**pre312 - Wind Energy**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Wind Energy</th>
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<tbody>
<tr>
<td>Module code</td>
<td>pre312</td>
</tr>
<tr>
<td>Credit points</td>
<td>5.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>150 h</td>
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<tr>
<td>Used in course of study</td>
<td>Master's Programme European Master in Renewable Energy (EUREC) &gt; Mastermodule</td>
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<tr>
<td>Contact person</td>
<td>Carsten Agert, Michael Hölling, Robin Knecht</td>
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**Entry requirements**

After completing the module, the student will

- have a good understand of the basics of wind energy converters (WECs) including the forces acting on the turbine blades and how they are related to the blade design, the maximum power extractable from the wind and the principle of wind turbine control strategies.
- be able to characterise wind turbines with common non-dimensional parameters like power coefficient and tip speed ratio.
- have a critical understand of varying wind conditions at different sites and their consequences for wind turbines design
- understand the measurement principles on drag and lift forces
- be able to establish power-and cp/lambda curves.
- be able to set up the experimental procedure for measuring the targeted parameters, collect data in a scientific format and analyse and critical review retrieved data

**Module contents**

- Wind speed measurements
- Wind field characterization
- Wind power and Betz limit
- Wind turbines - general design
- Wind and rotor blade interaction
- Power losses
- Control strategies
- Power curves

Lab work: The energy conversion process in wind turbines tested within a small wind tunnel.
- Drag and lift force, stall effect
- Blade forms
- Evaluation of lift and drag coefficients
- Cp/Lambda curve
- Tip-speed ratio

**Reader's advisory**

Kulschewski, Udo & Knecht, Robin et al., update 2013: Reader for the Winter Laboratory Course: Physical Principals of Renewable Energy Converters

**Links**

- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency: jährlich
- Module capacity: unlimited
- Modulart: Pflicht

**Vorkenntnisse / Previous knowledge**

Lecture, Tutorial, Laboratory, Excursion

**Examination**

<table>
<thead>
<tr>
<th>Time of examination</th>
<th>Type of examination</th>
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<tr>
<td>Written exam: At the end of lecture period (end of January)</td>
<td>Written exam (75%, 1.5 hours)</td>
</tr>
<tr>
<td>Written laboratory report: During Semester</td>
<td>Written laboratory report (25%, 10 - 20 pages)</td>
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**Course type**

Seminar

**SWS**

<table>
<thead>
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<th>Frequency</th>
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