phy644 - Wind Energy Physics, Data & Analysis

Module label: Wind Energy Physics, Data & Analysis
Module code: phy644
Credit points: 6.0 KP
Workload: 180 h
(attendance: 2*28 hrs, self-study: 124 hrs)

Used in course of study:
- Master's Programme Engineering Physics > Schwerpunkt: Renewable Energies

Contact person:
Module responsibility
- Martin Kühn

Entry requirements:
Skills to be acquired in this module:
- After successful completion of the module students should be able to:
- Evaluate wind energy related measurements,
- Interpret such measurements gained in the field of wind energy applications,
- Critically evaluate measured data

Module contents:
The winter term lecture teaches the basic knowledge in wind energy physics. Physical properties of fluids, wind characterization and anemometers, aerodynamic aspects of wind energy conversion, dimensional analysis, (pitheorem), and wind turbine performance, design of wind turbines, electrical systems. The sequentially following WPhyMPr addresses problems based on real wind data, which will be solved on at least four important aspects in wind physics. The course will comprise lectures and assignments as well as self-contained work in groups of 3 persons. The content consist of the following four main topics, following the chronological order of the work process:
- Data handling (measurements, measurement technology, handling of wind data, assessment of measurement artefacts in wind data, preparation of wind data for further processing); Energy Meteorology (geographical distribution of winds, wind regimes on different time and length scales, vertical wind profile, distribution of wind speed, differences between onshore and offshore conditions); Measure - Correlate - Predict (MCP) (averaging of wind data, bin-wise averaging of wind data, long term correlation and long term correction of wind data, sources of long term wind data); LIDAR (analyses and conversion of data from LIDAR measurements)

Reader's advisory:

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: Sommer- und Wintersemester
Module capacity: unlimited
Reference text: The module starts in the winter term: Wind Energy Physics has to be taken before participating in Wind Physics Measurement Project

Modullevel: MM (Mastermodul / Master module)
Modulart: Wahlpflicht / Elective

Vorkenntnisse / Previous knowledge:

Examination:
- Time of examination: Final exam of module
- Type of examination: 1 Exam

Course type: Lecture

SWS: 4.00
Frequency: SuSe or WiSe
Workload attendance: 56 h