Propulsion Systems

1	**Module Number** 3911	**Study Programme** ASM	**Semester** 2	**Offered in** ☐ WS ☒ SS	**Duration** 1 Semester	**Module Type** compulsory	**Workload** 180 h	**ECTS** 6

2	**Courses**	**Teaching and Learning Forms**	**Contact Time** (SWS)	**Contact Time** (h)	**Self-Study Time** (h)	**Language**
	a) Control of electrical and electrified Powertrains (Comb. Eng./EM/Hybrid)	Lecture / Exercise	3	45	90	English
	b) Operating Strategies of electrical and electrified Powertrains	Lecture / Exercise Seminar	2	30		
	c) Seminar Powertrain Simulation		1	15		

3 **Learning Outcomes and Competences**

Once the module has been successfully completed, the students can...

Knowledge and Understanding

a) Control of electrical and electrified powertrains
- …understand the function and construction of modern combustion engine control systems
- …know about torque based system structure, air-, fuel- and ignition paths
- …know and understand the possibilities of distribution of torque/power in hybrid powertrains
- …understand and explain the scope of functions for recuperation in electrified powertrains
- …understand the functionality of power electronic actuators

b) Operating strategies of electrical and electrified powertrains
- …identify and explain operating modes of hybrid vehicles
- …know and present operating modes of various powertrains
- …understand and evaluate operating strategies of electric- and hybrid vehicles in detail
- …understand the interaction of components in the powertrain system to optimize consumption and emissions

c) Seminar powertrain simulation
- …understand structure and functionality of powertrain simulation models

Use, Application and Generation of Knowledge

Use and Transfer

a) Control of electrical and electrified powertrains
- … design control of e-drives for electric and hybrid vehicles
- … evaluate concepts of electric drives
- … compare fuel consumption with different loads, speeds, ignition timings
- … calculate resulting speeds, torques, and powers for different powertrain types
- … based on the basic knowledge of common drive components, evaluate new drive structures in terms of evaluate essential properties such as performance, smoothness, package or costs

b) Operating strategies of electrical and electrified powertrains
- …design and optimize operating strategies for different hybrid structures
- …recognize concept-related restrictions and evaluate operating quality
- …compare different operating strategies and evaluate them with regard to consumption, emissions, efficiency and range

c) Seminar powertrain simulation
- … make use of simulation tools to represent and evaluate interactions in drive systems

Scientific Innovation

a) Control of electrical and electrified powertrains
- … create some software, functions for drives and discuss how they work