CATALOG DESCRIPTION:
This course provides an understanding of wind turbine aerodynamics and the various considerations that are involved when selecting airfoils for use on Wind Turbines. The students will be exposed to different methods of blade construction, assembly and repair techniques as well as experience the performance, operation and maintenance characteristics of different blade designs.

AUDIENCE: Wind Energy Students

FULFILLS MN TRANSFER CURRICULUM AREA(s): (LEAVE BLANK IF NOT APPLICABLE)
AREA: BY MEETING THE FOLLOWING COMPETENCIES
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PREREQUISITES OR NECESSARY ENTRY SKILL/KNOWLEDGE: NONE

LENGTH OF COURSE: 1 SEMESTER

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. Identify different parts of a wind turbine blade
   b. Identify with the past and current blade designs
   c. Describe how an airfoil works
   d. Nomenclature of different blade, airfoil and rotor sections
   e. Explore the different types of pitching and yaw controls systems

2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
   a. Completing homework (reading, reports, and worksheets)
   b. Participating in classroom discussions
   c. Taking open and closed book quizzes and tests
   d. Performing internet research on blade designs
   e. Designing their own airfoil and testing performance
3) COMMUNICATIONS SKILLS: This course will help students improve their oral and written communication skills through:

a. Participating in class discussions and reports
b. Participating in assignments, worksheets, and reports
c. Working with other students to collectively design their own airfoils
d. Working with other students on airfoil repair techniques

4) HUMAN DIVERSITY: This course will help students recognize, understand, and appreciate human diversity through:

a. Participating in classroom discussions
b. Working closely with students from other cultures
c. Working on effective communication to complete assigned tasks

TOPICS TO BE COVERED:

1) Basic aerodynamic principles
2) How we use wind for propulsion
3) What makes an effective airfoil
4) How blades are constructed and repaired
5) Hub and Rotor components
6) Wind turbine pitching mechanisms
7) Wind turbine yaw mechanisms
8) How blades evolved from windmills to blades used today
9) Nomenclature of blade, airfoils and rotors

LIST OF EXPECTED OUTCOMES:

1) Students will be able to identify blade, airfoil and rotor parts and where they are located
2) Students will have a better understanding of aerodynamics and its use in wind energy
3) Students will have a better understanding of the past and future of wind turbine blades, airfoils and rotors

LEARNING/TEACHING TECHNIQUES USED IN THIS COURSE:

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

ASSIGNMENTS & ASSESSMENTS USED IN THIS COURSE MAY INCLUDE:

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

EXPECTED STUDENT LEARNING OUTCOMES:

Students will learn the basics of wind turbine aerodynamics and the various considerations that are involved when selecting airfoils for use on Wind Turbines. The students will also learn the different methods of blade construction, assembly and repair techniques as well as experience the performance, operation and maintenance characteristics of different blade designs.

The information in this course outline is subject to revision.

Veteran Services: Minnesota West is dedicated to assisting veterans and eligible family members in achieving their educational goals efficiently. Active duty and reserve/guard military members should advise their instructor of all regularly scheduled military appointments and duties that conflict with scheduled course requirements. Instructors will make every effort to work with the student to identify adjusted timelines. If you are a veteran, please contact the Minnesota West Veterans Service Office.

To receive reasonable accommodations for a documented disability, please contact the campus Student Services Advisor or campus Disability Coordinator as arrangements must be made in advance. In addition, students are encouraged to notify their instructor.

This document is available in alternative formats to individuals with disabilities by
contacting the Student Services Advisor or by calling 800-658-2330 or Minnesota Relay Service at 800-627-3529 or by using your preferred relay service.

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