Faculty members are 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.** ELWT  
**COURSE NUMBER:** 1110

**NUMBER OF CREDITS:** 3  
**Lecture:** 2  
**Lab:** 1

<table>
<thead>
<tr>
<th>Course Title:</th>
<th>Mechanical Systems</th>
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<tr>
<th>Catalog Description:</th>
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<tr>
<td>Provide an understanding of wind turbine drive systems (gearboxes) and associated components, introduced two different types of gearboxes and associated mechanical systems and subsystems of today’s wind turbines, focus on lubrication, oil analysis, construction and preventative maintenance techniques for modern wind turbine drive systems.</td>
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**FULFILLS MN TRANSFER CURRICULUM AREA(S) (Leave blank if not applicable)**  
Goal 1: Communication: by meeting the following competencies:  
Goal 2: Critical Thinking: by meeting the following competencies:  
Goal 3: Natural Sciences: by meeting the following competencies:  
Goal 4: Mathematics/Logical Reasoning: by meeting the following competencies:  
Goal 5: History and the Social and Behavioral Sciences: by meeting the following competencies:  
Goal 6: The Humanities and Fine Arts: by meeting the following competencies:  
Goal 7: Human Diversity: by meeting the following competencies:  
Goal 8: Global Perspective: by meeting the following competencies:  
Goal 9: Ethical and Civic Responsibility: by meeting the following competencies:  
Goal 10: People and the Environment: by meeting the following competencies:  

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<tr>
<th>Prerequisites or Necessary Entry Skills/Knowledge:</th>
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<tr>
<td>None</td>
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### Topics to be Covered (General)

- Parts of a wind turbine drive system
- Past and current gearbox designs
- Describe how a gearbox system works
- Components of the gearbox (bearing, gears, and shafts)
- Different types of breaking, gear reduction and cooling systems.

### Student Learning Outcomes

- Investigate the basic drivetrain principles
- Investigate gear/bearing failure analysis
- Operate non-destructive testing techniques
- Demonstrate how to use tools and techniques on gearboxes
- Explore the purpose of the gearbox
- Investigate oil sample analysis
- Inspect braking and oil system components
- Investigate the types of failures (fatigue, corrosion, loop, fractures, etc.)
- Identify the drivetrain parts and where they are located
- Describe gearbox operation and failures in wind energy.
- Identify past and future wind turbine drivetrains

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

*If yes, please list the competencies below*

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Revised 8/19