

Module level Master	Credit points 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		
Workload	Workload 180h (150 h private study, 20 h exercise, 10 h contact time)		
Relation to curriculum	Specialist studies, Simulation and Structural Technology, elective		
Type of teaching, contact hours	Chapter-Checks, online scripts, skype, digital communication		
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 all students are able to understand the manufacturing process and obtain comprehensive knowledge of component construction and characterization.			
Content:			
<ul style="list-style-type: none"> • Polymer material properties <ul style="list-style-type: none"> - structure, chemical compound (thermoplast, thermoset, elastomer) - fiber reinforcement, design of fiber reinforced components - mechanical properties (temperature and time dependency) • processing technology <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - Structure of rotor blades - composites / skin materials - core materials - processing technology (bonding, lamination,...) • Material characterization <ul style="list-style-type: none"> - mechanical testing 			

<ul style="list-style-type: none"> - quasistatic, toughness, fatigue - Physical characterization - Structural analysis, density, thermal analysis, fiber orientation 	
Study and examination requirements and forms of examination	written examination (120min)
Media employed	online script
<p>Reading list</p> <p>Polymer chemistry: Polymerwerkstoffe, <i>G.W. Ehrenstein</i>, Hanser / Kunststoffkunde, <i>O. Schwarz</i>, Vogel Polymer materials, <i>J.L. Halary</i>, Wiley</p> <p>Processing: Einführung in die Kunststoffverarbeitung, <i>W. Michaeli</i>, Hanser Polymer Processing , <i>G. J. Morton-Jones</i>, Springer</p> <p>Characterization: Polymer testing, <i>W. Grellmann</i>, Hanser</p>	