



## Module Description for Block Week Module:

<b>Module title</b>	Signals and Systems for Automated Driving
Offering course of studies	Embedded Systems for Mechatronics
University Campus	Fachhochschule Dortmund
Language	English
Module representative/ Full-time lecturer	Prof. Dr. Andreas Becker
Contact	Andreas.becker@fh-dortmund.de

Abbreviation	Workload	Credits	Semester (WiSe/SuSe)	Planned group size	
				minimum	maximum
<b>10404</b>	<b>180</b>	<b>6</b>	<b>annually</b>	<b>5</b>	<b>25</b>
Courses/course types Attendance	Contact time		Self-study		
	Attendance during block week	Additional contact time during preparation and postprocessing e.g. videoconference	Guided during preparation and postprocessing	selfdirected	
	40	20		120	
Teaching types preparation	<b>Online-lectures</b>				
Teaching types postprocessing	<b>selfdirected</b>				

Teaching results/ teaching goals/competences
<p>5.1 Knowledge</p> <ul style="list-style-type: none"> <li>•Knows common driver assistance components and architectures</li> <li>•Knows basic signal processing algorithms for radars</li> <li>•Knows state estimation algorithms</li> <li>•Knows basics of related system engineering and norms</li> </ul> <p>5.2 Skills</p> <ul style="list-style-type: none"> <li>•Can develop tracking algorithms</li> <li>•Can develop radar signal processing algorithms</li> </ul>



- Can analyze requirements for subsystems of automated driving

### 5.3 Competence – attitude

- Understands the challenges in the development of automated driving and can discuss with experts from different domains
- Can lead development of subsystems for automated driving
- Can lead system level tests for automated driving

### Contents

#### Course Description

Automated driving requires the use of a multitude of sensors, controllers and actuators installed on the vehicle. Additionally, vehicle to vehicle and vehicle to infrastructure communication will be necessary. This course gives an overview about technologies used for automated driving. It starts with an overview about current R&D trends and then covers several sensor technologies with a special focus upon radar. Students will learn basic principles of stochastic signal processing and its application to tracking and mapping. Motion models and vehicle control technologies will be discussed to gain further insight into requirements for sensors and algorithms. Additional focus of this course is on architectures and infrastructures for automated driving. This includes bus interfaces and SW architectures as well as the basic principles of systems engineering. ISO 26262 as well as legal frameworks and their application to automated driving will be discussed. In addition to the lecture, exercises and small projects give additional insight into the technologies and concepts introduced in this course.

#### Teaching and Training Methods

- Lectures, Labs (with Matlab/Simulink)
- Access to tools and tool tutorials
- Access to recent research papers

Participation requirements	higher mathematics, programming, signal processing
Examination types	t.b.a. (online exam)
Requirement for rewarding credit points	compare Ruhr Master School website
Application of the modul (in other courses)	compare Ruhr Master School website
Literature	<p>Winner et al., Handbook of Driver Assistance Systems, Springer reference, 2016</p> <p>Pebbles, Radar Principles, John Wiley &amp; Sons, 1998</p> <p>Bar-Shalom et al., Estimation with Applications to Tracking and Navigation, John Wiley &amp; Sons, 2001</p> <p>Maurer et al., Automotive Systems Engineering, Springer 2013</p>
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