Module name / title **Main fields of studiy**	**Wind Turbines 1**
Competencies gained Learning Outcome	The students gain basic knowledge of energy production with wind turbines. They know the setup and the components of modern wind turbines and understand the principle of gaining energy by using the aerodynamic lift principle. They are able to calculate the maximum power coefficient and to judge the impact of external conditions. The students understand the BEM-method and are able to analyse the turbine's behaviour by simulation results, in order to understand the process of technical development of a wind turbine. They are also able to apply basic economical calculation methods to judge the profitability of wind turbines and wind parks.
Content of the module	1. Introduction, historical overview 2. Different technical concepts and components of wind turbines 3. Aerodynamics and aeroelasticity, hydrodynamics 4. Wind and modelling of wind 5. Power control and operation control 6. Structural dynamics, Campbell-diagrams 7. Multi Body Simulations 8. Rules and guidelines 9. Load calculations 10. Basic economical considerations
Learning and teaching types / methods / media types	Lecture, students team work, arithmetic problems and exercises
Language	English
Module prerequisites Requirements for participation (previous knowledge)	Recommended: Basic lectures in Physics, Mechanics and Mathematics Mandatory: Nothing
Applicability of the module	Wind energy is an essential and growing part of renewable energy production.
Requirements for	Written exam 90 minutes or oral exam

the award of credit points (Study and exam requirements)	
Workload / Credits	3 CP / 2 SHW Total workload 150 h Contact hours 28 h Self-study 62 h
Duration of the module semester / frequency	Duration: One semester Frequency: Each winter semester
Literature **Literature**	• Lecture notes • E. Hau: Wind Turbines, 3rd edition, Springer, Berlin, 2013. • Gasch, Twele: Wind Power Plants: Fundamentals, Design, Construction and Operation, Springer, Berlin, 2012. • S. Heier: Grid Integration of Wind Energy Conversion Systems, Wiley & Sons, Chichester, 2006. • M. Sathyajith: Wind Energy - Fundamentals, Resource Analysis and Economics, Springer, Berlin, 2006. • Manwell et al.: Wind Energy Explained, Wiley, Chichester 2008. • T. Burton: Wind Energy Handbook, Wiley & Sons, Chichester, 2002. • M. Hansen: Aerodynamics of Wind Turbines, Routledge, London, 2015