms the type of information found on the various diagrams.
5. Distinguish between process lines and instrument control lines used on a P&ID.
6. Identify control loops on a P&ID and describe their function.

LIST OF EXPECTED COURSE OUTCOMES:

The main focus of this course is to familiarize students with the various technical diagrams used at a process facility. The student will be able to identify instrument symbols and line symbols used on P & ID's and to be able to use a Process Flow Diagram (PFD) to trace the flow paths of a system.

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) |
| ☐ Lab | |

ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:

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

EXPECTED STUDENT LEARNING OUTCOMES:

The student will be able to describe the process flow of a Dry Mill ethanol plant, as well as identify and locate the symbols commonly used on Piping & Instrumentation (P & ID's) and Process Flow Diagrams (PFD).

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

This document can be made available in alternative format by contacting Student Services, the Campus Dean or calling Minnesota Relay Service at 1-800-627-3529. Reasonable accommodations will be provided upon request for documented disabilities.

An Affirmative Action Equal Opportunity Educator/Employer. ADA Accessible.
The information in this course outline is subject to revision.

MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE SYLLABUS FORM

ACADEMIC YEAR: **2009-10**
NUMBER OF CREDITS: **1**

COURSE NUMBER: **RNEW 1125**
COURSE TITLE: **P&ID / PFD Reading**

INSTRUCTOR NAME: Duane Carrow
OFFICE HOURS: 9:00 AM – 3:30 PM
OFFICE TELEPHONE: 320-564-4511
E-MAIL: duane.carrow@mnwest.edu

TEXTBOOKS TO BE USED:

Three Ring Binder: P&ID and PFD Reading
Reference material: Various P&ID and PFD diagrams supplied by instructor.

SYLLABUS INFORMATION:

The main focus of this course is to familiarize students with the various technical diagrams used at a process facility. The student will be able to identify instrument symbols and line symbols used on P & ID's and to be able to use a Process Flow Diagram (PFD) to trace the flow paths of a system.

COURSE STRUCTURE:

This course will be divided into two segments. The first segment will cover Process Flow Diagrams (PFD's) and the second will cover Piping & Instrumentation Diagrams (P&ID's). Content for this course will be supplemented with interactive online modules from TWLK, various diagrams, charts, and posted reading materials.

The Final Exam will test the student's ability to identify various parts of a P&ID, tag numbers and their meanings. Each student will demonstrate their ability to follow, locate and explain what is found on a P&ID.

COURSE OBJECTIVES:

1. Describe the process flow of a Dry Mill ethanol plant.
2. Identify and distinguish between PFD and P & ID diagrams.
3. Describe the function of a block diagram.
4. Describe the function of the three basic symbols of a block diagram.
5. Describe the function of an instrument tag.
6. Define the six types of information describe by an instrument tag.
7. Describe five types of instrument tags
8. Describe how an instrument tag identifies the location of a device.
9. Describe how to use an instrument tag to identify the function of a device.
10. Describe how an instrument tag identifies the function of a device.
11. Describe how to identify the area where a device is located given its instrument tag.

12. Describe how to identify the loop in which a device is connected given its instrument tag.
13. Describe how to draw an instrument tag given device information.
14. Describe the function of a P&ID.
15. Describe the function of a loop diagram.
16. Describe 10 line symbols used in P&IDs.
17. Describe how to represent binary signals in a P&ID.
18. Define 11 P&ID valve symbols.
19. Define four P&ID valve actuator symbols.
20. Describe three P&ID pump symbols.
21. Describe 10 P&ID liquid level sensing element symbols.
22. Describe 11 P&ID flow sensing element symbols.
23. Describe two P&ID pressure sensing element symbols.
24. Describe two P&ID temperature sensing element symbols.
25. Describe the P&ID heat exchanger symbol.
26. Describe the function of an instrument index.
27. Describe how to interpret the information contained in an instrument index.

STANDARDS USED FOR ASSESSMENT:

Grading of student performance will be done through assignment of point values to successfully completed student outcomes. Point values will be converted into a percentage to compute the letter grade earned:

GRADING:

	B+	88–89 %	C+	78–79%	D+	68–69 %	F	=< 60%
A	95-100%	B	82-87%	C	72-77%	D	62-67%	
A-	90-94%	B-	80-81%	C-	70-71%	D-	60-61%	

STUDENTS NEEDING ACCOMMODATIONS FOR A DISABILITY MUST NOTIFY THE INSTRUCTOR.

This document can be made available in alternative format, allowing ample time for adaptations, to individuals with disabilities by calling Diane Graber at 800-657-3966. For TTY Communications call the Minnesota Relay Service at 800-627-3529. An Affirmative Action Equal Opportunity Educator/Employer. ADA Compliant.

The information in this syllabus is subject to revision.

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 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, Symbolology, 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 | X Problem Solving |
| ☐ Student Presentations | X Interactive Lectures |
| ☐ Creative Projects | ☐ Individual Coaching |
| ☐ Lecture | X Films/Videos/Slides |
| ☐ Demonstrations | ☐ Other (describe below) |
| ☐ Lab | |

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.

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

This document can be made available in alternative format by contacting Student Services, the Campus CEOs or calling Minnesota Relay Service at 1-800-627-3529. Reasonable accommodations will be provided upon request for documented disabilities. An Affirmative Action Equal Opportunity Educator/Employer. ADA Accessible.

MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE

SYLLABUS FORM

Faculty is required to distribute to student within one week of the first class meeting. The faculty is requested to submit their syllabus to the Academic Affairs office within two weeks of the first class meeting. Refer to Policy 3.22 which defines information required on the syllabus.

COURSE TITLE: Instrumentation and Control

COURSE NUMBER: RNEW 1160

NUMBER OF CREDITS: 3

ACADEMIC YEAR: 2011

INSTRUCTOR NAME: Rosemary Patzer

OFFICE HOURS Tuesdays, 10 AM – 12:00 PM

OFFICE TELEPHONE 320-564-5044

OFFICE NUMBER: 103A

E-MAIL rose.patzer@mnwest.edu

TEXTBOOKS TO BE USED:

Instrumentation (ISBN#978-0-13-700413-3)

Developed by the Center for Advancement of Process Technology (CAPT)

SYLLABUS INFORMATION:

Course 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.

Help:

You have the right to expect help if you are struggling in the class. Talk to me **before** the situation becomes critical. Also be aware that you have access to the Student Resource Center and tutors.

Weekly Assignments:

Under the “Content” tab, you will find weekly assignments posted. Read through them thoroughly and complete everything as assigned by the date and time they are due. Late assignments will not be accepted. The Assignments will be posted at least one week in advance of their due dates. Topics that you will find in the Assignment sheets include:

Read:

In most cases, this will require you to read a chapter in the text. You may want to review the “Self Assessment Questions” because you will likely have to submit the answers to them as part of your assignment.

Dropbox:

You will be asked to complete the “Self Assessment Questions” (SAQ’s) at the end of most of the chapters. Complete these in a WORD document. First, save your document to your hard drive with something like, “CH12_YourLastName”. Make sure you title the assignment and include your name at the top. Then look under the Dropbox Tab and upload the document in the appropriate folder. You will receive an e-mail if your upload was successful. Save those messages until you see the grade posted for the assignment.

Quizzes/Exams:

Since quizzes and tests are open notes/open book, you will have 1 minute per question. i.e., you’ll have 9 minutes to answer 9 questions. However, if I post some short answer questions, you will have more time depending on the difficulty and number of the questions. Do NOT start the quiz/test until you feel you are ready to do so. You will only have one chance to take them.

Once you have submitted the quiz/test, you will see your score. I will open them back up for a brief time – after the expiration date has passed - so that you can see questions that you may have missed.

Discussion:

On occasion, you may be required to post something to the discussion board that can be found under the discussion tab.

Quiz/Exam Requirements:

All quizzes and exams will be completed by individual students. Seeking assistance from others prior to or during quizzes and/or exams or discussing them with someone before they take it constitutes cheating. Students caught cheating risk dismissal from the course and/or the program. Students are required to do their own work on this segment of the class.

Course Objectives:

1. Describe and evaluate sensors, signal processing and display elements commonly used with instrumentation used in the measurement of position, rotational speed , pressure, flow, liquid level and temperature.
2. Read and interpret performance terminology used in the specifications of instrumentation.
3. Explain how system elements are combined in instrumentation for some commonly encountered measurements.
4. Explain what is meant by open and closed-loop control systems,

5. Describe the function and terminology of a process controller and the use of proportional, derivative and integral control laws.
6. Describe common forms of correction/regulating elements used in control systems.
7. Explain the reasons for the choices of P, PI, PID controllers.
8. Explain the effect of dead time on the behavior of a control system.
9. Define *pressure* in terms of solids, liquids, and gases.
10. Describe the basic operation of a pressure transmitter.
11. Describe the basic operation of a fluid thermometer, bimetallic thermometer, thermocouple, and Resistance Temperature Detector (RTD).
12. Define fluid flow, flow rate and total flow.
13. State the general purpose of analytical measurements.
14. Define the terms, *concentration, density, clarity, humidity, moisture and analyzer*.
15. Describe the basic operation of a typical pH analyzer and a typical electrical conductivity measuring device.
16. Describe the basic operation of a paramagnetic oxygen analyzer, a thermal conductivity gas analyzer, and a chromatograph.
17. State the general function of an instrument system and identify the basic instruments/devices and the function of each.
18. Describe the relationship between the input and output of a transmitter.
19. Explain what a transducer is and its general function.
20. Describe the functions of the four basic elements of an automated process control system.
21. Explain how resistance, capacitance, dead time and lag time can affect a process control system.
22. Compare and contrast analog and digital control systems.
23. Explain the general operation of a complex process control scheme.

STANDARDS USED FOR ASSESSMENT: Industrial standards are non-existent. Formative and summative assessments will be used throughout the course.

GRADING:

Grades will be earned as follows as a percentage of the total possible points:

A 94–100 %	B+ 88–89.99 %	C+ 78–79.99%	D+ 68–69.99 %
A- 90-93.99%	B 82-87.99%	C 72-77.99%	D 62-67.99%
	B- 80-81.99%	C- 70-71.99%	D- 60-61.99%

F =< 60%

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

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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 Technology

COURSE NUMBER: RNEW 1175

NUMBER OF CREDITS: 2

COURSE TITLE: Industrial Water Treatment

CATALOG DESCRIPTION : This course covers the basic understanding of primary water treatment systems and chlorination. Students will be able to describe problems that can be caused by impurities in the water and explain how they can be removed physically and chemically. This course will also familiarize students with the basic concepts of treating industrial wastewater so it can be reused or discharged into the environment.

AUDIENCE : This course is designed for any individual that would like to increase their knowledge about industrial water treatment.

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. Students will gain a foundational knowledge about industrial water treatment systems.
 - b. Students will increase their knowledge about the effects that water treatment systems can have on production and discharge.
 - c. Students will understand the effects of improper management and control on industrial water treatment systems

- 2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
 - a. Students will understand the information required to apply the theory and concepts discussed in this course.
 - b. Written explanation of chapter topics
- 3) COMMUNICATIONS SKILLS: This course will help students improve their oral and written communication skills through:
 - a. Interactive electronic classroom discussion
 - b. Electronic communications with faculty and fellow students
- 4) HUMAN DIVERSITY: This course will help students recognize, understand, and appreciate human diversity through:
 - a. Respectable participation in on-line classroom discussions
 - b. Working on a team project in a cyber classroom, and recognizing the challenges that accompany such a task.

TOPICS TO BE COVERED:

The chemistry of water, scale, corrosion, microbial fouling, water treatment methods, steam generation and condensation, boiler systems, water cooling systems, wastewater treatment systems, basic analytical procedures, monitoring and control systems, and chemicals and safety.

LIST OF EXPECTED COURSE OUTCOMES:

Upon successful completion of this course, students will:

1. Understand the chemical and physical properties associated with water.
2. Understand the effects that scale, corrosion, and microbial fouling can have on water treatment systems.
3. Understand the role of steam generation and cooling systems in water treatment programs.
4. Identify and describe the social, economic, and environmental benefits of proper industrial water treatment.

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) |
| ☐ Lab | |

ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:

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

EXPECTED STUDENT LEARNING OUTCOMES:

Upon successful completion of this course, students will:

1. Demonstrate their understanding of the chemical and physical properties associated with water.
2. Demonstrate their knowledge about the effects that scale, corrosion, and microbial fouling can have on water treatment systems.
3. Understand the role of steam generation and cooling systems in water treatment programs.
4. Identify and describe the social, economic, and environmental benefits of proper industrial water treatment.

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

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MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE

SYLLABUS FORM

Faculty is required to distribute to student within one week of the first class meeting. The faculty is requested to submit their syllabus to the Academic Affairs office within two weeks of the first class meeting. Refer to Policy 3.22 which defines information required on the syllabus.

COURSE TITLE: Industrial Water Treatment

COURSE NUMBER: RNEW 1175

NUMBER OF CREDITS: 2

ACADEMIC YEAR: 2011

INSTRUCTOR NAME: Rosemary Patzer

OFFICE HOURS Tuesdays, 10 AM – 12:00 PM

OFFICE TELEPHONE 320-564-5044

OFFICE NUMBER: 103A

E-MAIL rose.patzer@mnwest.edu

TEXTBOOKS TO BE USED: Industrial Water Treatment, Minnesota Energy Enterprise Center
CINET on-line videos
Additional Information as provided by the instructor

SYLLABUS INFORMATION:

Course Description:

This course covers the basic understanding of primary water treatment systems and chlorination. Students will be able to describe problems that can be caused by impurities in the water and explain how they can be removed physically and chemically. This course will also familiarize students with the basic concepts of treating industrial wastewater so it can be reused or discharged into the environment.

Course Web Site Access:

Click on each of the tabs near the top of your screen to become familiar with the system. As assignments become available, you'll find them under the [Content](#) tab. On occasion, you may be asked to post something to the [Discussion](#) tab. The [Classlist](#) will list the students in the class. When there's a green dot by a name, it means that he or she is in D2L. The [Dropbox](#) is where you will post each of your assignments. The [Quizzes](#) tab is where you'll find quizzes and exams. And of course, the [Grades](#) tab is where you'll find your posted grades.

CiNET On-Line Videos:

Please see the log-in instructions for the on-line videos. The instructions can be found in the Admin File under the content tab.

Topics of Study:

1. Introduction to industrial water treatment
2. The chemistry of water
3. Scale
4. Corrosion
5. Fouling
6. Water Treatment methods
7. Steam generation and condensation
8. Boiler systems
9. Water cooling systems
10. Wastewater Treatment systems
11. Basic analytical procedures
12. Monitoring and control systems
13. Chemicals and safety

Student Learning Outcomes/Course Objectives

Upon successful completion of this course, students will:

1. Understand the chemical and physical properties associated with water.
2. Understand the effects that scale, corrosion, and microbial fouling can have on water treatment systems.
3. Understand the role of steam generation and cooling systems in water treatment programs.
4. Identify and describe the social, economic, and environmental benefits of proper industrial water treatment.

Student Contributions / Attendance:

Participation is critical in this class. Failure to turn in personal and group assessments will result in zero points for the assignment.

Academic Conduct and Honesty:

You are expected to uphold the Minnesota West "Student Code of Conduct" including academic integrity at all times. Please review this section in the

Help:

You have the right to expect help if you are struggling in the class. Talk to me **before** the situation becomes critical. Also be aware that you have access to the Student Resource Center and tutors.

Plagiarism:

Plagiarism will not be tolerated. All work that you submit must be your own. This includes downloading a file from the Internet and trying to turn it in as your original work. You risk failing the course and your standing at the college if you choose to plagiarize someone else's work.

Homework:

You should plan to work 2-4 hours per week on this class. In addition to reading and submitting chapter self assessments, you will watch some on-line videos and may be conducting some internet research.

STANDARDS USED FOR ASSESSMENT: Industrial standards are non-existent. Formative and summative assessments will be used throughout the course.

GRADING:

Grades will be earned as follows as a percentage of the total possible points:

A	94–100 %	B+	88–89.99 %	C+	78–79.99%	D+	68–69.99 %
A-	90-93.99%	B	82-87.99%	C	72-77.99%	D	62-67.99%
		B-	80-81.99%	C-	70-71.99%	D-	60-61.99%

F =< 60%

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

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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 Technology (formerly Renewable Energy Technology)

COURSE NUMBER: RNEW 1195

NUMBER OF CREDITS: 2

COURSE TITLE: Biodiesel Technologies and Regulatory Issues

CATALOG DESCRIPTION :

This course investigates the underlying research and reaction processes that are used to produce biodiesel. Studying feedstock options coupled with past and present technologies provides foundational knowledge about the industry. The course includes an in-depth review of the ASTM Standard for biodiesel and the regulatory issues that can arise from non-compliance.

AUDIENCE : Trainees for biodiesel process operations and plant personnel

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 : 2 credits, on-line

THIS COURSE IS USUALLY OFFERED:

Every other year ☐ fall ☒ spring ☐ 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. To increase student understanding of the past, present, and emerging technologies for biodiesel production
 - b.
- 2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
 - a. Students will gain a basic working knowledge about the traditional, current and emerging biodiesel production technologies.

- b. Students will understand the standards within the fuel specification standard for biodiesel: ASTM D6751
 - c. Students will identify down-stream issues related to out-of-specification biodiesel
- 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 formal reports on both individual and team platforms.
- 4) HUMAN DIVERSITY: This course will help students recognize, understand, and appreciate human diversity through:
- a. Working on team projects
 - b. Acknowledging the globalization of the production of biodiesel, and realizing the driving forces for production vary between countries or regions of the world

TOPICS TO BE COVERED:

- a. The legal definition of biodiesel that is recognized by the United States versus other countries
- b. Past, present, and emerging technologies associated with the biodiesel industry
 - a. Appropriate feedstock selection
- c. ASTM D6751, The Standard for Biodiesel
 - a. European Standard equivalents
- d. The role of the National Biodiesel Board
 - a. BQ-9000
- e. The Social, Economic, and Environmental Impact of off-specification biodiesel in the market place
- f. National trends and outlook for the biodiesel industry
- g. Global trends and outlook for the biodiesel industry
- h. Current and historical events regarding the biodiesel industry

LIST OF EXPECTED COURSE OUTCOMES:

1. Students will gain foundational knowledge about past, present and emerging technologies for biodiesel production.
2. Students will gain a foundational knowledge about past, present, and emerging regulations for biodiesel production.
3. Students will become familiar with ASTM D6751 and all of the associated standards that are used to qualify fuel specifications.
4. By addressing the concerns for out-of-specification fuel in the marketplace, students will learn to advocate for the quality control of biodiesel in a positive manner

LEARNING/TEACHING TECHNIQUES used in the course are:

- | | |
|--|--|
| X Collaborative Learning | X Problem Solving |
| X Student Presentations | X Interactive Lectures |
| ☐ Creative Projects | ☐ Individual Coaching |
| X Lecture | X Films/Videos/Slides |
| X Demonstrations | Other (describe below) |
| X Lab | |

ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:

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

EXPECTED STUDENT LEARNING OUTCOMES:

Students will gain an understanding of the chemical reactions that support successful biodiesel processing. They will be equipped to identify feedstock, production, and storage issues that can relate to production quality. They will also recognize the social, economic, and environmental benefits and concerns that relate to biodiesel production.

To receive accommodations for a documented disability, please contact the campus Student Services Advisor as soon as possible. Students are also encouraged to notify the instructor.

This document can be made available in alternative format by contacting Student Services, the Campus CEOs or calling Minnesota Relay Service at 1-800-627-3529. Reasonable accommodations will be provided upon request for documented disabilities. An Affirmative Action Equal Opportunity Educator/Employer. ADA Accessible.

MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE SYLLABUS FORM

Faculty is required to distribute to student within one week of the first class meeting. The faculty is requested to submit their syllabus to the Academic Affairs office within two weeks of the first class meeting. Refer to Policy 3.22 which defines information required on the syllabus.

COURSE TITLE: Biodiesel Technologies and Regulatory Issues

COURSE NUMBER: RNEW 1195

NUMBER OF CREDITS: 2

ACADEMIC YEAR: Fall 2009

INSTRUCTOR NAME: Rosemary Patzer

OFFICE HOURS: Monday 10:00 AM – 12:00 PM

OFFICE TELEPHONE 320-564-5044

OFFICE NUMBER: 301A

E-MAIL rose.patzer@mnwest.edu

TEXTBOOKS TO BE USED:

Building a Successful Biodiesel Business, 2nd edition, J. Van Gerpen, et. al.

Additional Resources:

Web-based research

Reference documents provided by instructor

SYLLABUS INFORMATION:

Course Description: This course investigates the underlying research and reaction processes that are used to produce biodiesel. Studying feedstock options coupled with past and present technologies provides foundational knowledge about the industry. The course includes an in-depth review of the ASTM Standard for biodiesel and the regulatory issues that can arise from non-compliance.

Students will:

1. Research and present information regarding emerging technology and alternative production methods for biodiesel production. A variety of media applications can be used including videos, Power Point presentations, internet meetings, and formal reporting.
2. Become familiar with the ASTM Standard established for biodiesel (ASTM D6751). Familiarization with the standards within the Standard will help students identify properties associated with in-specification biodiesel.
3. Identify and describe the social, economic, and environmental concerns of producing off-specification biodiesel.

STANDARDS USED FOR ASSESSMENT: Industry standards are non-existent; formative and summative assessments will be used throughout the course.

GRADING:

Grading will be based on a percentage calculation of the total available points as follows:

A 93–100 %	B+ 88–89.99 %	C+ 78–79.99%	D+ 68–69.99 %	F =< 60%
A- 90-92.99%	B 82-87.99%	C 72-77.99%	D 62-67.99%	
	B- 80-81.99%	C- 70-71.99%	D- 60-61.99%	

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