Module level Master	**Creditpoints** 6	**Language** English	**Return**: annual
Module designation Rotor Blades			
Course(s) Rotor Blades			
Code	**Subtitle:** Material properties – processing – characterization		
Person responsible for the module	Prof. Dr.-Ing. Hans-Peter Heim		
Lecturer	Prof. Dr.-Ing. Hans-Peter Heim, Prof. Dr.-Ing. Angela Ries, Dr.-Ing Maik Feldmann		
Workload	Workload 180h (170 h private study, 10h contact time)		
Relation to curriculum	Specialist studies, Simulation and Structural Technology, elective		
Type of teaching, contact hours	Self-studies with presentation slides and additional provided literature, regular consultation hours		
Requirements according to examination regulations	None		
Recommended prerequisites	Basic modules		

Module objective / intended learning outcomes

This course provides fundamental knowledge of polymer material properties and polymer processing.

The design, manufacturing, mechanical properties and testing of polymer materials for rotor blades will be presented.
The student should learn the fundamental knowledge of polymer materials and polymer processing.
The conventional structure of a rotor blade is known and the processing methods for the skin and core materials as well as for the sandwich manufacturing.
At the end of the module the student is able to understand the manufacturing process and obtain comprehensive knowledge of component construction and characterization.

Content:

- Polymer material properties
  - Structure, chemical compound (thermoplastic, thermoset, elastomer)
  - Fiber reinforcement, design of fiber reinforced components
  - Mechanical properties (temperature and time dependency)
- Processing technology
  - Injection moulding
  - Extrusion, foam extrusion
  - Resin transfer moulding (RTM)
  - Reaction Injection Moulding (RIM)
  - Tape laying and Prepreg processing
  - Introduction in polymer processing
  - Hand lamination
- Sandwich materials
  - Structure of rotor blades
  - Composites / skin materials
  - Core materials
  - Processing technology (bonding, lamination,…)
- Material characterization
  - Mechanical testing
  - Quasistatic, toughness, fatigue

- Physical characterization - Structural analysis, density, thermal analysis, fiber orientation	
Study and examination requirements and forms of examination	oral examination (45min)
Media employed	online script, additional literature
Reading list: **Fiber-Reinforced Composites** Materials, Manufacturing, and Design, Third Edition Author: P.K. Mallick **International Plastics Handbook – The Resource for Plastics Engineers** Authors: Osswald, Tim A.; Baur, Erwin; Brinkmann, Sigrid; Oberbach, Karl and Schmachtenberg, Ernst	