Course of study/ focus of study:	
M.Sc. Konstruktionstechnik und Produktentwicklung im Maschinenbau	

Module name / title	Virtual Product Development (engl.)
Module number	VPD
Module coordinator/ person responsible	Herr Prof. Dr. Hans-Joachim Schelberg
Duration of the module/ semester/ frequency	1 Semester/ first or second semester/ annually
Credits (CP)/ semester hours per week (SHW)	5 LP/ 3.00 SWS
Type of module , Applicability of the module	Course-specific elective module
Workload	Contact hours: 51 h and Self-study: 99 h (Basis: 17 semester weeks (incl. exam time), 1 SHW = 60 minutes)
Module prerequisites Requirements for participation/ previous knowledge	Recommended: Technical English, Programming Arduino (C) /RaspBerry Pi (Python).
Teaching language	Teaching language: English Alternate teaching language: German If there is more than one teaching language, the used teaching language will be announced by the lecturer.
Competencies gained/ Learning Outcome	At the end of this course, the attendants will be qualified to apply core principles, methods and tools of Virtual Product Development to a digitalized, IoT-enabled product. Students will acquire fundamentals of Virtual Product Development for digital IoT-enabled products, including guiding principles, concepts, processes, methods, best practices, and technologies. Based on a real life product development scenario, the application and implementation of selected virtual concepts and tools along the V-Model and/or Design Thinking will be intensively practised. The students will learn to evaluate the pros and cons of virtual tools in the context of the product development process.
Content of the module	- Introduction to Virtual Product Development – Approach, Objectives, Opportunities - The Virtual Product Development Process - VPD Infrastructure: Technologies, Tools, Provider, Strategies, Developments - Detailed investigation and application of selected VPD methods, such as - Virtual Conceptual Design - Model Based Systems Engineering - Advanced CAD - Digital Mockup - Virtual Reality - Augmented Reality - The Digital Twin
Requirements for the award of credit points (Study and exam requirements)	Seminaristischer Unterricht: Regular examination type for module testing: written report / paper (PL) Further possible examination types: Written exam Laboratory internship: Laboratory degree (SL) Where more than one possible examination type is used in the module, the examination type to be used is to be made known by the responsible lecturer at the start of the course.

Learning and teaching types/ methods/ media types	Facilitated Team Work, eLearning, Self-paced Learning, Lectures
Literature	Howard Crabb - The Virtual Engineer: 21st Century Product Development
	Kenneth B. Kahn - The PDMA Handbook of New Product Development
	Stephen C. Armstrong - Engineering and Product Development Management
	Tony Parisi - Learning Virtual Reality
	Stephen Cawood - Augmented Reality